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

Report of the Secretary-General**

Summary

The present report provides an analysis of how to harness technologies in the digital age so that women and girls may enjoy equal opportunities and rights, have the skills to participate in innovation processes and shape the values and principles that should underpin their safe and equitable use. It concludes with recommendations for consideration by the Commission on the Status of Women.

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I. Introduction

1. In accordance with its multi-year programme of work (2021–2024), the Commission on the Status of Women will consider “Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls” as its priority theme in 2023. The present report contains an analysis of the impact that technological change, and especially the exponential development and integration of digital technologies in all economic, social and political areas, is having on the achievement of gender equality, and of how innovation processes can be harnessed to develop new services and products that fulfil the needs and human rights of women and girls.

2. Digitalization is among the seismic shifts that are shaping the twenty-first century. Digital technologies are rapidly transforming society, simultaneously allowing for unprecedented advances to improve social and economic outcomes for women and girls but also giving rise to profound new challenges that may perpetuate and deepen existing patterns of gender inequalities. Since 2020, the coronavirus disease (COVID-19) pandemic has magnified the unequal pace of digital transformation within and across countries and shown how this is being layered over structural and systemic barriers, which translates into unequal opportunities for women and girls.

3. Governments and intergovernmental bodies have been slow to anticipate the impacts of the technological evolution and to regulate digital technologies with measures grounded in international human rights law. This has exacerbated power asymmetries between the owners and users of digital services, contributed to the proliferation of technological companies that dominate the digital landscape and exercise outsized global influence without adequate safeguards, and undermined fundamental rights.

4. The Beijing Declaration and Platform for Action frames technology issues from an education, employment and communication perspective. This focus is no longer reflective of the breadth of gender equality challenges and opportunities that the technological evolution has triggered since 1995. In the review of the implementation of the Declaration and Platform issued in 2019 ([E/CN.6/2020/3](#)), those gaps were recognized and States were called upon to set priorities for and fund technological development and innovation in a way that advanced gender equality and ensured that all women and girls benefit equally. States were also urged to close the gender digital divide, enable women’s equal participation in the design of technology and implement laws, policies and regulations to combat new risks, including online harassment and other forms of violence, threats to privacy rights and bias in the fields of artificial intelligence and robotics.

5. The integration of a gender perspective in technology and innovation is crucial to the achievement of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. The present report highlights the need to harness the speed, scale and scope of digital transformation for the empowerment of all women and girls and urgently address the key issues affecting their rights in the digital age. It draws on the findings of the expert group meeting convened by the United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women) from 10 to 13 October 2022, as well as research and data from United Nations entities and other sources.

II. Identifying and removing misconceptions of the gendered dimensions of technology and innovation

6. There has long been an assumption that the use of digital tools and services will increase with universal Internet access. At present, 76 per cent of the population living in least developed countries is covered by a mobile broadband signal. However, only 25 per cent are online,¹ with men 52 per cent more likely to be online than women.² This shows that improvement in infrastructure alone is not sufficient to reach “meaningful access” for all women, as other factors, such as affordability, digital literacy and skills, privacy and safety, content, relevance, ownership, awareness, agency and access to electricity are equally critical.

7. Gender social norms are at play in each of those dimensions and influence whether and how women and girls can use digital tools and services, for reasons such as obstacles limiting girls’ education, negative perceptions towards women who use the Internet or patriarchal control over their communications and economic decisions. Despite small steps to bridge the gender digital divide, progress has been uneven. Since 2019, the gender parity score has improved; however, the absolute difference between the numbers of men and women online actually increased by 20 million. In 2022, 63 per cent of women across the globe were using the Internet, compared with 69 per cent of men.³ Women are 12 per cent less likely to own a mobile phone than men, a figure virtually unchanged from 2019.⁴ Those averages mask significant differences across regions and within countries, with gaps being even more acute for older women, those living in rural areas and those with disabilities. There is not a singular, universal type of gender digital divide but a confluence of factors that are context-dependent.

8. The gaps are rooted in long-standing and persistent stereotypes, which also have an impact on women’s participation and leadership in innovation processes. When personal computers appeared, they were marketed almost exclusively to men, and research demonstrates that men continue to be falsely portrayed as more inherently talented than women in technology, with women and girls rarely presented as innovators. Studies have identified a “gender equality paradox”, showing that those stereotypes are even stronger among high-achieving students in countries that rank higher on some gender equality indices or in sectors that require disruptive technical skills and offer higher wages.⁵ However, policies and programmes to increase parity in science and technology largely continue to focus on “fixing women” and place the onus to drive change on women, rather than on the people and institutions that are perpetuating stereotypes and on unsupportive education and work environments. As a result, initiatives to address gender gaps in technology over the past years have not generated discernible changes and tend to deploy unsustainable short-term actions that are limited in scope, lack evidence of impact and reinforce gender stereotypes and false narratives of girls’ lack of interest in or talent for technology.

9. Digitalization has often been portrayed as an equalizer of opportunities; however, it has continued a pattern of gender-blind innovation already seen in the “analog world”, which fails to take into account gender, age, race, locality, disability,

¹ International Telecommunication Union (ITU), *Connectivity in the Least Developed Countries: Status Report 2021* (2021).

² Carlos Iglesias, “The gender gap in Internet access: using a women-centred method”, World Wide Web Foundation, 10 March 2020.

³ ITU, “The gender digital divide”, *Facts and Figures* (2022). Available at www.itu.int/itu-d/reports/statistics/2022/11/24/ff22-the-gender-digital-divide/.

⁴ Ibid.

⁵ United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women), document EGM/STI/EP.3.

income or the sociotechnical infrastructure of low-income countries when developing technological solutions. As a result, the lack of clear and deliberate intention to develop gender transformative technology that responds to the needs of women and girls and addresses the underlying structural problems driving gender biases creates vicious circles, where inequalities are amplified and perpetuated through digital tools.

10. International cooperation on digital technology has focused on technical and infrastructural issues and the digital economy, often at the expense of how technological developments were affecting society and generating disruption across all its layers – especially for the most vulnerable and historically excluded. Similarly, discussion on technological change and gender equality have overly focused on economic aspects, creating an incomplete picture of the gendered impacts of digitalization and failed to identify cross-cutting actions that could benefit multiple agendas, especially with regard to education, health, climate resilience, poverty eradication, food security, crime prevention and humanitarian emergencies, but also participation in public life and strengthening of democracy.

11. The present session of the Commission and the subsequent development of the Global Digital Compact, as laid out in Our Common Agenda, provide a unique opportunity to shape a future where technology contributes to transforming social norms, amplifying women’s voices, pushing back against online harassment, preventing the perpetuation of algorithmic biases, and distributing the benefits of digitalization equally to achieve the Sustainable Development Goals. This calls for a great paradigm shift, to reassert human agency over technology and explore new avenues to adopt a human-centric approach to digitalization, with the feminist principles of inclusion, intersectionality and systemic change at its core (see [E/CN.6/2022/3](#)).

III. Taking an intersectional approach to gender gaps in digital access and competence

A. Increasing women and girls’ access to and use of digital technology

12. The distinction between connected and unconnected is no longer sufficient or acceptable for a comprehensive understanding of barriers to access to and use of digital technologies. Women across the globe are less likely to be meaningfully connected at a level that allows a safe, satisfying and productive online experience at an affordable cost. Thus, access to a device and a connection are critical but not sufficient conditions for women and girls to harness and benefit from the Internet. Demand-side barriers, such as lack of skills, affordability, safety, relevance and family disapproval, are the greatest obstacles to mobile Internet use by women and girls, but the relative importance of those barriers greatly varies within and across countries.⁶ The differences observed require adopting an intersectional lens to examine the impact on different groups of women, including the unemployed, those with low literacy or low incomes, women living in rural or remote areas, migrants, women with disabilities and women above 55 years of age.

13. The digitalization of many services provides unique opportunities to empower women as economic, social and political actors. E-commerce provides new avenues for women entrepreneurs to gain access to new markets and greater profits. Digital financial services can contribute to women’s financial inclusion, enabling them to save, build assets, secure loans or expand their businesses, as well as receive government payments and remittances. In the agrifood sector, digital extension and

⁶ Matthew Shanahan, *The Mobile Gender Gap Report 2022* (London, GSMA, 2022).

advisory services can supply women farmers with real-time and rapid access to relevant information to support sustainable farming practices and disaster-resilient and climate-smart solutions. Public services are more accessible online, with the number of countries offering at least one online service having increased from 162 in 2020 to 189 in 2022. Forty-five countries allow users to apply online for maternal or newborn benefits, and the number of countries offering online services to apply for social protection programmes, such as child subsidies, pensions, housing and food allowances, has seen the most significant increase globally since 2020, likely in response to the COVID-19 pandemic.⁷ Mobile health positively influences health outcomes, especially by providing sexual and reproductive health information to young people⁸ or antenatal and postnatal health care.

14. Overlaying those e-services onto the existing digital gender gap compounds risks, making them less accessible to the most marginalized unless their introduction is accompanied by incentives and targeted support. Today, women and girls are 25 per cent less likely than men to have sufficient knowledge and digital skills to use technology to gain access to such services.⁹ Many have their online activities monitored or bear disproportionate responsibility for unpaid care work, unfairly limiting their time online. A recent survey across eight African countries showed that men-owned businesses make far greater use of information and communications technology (ICT), correlating with higher revenues.¹⁰ Each member of the population must have equal access to digital skills to understand and use digital services productively, as well as sufficient knowledge to trust their use, and to use them safely, protecting himself or herself from economic abuse, cybercrime and fraud. To remove barriers and provide incentives for non-users and the least connected, policy action needs to prioritize inclusion and equity considerations to ensure that women are equipped with the knowledge, awareness and skills to leverage connectivity for their economic and social empowerment and that digital services are tailored to be accessible and valuable to all women.

B. Leveraging digital technologies to enhance women and girls' skills and learning

15. Digital technologies provide opportunities for remote exchange and collaboration and facilitate access to online resources and new types of tools and pedagogies. They must be used to supplement teaching, rather than replace in-person education, and hold the potential to reduce inequality in access to quality and lifelong learning experiences, providing more flexible ways to gain access to courses and credentials, especially for women facing barriers in access to higher education or upskilling and reskilling opportunities. Digital learning can increase access to diverse women role models, especially in underrepresented fields, remove gender bias and stereotypes from curricula and learning material, implement gender-responsive teaching strategies, develop gamified learning around such sensitive subjects as

⁷ United Nations, Department of Economic and Social Affairs, *E-Government Survey 2022: The Future of Digital Government*, 2022.

⁸ Nicole B. Ippoliti and Kelly L'Engle, "Meet us on the phone: mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries", *Reproductive Health*, vol. 14, No. 11 (2017).

⁹ United Nations Educational, Scientific and Cultural Organization (UNESCO), *I'd Blush if I Could* (Paris, 2022).

¹⁰ UN-Women, document EGM/STI/BP.1.

mental health, media literacy, online safety or comprehensive sexuality education,¹¹ or customize learning experience for girls with disabilities.

16. Teaching and using technology in educational settings are currently limited by the lack of investments in ICT infrastructure and equipment, school connectivity, the lack of public learning content¹² and teachers' capacity. Teachers need to be equipped with the knowledge and skills to use gender-responsive blended and hybrid learning methods and be better prepared for emergencies interrupting in-person education, such as the COVID-19 pandemic, which caused millions of girls never to return to schools. Teaching digital literacy at school should go beyond teaching basic computer skills and focus on a set of competencies that include technical as well as transferable skills, allowing women and girls to be both safe and empowered in their use of technology not only to learn and search but also to play and socialize. There is also evidence that exposing girls to computational thinking during their formative early childhood years can provide them with equal opportunities in technical fields throughout their later educational and career years.¹³ Several countries have adopted computational thinking in their school curriculum, from primary to secondary education, to help students to think critically and resolve complex problems by applying logical reasoning.

C. Addressing the underrepresentation of women and girls in science and technology

17. At present, only 28 per cent of engineering graduates and 22 per cent of artificial intelligence workers globally are women, while girls do as well as boys in science in most countries.¹⁴ This limits women's access to fast-growing and well-paid careers and their direct participation in shaping technologies and leading investments, research, public policy and businesses. The underrepresentation of women in science and technology is influenced by societal stereotypes and several factors at the personal, environmental and school levels. A national study found that only 1 per cent of parents imagined girls to be more interested in technology than boys (compared with 70 per cent for boys).¹⁵ This creates a self-perpetuating cycle, where girls are not encouraged to enter technology-related arenas, lack knowledge about technology, feel no affinity with role models portrayed by the media and therefore do not express interest. Interventions to remove those stereotypes must simultaneously target all those factors and involve all socializing agents that shape girls' interests and choices, including teachers, school counsellors, families and peers. The intersection of gender with various factors of inequality must be incorporated in programme design and evaluation, as girls from low socioeconomic backgrounds have less contact with science-related activities¹⁶ and are less likely to receive encouragement from parents to engage in technology pathways.

18. Research demonstrates that the motivation behind girls' educational and career choices differs from that of boys, and that they are often driven by their prevailing

¹¹ Susie Jolly and others, "A review of the evidence: sexuality education for young people in digital spaces" (2020).

¹² United Nations, "Welcome to the transforming education hub". Available at <https://transformingeducationsummit.sdg4education2030.org/>.

¹³ Amanda Sullivan, "Supporting girls' computational thinking skillsets: why early exposure is critical to success", in *Teaching Computational Thinking and Coding to Young Children*, IGI Global, ed. (United States of America, IGI Global, 2001).

¹⁴ UNESCO, "UNESCO research shows women career scientists still face gender bias", press release, 10 February 2021.

¹⁵ See www.datocms-assets.com/22590/1589284030-pixi-stempaalystavlenhosboernogunge.pdf.

¹⁶ UN-Women, document EGM/STI/EP.3.

desire to solve societal challenges.¹⁷ The emergence of new green and circular economy jobs that will rely on innovation and technology may help to improve women's labour participation. For example, the share of women in renewable energy is 10 per cent higher than in the overall energy sector.¹⁸ Women with no technology background are increasingly working on digital technologies, despite current academic silos between arts, humanities and social sciences on the one hand, and engineering and computer science on the other. The growing recognition that digitalization requires multidisciplinary teams could be an effective lever to diversify technology-related talents while strengthening attention to social impacts and gender perspectives in technology design and development.

IV. Shaping inclusive and transformative innovation ecosystems

19. Innovation ecosystems are interconnected networks of actors, including Government, companies, universities, start-up incubators and accelerators, financial institutions, foundations, media, entrepreneurs and civil society. They work cooperatively and competitively to develop new products and services, each actor playing a role in creating value and generating an active flow of information-sharing, knowledge transfer and investments. Most innovation ecosystems are male-dominated, with women experiencing fewer opportunities for participation and leadership. In the technology sector, globally, women occupy less than one third of positions and face a gender pay gap of 21 per cent,¹⁹ and 48 per cent have experienced workplace harassment.²⁰ Gender disparities are also significant in the public sector. In the 111 countries with chief information officers, only 11 per cent of those officers are women.²¹

20. While the Internet emerged from public-funded programmes, the subsequent rate of technological advancement has outpaced the ability of Governments to shape innovation, resulting in business-led development. Reshaping innovation ecosystems to advance gender equality and deliver public value requires a multi-stakeholder approach, where the capacities and expertise of companies and academia stimulate the development of digital solutions, while Governments and civil society organizations provide a bridge with policymakers to amplify impact and promote an enabling environment with adequate safeguards.

A. Fostering multidimensional gender-responsive digital policy

21. Many national digital strategies do not provide a cohesive basis for gender-responsive policies and programming, missing the opportunity to design interventions directly targeting groups left behind, the majority of which are of women. In 2020, a study on affordability drivers across 72 low- and middle-income countries showed that gender consistently received the lowest average scores and that 40 per cent of the countries surveyed had no meaningful policies or programmes for improving women's access to the Internet.²² Many countries have digital strategies that focus on one or a combination of topics, such as broadband development, digital government, artificial intelligence or digital skills. Some frameworks recommend the adoption of national digital strategies that improve policy coherence across several dimensions,

¹⁷ UN-Women, document EGM/STI/EP.7.

¹⁸ International Renewable Energy Agency, *Renewable Energy: A Gender Perspective* (Abu Dhabi, 2019).

¹⁹ International Labour Office, "Tech's persistent gender gap", 12 November 2019.

²⁰ Women Who Tech, "The state of women in tech and start-ups", 2020.

²¹ United Nations, *E-Government Survey 2022: The Future of Digital Government*.

²² Teddy Woodhouse, "The Affordability Report 2021", Alliance for Affordable Internet, 2021.

such as access, use, innovation, jobs, society, trust and market openness.²³ However, such frameworks often consider gender aspects as a siloed policy domain, missing the opportunity to advance gender perspectives and targets across all dimensions, including skills, privacy, investments, consumer protection, jobs and entrepreneurship. Shaping transformative ecosystems require integrating gender perspectives, so that women's experiences are coherently considered in policy development and implementation, and systemic approaches, thereby addressing power dynamics and structures that maintain gender inequalities.

22. The transformation of innovation ecosystems demands shared responsibility and aligned efforts from diverse stakeholders. Whole-of-society approaches that bring actors together and also include civil society, local institutions and marginalized and vulnerable groups are the most effective way to address common challenges. The role of government policy is crucial to generate explicit, strong and sustained commitments from all actors to ensuring that safe and relevant digital services can be accessed and used by women and girls in all their diversity and to promote women's equal participation in the technology workforce, especially as content creators and entrepreneurs.

23. Each ecosystem actor contributes to putting in place the conditions that will shape infrastructure, regulations, business, investments and education systems and provide a more inclusive environment. As an example, digital financial services can be powerful tools to accelerate progress towards women's equal rights to economic resources, especially in rural and remote areas without banking services. However, they can only be successfully accessed and used by all segments of the population if several building blocks are in place, ranging from gender-responsive ICT and energy infrastructure to digital payment system and service providers, distribution system and access points, cybersecurity and consumer protection regulations and an effective user identification system. This also requires removing structural and discriminatory barriers faced by women, such as limitations to women's rights to own property (restricting access to collateral) or the lack of the formal identification needed to buy a SIM card.²⁴

B. Setting targets and pulling financial levers

24. Despite the exponential amount of data generated every year, there are very few indicators that can be used to measure the digital transformation of economies and societies and ensure that no one is left behind in the digital era. Many indices, scorecards or self-assessments have been developed, some integrating gender indicators, but none of them systematically collects data across countries using similar definitions, methodologies or sex-disaggregated data. The Sustainable Development Goals include targets on access to appropriate new technology (target 1.4), on using ICT to promote the empowerment of women (target 5.b) and on ICT skills (target 4.4). Other targets related to technology, such as target 9.c (on universal access) or target 17.6 (on South-South cooperation) do not provide sufficient metrics to capture the gendered dimensions of technological change adequately. Simultaneous disaggregation by other dimensions, including income, age, race, ethnicity, migration status, disability, sexual orientation and gender identity and geographical location, is very limited, yet critical. The multi-stakeholder group examining digital inclusion as part of the implementation of the Secretary-General's Road Map for Digital Cooperation has developed definitions and highlighted the lack of indicators

²³ Organisation for Economic Co-operation and Development (OECD), "Assessing national digital strategies and their governance", OECD Digital Economy Papers No. 324 (Paris, OECD, 2022).

²⁴ UN-Women, document EGM/STI/EP.10.

measuring the level of trust and transparency in digital technologies and data uses, as well as participation in digital policymaking. Currently, all those data gaps limit the knowledge and capacity of decision makers and practitioners to develop and adopt effective, evidence-based policies and programmes at all levels.

25. The structural changes required to transform innovation ecosystems can also be achieved through strategic financial levers. Public sector digital programmes, as well as research grants and procurement related to technology and innovation, rarely include gender and intersectional perspectives into their design and implementation or in the selection of goods and services. In addition to increasing the number of projects that directly target women and girls, there is a need to systemically include gender analysis, targets and disaggregated data collection into all global or sectoral digital projects that are creating knowledge, tools, capacity or services around artificial intelligence, agritech, e-health, e-governments and edtech, among many others.

26. Private sector funding has also been underused to influence investments and innovation ecosystem structures to support women's participation and leadership and provide more services addressing the needs of women and girls. In 2020, only 2 per cent of global venture capital funding was invested in start-ups solely founded by women.²⁵ Greater investments are needed to support women entrepreneurs, as well as innovative ways to tie venture capital funding and incubation and accelerator support to gender-responsive technology design, development and deployment. Making effective use of untapped or innovative sources of financing is also a critical step to open new avenues, such as making gender equality more prevalent in environmental, social and governance impact investments strategies. Universal service and access funds, which are financed in many countries through mandatory contributions by mobile network operators to connect underserved communities, could also be leveraged to be aimed explicitly at bridging the digital gender divide.

C. Anticipating and orienting policies in the changing world of work

27. Technological and digital innovations, including automation and artificial intelligence, bring major disruptions to industries and the labour force, leading simultaneously to job creation, elimination and transformation. While job losses will differ among countries, women will predominantly bear the impact of those changes, owing to the varied nature of persistent occupational and vertical segregation.²⁶ In Latin America, 22.5 million new jobs are forecast in sustainable agriculture and food production, clean energy and energy efficiency, among other green sectors. However, 80 per cent of the new jobs are expected to be created in male-dominated professions, with only 20 per cent in economic sectors in which women make up the majority of the workforce.²⁷ Transitions towards sustainability have the potential of creating millions of decent jobs that women will not be able to benefit from on an equal footing with men if current skills gaps and stereotypes remain unaddressed (see [E/CN.6/2022/L.7](#)). To prepare women for those impending changes in the world of

²⁵ Gené Teare, "Global VC funding to female founders dropped dramatically this year", Crunchbase News, 21 December 2020.

²⁶ UN-Women, document EGM/STI/EP.9.

²⁷ Catherine Saget and others, *Jobs in a Net-Zero Emissions Future in Latin America and the Caribbean* (Washington D.C. and Geneva, Inter-American Bank of Development and International Labour Organization, 2020).

work and ensure that they can benefit from them, policymakers should consider investing in human capital, re-skilling programmes and decent job creation.²⁸

28. Digital transitions also need to be accompanied by expanded social protection measures. The new jobs generated by the rise of the platform economy often upends traditional employment models without improving the overall labour market position of women. They tend to replicate the same biases found in traditional employment, including lower pay, instability and a lack of labour protection and entitlements, such as social security, child or long-term care services or care leave policies or the right to engage in collective action.²⁹

V. Embedding gender perspectives across innovation and technology design, development and deployment

A. Building gender-balanced cross-functional teams

29. Technology is a human creation that reflects the people who develop it. Women are rarely viewed and empowered as creators, promoters and decision makers in that field, which limits their ability to innovate and create technology that responds to the needs and priorities of women and girls in all their diversity. Until the recent emergence of “femtech” in 2017, very few digital tools were being developed for sexual and reproductive health. Similar lack of interest and investments can be seen in other sectors, such as the care economy or assistive technology. This requires the adoption of diversity, equity and inclusion strategies in technology sectors where women are underrepresented, especially women with disabilities or those facing systemic barriers, and men’s involvement in and commitment to developing gender-transformative innovation that challenges gender stereotypes and unconscious bias.

30. While increasing the representation of women in innovation teams can help to generate digital tools that reflect a diversity of values and experiences, it is insufficient to build gender-responsive technology. This requires the assembly of cross-functional teams trained on gender-responsive design, that combine technical and social science knowledge and take a multidisciplinary approach that ensures that all population groups equally benefit from new services and prevents harm or unfair treatment. Digital technologies are often referred as “dual use”, while they may serve legitimate societal objectives, they can also be used to undermine human rights, such as freedom of expression or privacy.³⁰ Digital trackers are useful to find lost objects but have also immediately been used to stalk women. This requires technologists to be formally trained on assessing, correcting or mitigating dual use and potential harm that can be associated with new technological products before they are released, drawing on socioeconomic, political and environmental perspectives and human rights.

B. Adopting a human rights-based approach by design

31. Providing safe, inclusive and equal access to ICT for all women and girls is essential for the full enjoyment of their human rights. This requires embedding participatory design into the development of new digital tools, centred around the

²⁸ Such as Global Accelerator, “Global accelerator on jobs and social protection for just transitions: high-level summary”, September 2021.

²⁹ UN-Women, document EGM/STI/EP.5.

³⁰ Jonathon Penney and others, “Advancing human-rights-by-design in the dual-use technology industry”, *Columbia Journal of International Affairs*, vol. 71, No. 2 (August 2018).

voices of marginalized and vulnerable women and girls, to better harness technology in order to facilitate their enjoyment of the right to education, energy, water and sanitation, food and health, among others. It also requires policies that balance and proportionally address tensions around multiple rights when regulating online spaces and tools, including the right to safety, movement, participation in public life, freedom of expression and privacy.³¹ This requires all stakeholders to collect, use, share, archive and delete data in ways consistent with international law and the right to privacy and to ensure that unwanted harm (safety risks) and vulnerabilities to attack (security risks) are properly prevented, addressed and eliminated.³²

32. The serious harm and discrimination against women and girls triggered by new digital technologies have highlighted the need for ethical reflection. In recent years, there has been a proliferation of ethical and responsible frameworks developed by civil society organizations, companies, Governments and multi-stakeholder partnerships to articulate principles to help to mitigate risks and spread technological benefits. Many cover prevention of bias, safety and protection of privacy, but few adopt a gender-responsive approach or call for artificial intelligence systems to “help to eliminate relationships of domination between groups and people based on differences of power, wealth, or knowledge”.³³ Those frameworks are founded on best practices and values, making it difficult to hold Governments or corporations accountable for any violations. Instead, they should be grounded in international human rights standards and norms and adopt a human rights-based design approach that would commit to designing digital technologies that respect human rights by default, rather than permit abuse or exploitation as part of their business model, the consequences of which are only addressed after they have occurred.³⁴

C. Improving transparency and accountability

33. The development of voluntary ethical frameworks are meant to guide the behaviours, actions and standards of the new delivery channels and service providers that have emerged from the digital transformation, and remain widely unregulated. However, most of those frameworks have no safeguards, resulting in diverging interests undermining their application and oversight. Self-governance systems put in place by companies have been underpowered, such as internal human rights or ethical artificial intelligence teams. Similarly, external oversight boards making decisions on the removal of content are not in a position to influence structural or design decisions that may curb technology-facilitated gender-based violence or privacy issues. As self-regulation resulted in many companies ignoring or underinvesting in efforts to address the harm of their products and services, there is a need for government involvement in regulatory reform. This would entail mandatory measures, such as requiring gender impact assessments, and regulations that clearly outline the responsibilities of companies, especially in transnational contexts. Co-regulatory approaches are also a positive step forward, such as the new European Union Digital Services Act, which imposes new obligations on digital platforms, including algorithmic transparency and improved content moderation, through a two-pronged approach setting concrete obligations for digital services to tackle illegal content and

³¹ Association for Progressive Communications, “Online gender-based violence: a submission from the Association for Progressive Communications to the United Nations Special Rapporteur on violence against women, its causes and consequences”, November 2017.

³² UNESCO, “Recommendation on the Ethics of Artificial Intelligence”, 2021.

³³ Jessica Fjeld and others, “Principled artificial intelligence: mapping consensus in ethical and rights-based approaches to principles for AI”, *Berkman Klein Center Research Publication*, No. 2020-1 (January 2020).

³⁴ Penney and others, “Advancing human-rights-by-design in the dual-use technology industry”.

introducing novel due diligence obligations to address societal risks posed by the provision of services, such as risks to fundamental rights or sexist hate speech.³⁵

34. The gender digital divide results in women producing less data, while the lack of disaggregated data leads to the overrepresentation or underrepresentation of certain groups in data sets. This influences machine learning systems, which subsequently use those imbalanced data sets to train smart appliances or artificial intelligence-enabled public and private service delivery. Gender-biased technology affects individuals but also contributes to setbacks in gender equality and women's empowerment. A recent global analysis of 133 systems across industries from 1988 to the present day found that 44.2 per cent of them demonstrated gender bias, with 25.7 per cent exhibiting both gender and racial bias, resulting primarily in lower quality of service, unfair allocation of resources and reinforcement of existing, harmful stereotypes.³⁶ Regulations should be aimed at enhancing transparency on how public and private sector entities use data, strengthening trust in data-driven products and services and ensuring a more equitable distribution of benefits. Many Governments are currently developing legislation to put in place mandatory artificial intelligence audits, which need to integrate a gender perspective. National and international discussions are also needed on data governance, to ensure that data are not the property of a few but are safeguarded as "global commons" resources and collective public good that help to achieve equitable and sustainable development.

VI. Preventing and eliminating technology-facilitated gender-based violence

35. Much of the existing work to address technology-facilitated violence against women has been fragmented, with the absence of normative standards and common vocabulary that explicitly capture the unique nature of that threat.³⁷ It refers to any act that is committed, assisted, aggravated or amplified by the use of ICT or other digital tools and that harms or disproportionately affects a person on the basis of gender. It can be carried out by individual perpetrators, organized groups or institutions, all of which act with the objective of controlling, harming, silencing or discrediting a woman or a group of women. Studies show that women who experience multiple and intersecting forms of discrimination are at a greater risk of being harassed, in particular LGBTQ+ persons, while women in the public eye are targeted to a much greater extent than men, especially politicians, journalists and women human rights defenders.³⁸

36. This threat covers a large variety of behaviours and impacts, the extent of which has not yet been comprehensively measured, but results in physical, sexual, psychological, social, political or economic harm or other infringements of rights and freedoms. It can significantly increase the risk of depression and suicide, especially among adolescent girls. It can result in women and girls having to change schools, employment or housing. There is a continuum between physical and online gender-based violence, with technology often aggravating the level of surveillance, trafficking or physical violence perpetrated. It forces women and girls to self-censor, deplatform or reduce their interaction in online spaces, limiting their participation in public life and undermining democracy and human rights. A recent survey on women journalists from 125 countries found that 73 per cent of respondents had suffered

³⁵ UN-Women, document EGM/STI/EP.12.

³⁶ Genevieve Smith and Ishita Rustagi, "When good algorithms go sexist: why and how to advance AI gender equity", *Stanford Social Innovation Review*, March 2021.

³⁷ United Nations Population Fund, *Making all Spaces Safe* (New York, 2021).

³⁸ Ibid.

online violence in the course of their work, 30 per cent reporting that they self-censored in response.³⁹

A. Teaching digital citizenship for responsible access and use of technology

37. Social media has transformed how information is shared globally, providing women with new channels to share content and opinions but also to come together to call attention and protest. Individuals and communities that experience intersecting inequalities use those new spaces to organize their activities and civic action and connect in solidarity across geographical boundaries. Digital activism and movements such as #MeToo demonstrate the power of collective digital action, to raise awareness, advocate and mass-mobilize. However, social media has also given rise to gendered disinformation, misinformation, sexist hate speech and new forms of societal narratives that undermine women's online expression.

38. Teaching children and adolescents digital citizenship helps to cover not only issues related to online safety, privacy and cyberbullying, but also focuses on positive values of empathy, ethical use of digital media to communicate and engage in society and develop a responsible activist stance. It helps to frame conversations around positive masculinity and empower young men and boys to become agents of change for gender equality. Within the European Union, 51 per cent of young women hesitate to engage in online debates after witnessing or directly experiencing online abuse.⁴⁰ Young women and girls are the most at risk of being dissuaded to make their voices heard on global affairs and be active citizens on "digital public squares" that are owned by a few companies wielding monopoly powers. This brings growing concerns that those platforms have become a public utility while being driven by profit and lacking safeguards associated with public interest organizations.

B. Adopting an ecosystem approach for greater policy coherence and law enforcement coordination

39. Adequately preventing and responding to acts of technology-facilitated violence against women and girls require improved coherence in policy actions and coordination in implementation from a large ecosystem of actors, ranging from policymakers and legislators to the police, the judiciary, researchers, civil society organizations, companies, psychosocial workers, educators and the media. Many potential legal responses are available, ranging from criminal responses to civil torts, privacy and data protection law, human rights law or administrative bodies. Legislators can consider a variety of avenues and should also include comprehensive multisectoral systems, such as helplines, independent statutory offices, front-line workers, access to justice programmes or women's rights organizations.

40. In some jurisdictions, existing legislation may be applied to incidents of technology-facilitated violence against women, such as harassment laws that may be used for stalking involving tracking devices. However, legal frameworks often need to be expanded and amended, especially when technology creates uniquely novel forms of violence, such as non-consensual deepfake photographs.⁴¹ This requires increasing collaboration with and consultation of women's organizations and

³⁹ Julie Posetti and others, *Online Violence against Women Journalists: a Global Snapshot of Incidence and Impacts* (Paris, UNESCO, 2020).

⁴⁰ European Institute for Gender Equality, "Cyberbullying restricts young women's voices online", October 2018.

⁴¹ UN-Women, document EGM/STI/EP.15.

enhancing government actors' knowledge of technology-facilitated violence against women, to handle adequate reporting, the collection of evidence and law enforcement, while also preventing inappropriate discriminatory stereotyping or minimization of the harm experienced by survivors. Those efforts should be centred around principles focused on human rights, survivor-informed approaches, transparency, accountability and proportionality, so that policies do not become tools of oppression against women reporting an incident or threaten freedom of expression.⁴²

C. Increasing engagement and accountability of State and non-State actors

41. Existing evidence points to the magnitude of technology-facilitated gender-based violence, and ensuing impunity remains colossal.⁴³ However, there is a lack of comprehensive and accurate data collection on the extent of the prevalence, forms and impact of technology-facilitated gender-based violence, resulting in fragmented and incomplete information. So far, much of the data analysed is derived from studies conducted by research organizations, civil society or the United Nations. Governments have a crucial role to play in including that topic in household surveys and ensuring that companies commit to reporting on the extent of technology-facilitated gender-based violence induced by their services. This information is essential to understand the scale of the phenomenon and shape stronger policy responses, advocacy messages and digital products.

42. Regulatory approaches are also required to improve digital product design and transparency and accountability requirements with regard to the safety of women and girls and the protection of their human rights online. A recent survey showed that underreporting hid the real numbers, with only one in four women reporting acts of technology-facilitated gender-based violence to the platform or platforms on which it occurred, and only 14 per cent of them reported it to a protective agency.⁴⁴ Human rights-based design can improve reporting and moderation systems, to take the onus off survivors to be responsible for reporting and monitoring the level of abuse experienced across platforms. It can also improve transparency around the intersection of technology-facilitated gender-based violence with other issues that undermine women's presence and freedom of expression in public spaces, such as gendered disinformation or algorithmic censorship and amplification. While much abuse happens on social media platforms, regulations should cover other sectors, including instant messaging, gaming, video live-streaming, dating, e-commerce and connected products that can be used for surveillance by individuals or institutions. Design solutions should not only focus on the product itself, but also consider other parameters, including responsive user services, responsible content moderation, allowing open application programming interfaces that enable innovators to custom-build tools that can be used to add additional layers of protection, as well as increasing investments and focus for countries, communities or vulnerable groups where gender-based violence is more prominent or women in the public eye are at higher risk of being targeted.

⁴² UN-Women, document EGM/STI/EP.14.

⁴³ Council of Europe, "No space for violence against women and girls in the digital world", 15 March 2022.

⁴⁴ The Economist Intelligence Unit, "Measuring the prevalence of online violence against women", infographics.

VII. Conclusions and recommendations

43. The digital age is transformational and can provide opportunities for women to thrive in the future of work, access essential digital services and increase their civic and political engagement. Harnessing technology and innovation for the political and socioeconomic empowerment of women and girls is essential to achieve the Sustainable Development Goals, but requires prioritizing inclusion and safety. Efforts to close the gender digital divide and ensure that no one is left behind in the digital economy and society must be expanded and grounded in equity. Universal access to ICT needs to be accompanied with the provision of necessary digital skills and by effective safeguards that prevent the exacerbation of inequalities, biases and the use of technology to extend the reach or create new forms of abusive behaviour towards women and girls.

44. The current innovation ecosystems greatly lack gender equality and are characterized by an uneven distribution of power and financial resources. The benefits of digital technologies must be equally distributed and their development and use anchored in human rights-based approaches and the principles of inclusivity, fairness, universality, transparency and accountability. The disproportionate and distinct effects of digitalization on women and girls must be recognized and addressed to prevent the reinforcement of negative social norms and gender stereotypes, as well as democratic backsliding.

45. To fulfil those objectives, the Commission on the Status of Women may wish to urge Governments and other stakeholders to take the actions set out below, aligned with the principles outlined above:

Prioritizing digital equity to close the gender digital divide

(a) **Mainstream gender perspectives in national digital policies, to include time-bound gender-specific targets, allocate resources, increase coherence to remove the multidimensional and discriminatory barriers faced by women and girls, especially costs of devices and data, lack of skills and safety and restrictive social norms, and coordinate actions, subsidies and incentives to provide universal meaningful connectivity and public access facilities for women and girls, especially for underserved areas;**

(b) **Put in place the conditions supporting the creation and expansion of safe, affordable, accessible, relevant and inclusive public and private digital tools and services addressing the most pressing needs of women and girls across sectors and geographies;**

(c) **Implement programmes to increase the digital literacy and skills of women and girls, focusing on their needs and building confidence and trust for meaningful use, including support for registering for identification papers, community engagement to challenge stereotypes, public awareness campaigns and the development of online content for women and girls with limited literacy or accessibility, including older women, women with disabilities or women living in remote areas;**

(d) **Promote whole-of-society and multi-stakeholder approaches to foster collaborations across different societal sectors and combine knowledge, skills and resources towards concrete actions to bridge the gender digital divide;**

Leveraging financing for inclusive digital transformation and gender-transformative innovation

(e) **Significantly increase public and private sector investments in evidence-based initiatives aimed at bridging the gender digital divide, build more inclusive and diverse innovation ecosystems and promote safe and gender-transformative innovation, including by using innovative finance mechanisms;**

(f) **Ensure that funding for all national and international digital policies and programmes, research grants and procurement systematically integrates gender analysis, targets and disaggregated data collection;**

(g) **Incentivize financial institutions and venture capital firms to support women-owned enterprises in entering the digital economy, including through minimum quotas and tying investments to gender-transformative innovation;**

Fostering gender-responsive digital and science and technology education in the digital age

(h) **Create conditions for gender-responsive digital learning environments for girls and women who have missed out on education, including by investing in school infrastructure, the development of free, safe and accessible digital public learning resources, with good-quality, multilingual and context-relevant educational content, and the training of teachers to use gender-responsive blended and hybrid learning methods and deliver digital skills training;**

(i) **Transform digital literacy teaching to combine technical and transferable skills allowing women and girls to be both safe and empowered in their use of digital technology, and to eliminate gender stereotypes and bias from curricula and educators' behaviours and attitudes;**

(j) **Promote evidence-based programmes and the exchange of best practices to improve the participation of women and girls in science and technology, including teaching of computational thinking and interdisciplinarity approaches combining the teaching of social sciences and scientific fields;**

(k) **Include digital citizenship teaching in schools curricula to sensitize young people, especially young men and boys, caregivers and educators to ethical and responsible online behaviour;**

Promoting the participation, employment and leadership of women in technology and innovation

(l) **Forecast and anticipate future job and skill needs to minimize the adverse impacts of digitalization and automation, and adapt educational and vocational curricula, reskilling and upskilling programmes to facilitate women's transition to new occupations and jobs, in particular for those at risk of being replaced by automation;**

(m) **Prioritize gender-responsive labour and employment policies that facilitate the recruitment, promotion and retention of women in technology, including temporary special measures, policies on care work, equal pay, sexual harassment and elimination of discriminatory practices in career advancement;**

(n) **Establish labour regulations and protections for women workers in the platform economy, including a minimum wage and universal and gender-responsive social protection;**

(o) **Provide targeted support for women-owned businesses and women entrepreneurs, including training programmes to use digital tools and services, and access to incubators and accelerators for start-ups;**

(p) **Ensure the full, equal and meaningful participation and leadership of women in digital cooperation and ICT and data governance, with particular attention given to young women;**

Adopting gender-responsive technology design, development and deployment

(q) **Encourage and assemble gender-balanced cross-functional innovation teams, integrate intersectional and social analysis into core engineering and computer science training and include gender-responsive technology design as a criterion within relevant professional standards bodies;**

(r) **Promote participatory approaches for technology design, development and deployment, including community-based approaches involving women's rights organizations, to create products and services based on the principles of accessibility, inclusivity, affordability and availability and catering to the needs of all women and girls;**

(s) **Adopt a human rights-based approach as standard in the financing, design, development, deployment, monitoring and evaluation of emerging technologies to prevent, identify and mitigate potential risks for women and girls;**

Strengthening fairness, transparency and accountability in the digital age

(t) **Establish mandatory requirements for impact assessments and due diligence mechanisms to identify, prevent and mitigate societal risks and the negative impacts of digital technology on women and girls, especially by including affected groups, women's rights organizations and human rights experts;**

(u) **Adopt regulations mandating evaluation and audit requirements for the development and use of artificial intelligence to provide a secure and high-quality data infrastructure and systems that are either continually improved or terminated if human rights violation or gendered bias are identified;**

(v) **Take concrete measures to harness digital technologies for the common good and promote norms and mechanisms facilitating accessibility and the fair distribution of the benefits of digital technologies for sustainable development and gender equality, such as global data commons;**

(w) **Apply international human rights law and internationally agreed standards or principles and ensure that the Global Digital Compact advances women's rights and builds a human-centred approach to digital transformation;**

Enhancing data science to advance gender equality

(x) **Strengthen the capacity of national statistics offices and foster collaboration among stakeholders to assess data needs and address gaps, including by financing qualitative research on women's and girls' barriers to digital inclusion, the prevalence of technology-facilitated gender-based violence and the lack of disaggregated data by income, sex, age, race, ethnicity, migration status, disability, geographical location and other characteristics, to ensure targeted policies and interventions;**

(y) **Apply gender-responsive and human rights-based standards for data collection, use, sharing, archiving and deletion, especially to ensure the privacy**

of women's sensitive personal data and to strengthen the capacity of women and girls to create, curate and control their personal data;

Preventing and eliminating technology-facilitated gender-based violence and protecting the rights of women and girls online

(z) Adopt a comprehensive definition of technology-facilitated violence against women, as well as international methodological guidance, to understand and track patterns of harm and rights violations to guide evidence-based policymaking and programming;

(aa) Develop, amend and expand legislation and policies and strengthen their implementation to prevent and eliminate acts of technology-facilitated gender-based violence, with the meaningful participation of survivors of violence, young women and women's organizations, including survivor-informed responses and fast-track processes to facilitate the swift removal of illegal, harmful or non-consensual content;

(bb) Provide support to survivors of technology-facilitated gender-based violence through the provision of civil and administrative alternatives for victims who have difficulty in gaining access to legal avenues owing to financial barriers or systemic discrimination, and through the provision of helplines and social and legal services;

(cc) Strengthen the capacity of government actors, including policymakers, law enforcement officials, the judiciary, health and social workers and educators, and of civil society organizations to develop knowledge and skills to prevent and eliminate technology-facilitated violence against women and provide survivor-centred support;

(dd) Ensure that public and private sector entities prioritize the prevention and elimination of technology-facilitated violence against women and girls by implementing human rights-based design approaches and safeguards that address multiple risk and protective factors that underlie violence, including improved content moderation and curation; interoperability and effectiveness of reporting systems; immediate removal of illegal content and necessary, proportionate and non-discriminatory removal of other content; and adequate investments for the provision of responsive and responsible user services.

46. The Commission may wish to call upon the United Nations system and other international organizations to work collaboratively, including through the Action Coalition on Technology and Innovation for Gender Equality of the Generation Equality Forum, to support Member States in implementing, measuring and monitoring the aforementioned recommendations at all levels.