

STUDY

For the FEMM committee



The underlying causes of the digital gender gap and possible solutions for enhanced digital inclusion of women and girls

WOMEN'S RIGHTS & GENDER
EQUALITY



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WOMEN'S RIGHTS & GENDER EQUALITY

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gender gap and possible solutions for
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Abstract

This study, commissioned by the European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs at the request of the FEMM Committee, attempts to reveal the links between the different factors (access, skills, socio-economic and cultural), which prevent women from having equal access to digital technology. It then suggests ways of dealing with online and offline inequalities to the effect of closing the digital gender gap and improving women's and girls' digital inclusion and future technology-related career paths.

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CONTENTS

LIST OF ABBREVIATIONS	4
LIST OF FIGURES	5
LIST OF TABLES	5
EXECUTIVE SUMMARY	6
INTRODUCTION	8
1. GENDER IN THE GLOBAL AND EU DIGITAL AGENDA	10
1.1. Policy developments	10
1.2. Current situation	14
1.2.1. Gender gap in access to digital services and technologies	14
1.2.2. Gender gap in digital skills and education	16
1.2.3. Gender segregation in the labour market	19
1.2.4. ICTs, gender and cybercrime	22
2. EU POLICY AND PRACTICE	23
2.1. Access and use of digital services and technologies	23
2.2. Digital skills and knowledge	24
2.3. Gender segregation in the labour market	27
2.4. Gender and cybercrime	31
3. USING THEORY TO INFORM AND EVALUATE POLICIES	32
3.1. Theoretical perspectives	32
3.2. Drawing on theory to address the barriers	34
3.2.1. Affordable access	35
3.2.2. Threats that prevent access and use	36
3.2.3. Digital literacy and confidence	36
3.2.4. Relevant content, applications and services	37
3.3. Evaluation methods and tools	38
4. CONCLUSIONS AND POLICY RECOMMENDATIONS	41
5. REFERENCES	46
6. ANNEX	51

LIST OF ABBREVIATIONS

APC	Association for Progressive Communications
DESI	Digital Economy and Society Index
EIGE	European Institute for Gender Equality
ENISA	European Union Agency for Network and Information Security
EU	European Union
GDP	Gross Domestic Product
GEM	Gender Evaluation Methodology
ICTs	Information and Communication Technologies
IGO	Inter-governmental Organisation
ILO	International Labour Organisation
ITU	International Telecommunication Union
OECD	Organisation for Economic Co-operation and Development
NGO	Non-governmental Organisation
PISA	Programme for International Students Assessment
SDGs	Sustainable Development Goals
SME	Small and Medium Enterprise
STEM	Science, Technology, Engineering and Mathematics
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WSIS	World Summit for the Information Society

LIST OF FIGURES

Figure 1:

Digital Economy and Society Index (DESI) 2017	24
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LIST OF TABLES

Table 1:

DigComp 2.0: The Digital Competence Framework for Citizens.....	25
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EXECUTIVE SUMMARY

Background

Information and communication technologies (ICTs) are seen as necessary ingredients for economic and social development in the so-called 'knowledge society' and have attracted attention by governments, businesses, citizens and civil society organisations. They are tools with multiple functionalities providing ample opportunities for information and communication and having applicability in the entire sphere of economic, social, political and cultural life.

Nonetheless, the availability of ICTs should not be taken for granted and their deployment presents variations according to individual, social and cultural characteristics. Disparities in access, capacity to use and ways of engagement with ICTs (the so-called digital divide) have also been on the EU and international policy agendas for quite some time. Such disparities have pronounced gendered dimensions and are generated by political, economic and socio-cultural factors but often by the nature of technology itself. They call for multi-level policy interventions in the areas of ICT access, education and digital skills, employment in ICT and related jobs, as well as matters related with the information content available and the ways of accessing it on the Internet.

Aims

- To provide an overview of the issue of the digital gender gap and disparities in policies related to the digital economy in the EU and beyond
- To identify important areas where gender disparities are encountered, namely access and use of digital services, education and ICTs, ICT-related employment, ways of engagement with ICTs and relevant content
- To shed light on the intricate synergies and links between socio-economic, cultural factors, dominant stereotypes and technological barriers which account for the digital gender gap
- To present good practices seeking to address the digital gender gap in the EU and globally drawing on national, sectoral, civil society and other examples and their articulation with policy
- To problematize the above policies and practices by critically discussing the underlying causes of gender disparities in ICTs engagement and make policy recommendations for enhanced digital inclusion of women and girls.

Addressing the underlying causes of digital gender disparities is vital, as dealing with the symptoms without fighting the causes would lead to superficial and ineffective measures. Equally important is the awareness that technology (ICTs and the Internet in particular) is not an agent of change in itself but encompasses gendered characteristics and interacts with social circumstances in complex ways. The aim of policy and practice is that the outcomes of such interaction work toward greater gender equality. Nonetheless, the settings in which ICTs are often placed might as well reproduce such inequalities or recast them in new forms.

The study presents a number of conclusions and critical policy recommendations on the need for better statistics, holistic planning approaches, engagement of various stakeholders, participation of women in the design of technology, challenging male and female stereotypes, evaluating policy interventions from the perspective of empowerment of women. It concludes that the gendered qualities of ICTs and their socio-economic context need to be challenged and alternatives put forward for reducing and overcoming the digital gender divide.

INTRODUCTION

Globalisation and the **expansion** of information have been transforming our life in different and profound ways. Information and communication technologies (ICTs) are seen as necessary ingredients for economic development in the so-called 'knowledge society'. By ICTs we understand computers, telecommunication technologies (telephones, mobile phones, radio, broadcasting and television), as well networking technologies (predominantly the Internet). Often these old and new forms of technology converge in forms of communication practised in many communities. They also constitute tools which provide opportunities for information access, communication and self-expression. Internet search, blogs, online multimedia resources, social media, wikis, as well as services such as e-government, e-health, e-banking, e-learning, e-commerce, e-voting, all create new arrangements of communication, engagement and social and economic behaviour.

In order to cope with this transformation in both the private and the public spheres, new skills and competences are required. As Voogt et al. say 'collaboration, communication, problem solving, critical thinking, creativity and productivity are essential for living and contributing to the present societies'.¹

Europe is becoming increasingly culturally diverse. Cultural pluralism may lead to social exclusion but also to unequal access to ICT for vulnerable groups. This makes education key to social integration and lifelong learning an imperative.²

Issues of gender equality are approached from different perspectives, including economic, political and human rights' ones. Despite the important progress made, not least in education and employment, gender equality still faces significant challenges.

Digital inequalities are high on the political agenda nationally, at EU level, and globally, with a variety of actors (governments, civil society, international organisations, inter-governmental bodies, private firms and others) having vested interests and engaging in discussion, advocacy and policy. The evocative term **digital divide** denotes 'the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICT and to their use of the Internet for a wide variety of activities'.³ The digital divide involves both issues of access to ICT resources, as well as the patterns of use that different individuals and organisations demonstrate. Disparities and differentials have been often explained by referring to the socio-economic background, age, educational characteristics of the user or household, location, ethnicity or disability, with certain groups of users more disadvantaged compared to others.⁴

While ICTs are recognised as having the potential to promote gender equality and women's empowerment, a **digital gender divide** has been identified, whereby women access and use ICTs less than men, which can exacerbate gender inequalities.

¹ Voogt, J., O. Erstad et al. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning. Special Issue 29*: 403-413, p.404.

² Arnaldi, S., F. Boscolo, and J. Stamm (2010) Living the digital revolution: exploration into the futures of the European Society. *European Review 18*(3): 399-416.

³ OECD (2011) *Guide to Measuring the Information Society 2011*. Paris: OECD.

⁴ Cruz-Jesus, F., M.R. Vicente et al. (2016) The education-related digital divide: an analysis for the EU-28. *Computers in Human Behaviour 56*: 72-82.

Does the use of the Internet challenge, reproduce existing cultural and socio-economic arrangements, or create new ones? For some, online activity facilitates women's empowerment, provides opportunities to challenge traditional norms and promotes gender equality.⁵ Yet, for others, the Internet will provide more opportunities for the reproduction of patriarchal and exclusionary structures and practices or the generation of novel ones. In any case, it is important to reflect on the changes associated with ICT and Internet deployment, the way they affect gender relations, how they can be measured and evaluated and, finally, the degree of empowerment that they provide to women and girls.

A number of gender evaluation models have been developed to address power relations between men and women and the ways in which these intersect with class, race, disability, religion and other forms of inequalities⁶. Using ICTs introduces a further dimension in gender relations, which interacts with the above forms in intricate ways. Issues of access, information content, education, use, digital skills, language, privacy and security, and other ways of engaging with digital technology reflect and shape social and gender relations.

Policies have attempted to capture and deal with some of those complexities from a gender equality perspective. More specifically, they have engaged with barriers to access and use, the interplay between online and offline gender disparities, as well as the possibilities for social change and more specifically women's empowerment through ICT use. Increasing the number of women in ICT-related education has been a policy consideration for some time. The ICT sector has changed over the last years, as software tools and Internet connectivity have brought together many different businesses and industries, and have revolutionised the organisation of work. However, the opportunities for women professionals in the sector are restricted by barriers to entry and promotion within the ICT industry.⁷

A recent report on ICT and gender mentions: 'Many things can come between women and the new technology: social norms about appropriate behaviour of women, cultural attitudes, gendered division of labour, gender stereotypes and even gender-based violence. Women may also have more to gain from ICT than men, in time, freedom and opportunities.'⁸ Addressing the underlying causes of digital gender disparities is vital, as dealing with the symptoms without fighting the causes would lead to superficial and ineffective measures.

⁵ Empowerment generally is taken to mean greater control of one's resources (economic empowerment) and increased ability to participate in decision-making processes (political empowerment), but from a feminist perspective it extends to challenging social and cultural structures (social empowerment). See Patil, D.A., A.M. Dhere and C. B. Pawar (2009) ICT and empowerment of rural and deprived women in Asia. *Asia-Pacific Journal of Rural Development* XIX(1): 1-22.

⁶ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications, Women's Networking Support Programme.

⁷ ITU (2012) *A Bright Future in ICT: Opportunities for a New Generation of Women*. Geneva: International Telecommunications Union. Available at: <https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Documents/ReportsModules/ITUBrightFutureforWomeninICT-English.pdf>

⁸ Hafkin, N. (2013) *Stocktaking and Assessment on Measuring ICT and Gender for the Partnership on Measuring ICT for Development*. Task Group on Gender of the Partnership on Measuring ICT for Development, p.11.

1. GENDER IN THE GLOBAL AND EU DIGITAL AGENDA

KEY FINDINGS

- A number of policy initiatives in the EU and globally have aimed at addressing the digital gender divide by stressing the opportunities and benefits that new information and communication technologies offer for women themselves, but also for the economy and society.
- The current situation demonstrates a persistent gender gap in access and use of digital technologies, in digital skills and in the digital labour market, while women also face certain online risks when engaging with new technologies.
- Such gaps are due to a number of non-technological barriers, including inadequate economic resources, lack of education and training and socio-cultural assumptions about women's roles and place in society and the labour market.
- There is a clear need for further engagement of multiple stakeholders, public and private, as well as women users themselves, in ways that can overcome these identified barriers and empower women.

1.1. Policy developments

The 1995 United Nations (UN) Beijing Declaration states: 'Eradication of poverty based on sustained economic growth, social development, environmental protection and social justice requires an involvement of women in economic and social development, equal opportunities and the full and equal participation of women and men as agents and beneficiaries of people-centred sustainable development'. It also expresses determination to ensure, through international cooperation, women's equal access to economic resources, science and technology, vocational training, information and communication so as to promote the empowerment of women and girls.⁹

One of the main outcomes of the UN Conference on Sustainable Development (Rio+20), held in Rio de Janeiro in June 2012, was the agreement by Member States to launch a process for developing a set of sustainable development goals (SDGs), of which Goal 5 refers to gender equality and empowerment of women and involves the use of 'enabling technologies, in particular ICTs'.

The 2003 World Summit on the Information Society (WSIS) likewise viewed ICTs as key resources for women's empowerment: 'We are committed to ensuring that the Information Society enables women's empowerment and their full participation on the basis of equality in all spheres of society and in all decision-making processes. To this end, we should mainstream a gender equality perspective and use ICTs as a tool to that end.'¹⁰

⁹ <http://www.un.org/womenwatch/daw/beijing/platform/declar.htm>

¹⁰ ITU (2003) *World Summit on the Information Society. Declaration of Principles, Building the Information Society: A Global Challenge in the New Millennium*. Geneva: International Telecommunication Union, p.12.

The 2012 World Bank development report demonstrates the significance ascribed by the World Bank on gender equality, when it mentions that there are existing disparities between men and women in education, access to economic opportunities and power in the household and in society.¹¹ Moreover, the 2014 UN Women's report on Gender Equality and Sustainable Development goes even further and attempts an analysis of the underlying reasons for these disparities.¹² It argues that macroeconomic policies are not gender-neutral, as it is commonly believed. Rather, economic policies having liberalisation, privatisation and macroeconomic stability as core objectives 'create a deflationary economic environment characterised by reduced capacity to generate employment, fiscal squeeze and limited public policy space, with implications for the achievement of social and environmental sustainability'.¹³ As a result, the 'hollowing out' of the state affects women disproportionately.¹⁴ The report pays attention to unequal power dynamics and structural inequalities, which are largely absent from dominant development policies and acknowledges that aiming at sustainability and gender equality is not power-neutral.

In 2016, the International Telecommunication Union (ITU) adopted an Action Plan to accelerate inclusive and sustainable development by closing the digital gender gap and harnessing the transformative potential of ICTs for women's (including girls') empowerment (which can be understood as potentially challenging and changing the power relations between men and women and as enabling women to take greater control over their resources and lives in general).

The broad aims of the Action Plan are:

- Develop gender-responsive strategies and policies
- Ensure access to ICTs by women and mitigate the online risks that hinder women's access to and use of technology
- Build digital capacities and support development of content, applications and services that meet women's needs
- Promote women in the technology sector, including in positions of decision-making
- Establish multi-stakeholder partnerships

This Action Plan operates in the light of the 2030 Agenda for Sustainable Development and the Addis Ababa Action Plan 2015, as well as commitments and outcomes of WSIS, the Beijing Declaration and Platform for Action and General Conclusions of the Commission on the Status of Women. It encourages stakeholders (governments, the private sector, NGOs, civil society and IGOs) to cooperate and build synergies towards closing the digital gender gap. The Action Plan stresses the importance of women's 'equal and meaningful participation in the digital society' for the realisation of women's rights in the 21st century, as well as the realisation of a 'just, inclusive and rights-based information society'.

The European Commission's Digital Agenda is the first of the seven flagship initiatives under the Europe 2020 Strategy: 'The digital agenda for Europe was established with a view to stimulating economic growth while at the same time addressing social challenges

¹¹ World Bank (2012) *World Development Report 2012: Gender Equality and Development*. Washington, DC: World Bank.

¹² Asher, K. and B.S. Basnett (2016) *Gender equality as an entitlement: an assessment of the UN Women's Report on Gender Equality and Sustainable Development 2014*.

¹³ UN Women (2014) *Gender Equality and Sustainable Development: World Survey on the Role of Women in Development*. New York: UN Women, p.42.

¹⁴ Asher, K. and B.S. Basnett (2016) *Gender equality as an entitlement: an assessment of the UN Women's Report on Gender Equality and Sustainable Development 2014*.

through information and communications technology (ICT). In both cases, gender has particular relevance'.¹⁵ Digital inequalities need to be addressed, if the aim of the 2020 Strategy is to be sustained.¹⁶

The European Institute for Gender Equality (EIGE) refers to the 2013 Broadband Commission report, according to which the presence of women online can boost GDP: bringing an additional 600 million women and girls online around the world will result in a GDP increase of up to USD 18 billion. But the effects are far from just economic or simply quantifiable. The report stresses that, as women are more often than not enmeshed and committed to family and community welfare, they are likely to give large parts of their income back with obvious positive impact on health and education, including that of children, as studies have shown. In addition, an information-sharing process, emanating from women ICT-users could likewise have multiplier effects for the community at large. Last but not least, ICT-competent women can participate and be influential in shaping gender awareness at the national levels – and contribute to relevant policies, programmes and practices.¹⁷

Significantly, the Broadband Commission report sees Internet connectivity and better Internet deployment as empowering processes, since, apart from providing equal access to resources and opportunities, they also enhance the agency to use these resources for personal purposes and for economic, social and political participation. More specifically, access to Internet is access to relevant information, which in turn can serve a number of purposes, such as increased efficiency at work, opportunities to start or improve one's own business, sell and buy goods, use health and education services, expand social and other networks, as well as engage in innovative practices.¹⁸

EU policy documents reiterate the same arguments. The Digital Single Market Strategy for Europe stresses the economic opportunities provided by digitalisation. The Commission Report *Women active in the ICT sector* concludes that if as many women as men held jobs in the digital economy, this could boost the annual EU GDP with roughly EUR 9 billion.¹⁹

The European Parliament draws on the Digital Single Market Strategy but 'regrets its narrow focus, as it underestimates the considerable potential that digitalisation can have with regard to an inclusive, equal and participatory society and fails to give sufficient recognition to the opportunities that targeted support and funding infrastructure can provide for women's empowerment'.²⁰

ICT enables the acquisition of new skills and acts as a catalyst in the delivery of public services such as education, employment, healthcare and financial services: 'In this light, ensuring equal access to ICT and the Internet is not seen only as a matter of human rights (e.g. freedom of expression); it would also improve women's health and the health of their families and communities, support women's access to education and other social services and contribute to women's employment, economic independence and the sustainable

¹⁵ EIGE (2016) *Gender and Digital Agenda*. Luxembourg: European Institute for Gender Equality, p.3.

¹⁶ Cruz-Jesus, F., M.R. Vicente et al. (2016) The education-related digital divide: an analysis for the EU-28. *Computers in Human Behaviour* 56: 72-82.

¹⁷ Broadband Commission (2013) *Doubling Digital Opportunities: Enhancing the Inclusion of Women and Girls in the Information Society*. Available at: <http://www.broadbandcommission.org/documents/working-groups/bb-doubling-digital-2013.pdf>.

¹⁸ *ibid.*

¹⁹ European Commission (2013) *Women Active in the ICT Sector*. Brussels: European Commission.

²⁰ European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. (2015/2007(INI) Brussels: European Parliament, p.10.

development of their livelihoods'.²¹ ICT inclusion would also enable women (and other under-represented groups) to participate more actively in political processes and engage in participatory democracy through electronic voting, surveys and discussion fora.²²

Building on these premises, the 2013 Broadband Commission report examines how access to the Internet and ICTs can help redress some of the inequalities women and girls face in their everyday lives. Conversely, however, it expresses concerns that unequal Internet access will reflect and reinforce 'offline' gender inequalities; additionally, the type of content available online might also strengthen gender inequalities and certain attitudes (e.g. sexist) towards women.²³

ICTs are often viewed as transformational tools put to practice to overcome chronic problems, not least poverty or administrative inefficiencies. Indeed, the language of 'information society' or 'knowledge-based economy', so pervasive in EU circles and beyond since at least the beginning of the 1990s, (e.g. the 1994 Bangemann Report) was included in the Lisbon agenda (making the EU the most competitive information economy with social cohesion and cultural diversity), the eEurope initiatives and the i2010 European information society for growth and employment.²⁴ The rhetoric has perhaps focused more on the economy and less on social policy; however, in the development discourse and in the gender equality debate, ICTs are seen as potential tools for liberation, prosperity, democracy and participation. Nonetheless, one has to be cautious when referring to the power of ICTs: avoiding a technological determinist attitude, we would rather see ICTs as embedded in a social context, which can be changed according to both the assumptions built in the technology at the point of design, as well as the interplay of the technology with the context in which it is placed.

In this vein, there are not many empirical studies which show how ICTs have contributed to poverty alleviation. The increasing realisation that ICTs are not deterministic, though, has informed different approaches to poverty alleviation which put people first: the livelihood approach is based on local content, which is seen as relevant to the needs of people, whereas the rights-based approach focuses on local ownership and participation in decision-making processes. Both demonstrate 'increasing awareness that instead of just promoting economic well-being of the poor, there is a need to use ICTs to facilitate their empowerment, to enhance their overall personal and social well-being'.²⁵ In this sense, a number of ICT centres in rural and urban India, for instance, create opportunities for women to access information of relevance, generate income, support each other, engage in business, or improve agricultural practices.

²¹ EIGE (2016) *Gender and Digital Agenda*. Luxembourg: European Institute for Gender Equality, p.3.

²² European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. (2015/2007(INI) Brussels: European Parliament.

²³ Broadband Commission (2013) *Doubling Digital Opportunities: Enhancing the Inclusion of Women and Girls in the Information Society*. Available at: <http://www.broadbandcommission.org/documents/working-groups/bb-doubling-digital-2013.pdf>.

²⁴ For a summary, see Boucas, D. (2017) The state and the development of an information society: Greek policy and experience. *The British Journal of Sociology* 68: 556–580. doi:10.1111/1468-4446.12238.

²⁵ Dighe, A and U. Reddi (2006) *Women's Literacy and Information and Communication Technologies: Lessons that Experience has Taught us*. Commonwealth Educational Media Centre for Asia, p.31.

1.2. Current situation

The EIGE study *Gender and Digital Agenda*²⁶ provides an overview of issues of gender inequalities in digitalisation and identifies:

- gender gaps and differences in access to and use of digital technologies
- gender gaps and differences in digital-related education and other fields of study between girls and boys
- gender divides in digital labour market: women's low participation in the digital labour market and in particular in high-quality jobs and top management positions
- ICT, cybercrime and gender issues.

1.2.1. Gender gap in access to digital services and technologies

Gender and ICT indicators are not widely available and indeed there has been an ongoing discussion as to how statistics on the deployment of ICTs can be improved. The 2003 WSIS recognised this and recommended that gender-specific indicators should be developed in order to assess adequately the performance and impact of ICT-funded projects.

ITU gender-disaggregated data for 91 economies show an overall wider global gender gap in 2017 than in 2013: while the gender gap has narrowed in most regions since 2013, it has widened in Africa. In 2017 the overall Internet penetration rate stands at 50.9% for men, compared to 44.9% for women. In addition, the share of men using the Internet is slightly higher than that of women in two thirds of the countries (but in the Americas the share of women is overall higher than that of men).²⁷

Eurostat collects extensive information society data and uses indicators of ICT usage by households and individuals that are gender-disaggregated. In 2013 70% of women aged 16-74 had Internet access at home compared to 74% of men; at work the percentages were 29% and 35% respectively. Women with a laptop, notebook, netbook or tablet computer to access the Internet were 21% (27% of men), while 32% of women (39% of men) had a mobile phone with Internet access.²⁸ Further, studies have shown that Internet access is probably less present in women-headed households, due to lower income, digital skills or interest.

In terms of regular Internet use, in 2013 weekly or more frequent use of the Internet (including every day) was 69% for women compared to 74% of men; 59% of women age 16-74 were using the Internet every day (65% of men). Still, between 2010 and 2014 the percentage of women aged 16-74 frequently using the Internet increased by 13 % (compared with a 9% increase among men), a good indicator of narrowing the gender gap.²⁹

Some available data on the EU-28 and ages 16-74 on the gender gaps in type of Internet use show that:³⁰

²⁶ EIGE (2016) *Gender and Digital Agenda*. Luxembourg: European Institute for Gender Equality.

²⁷ See <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdf>

²⁸ EIGE (2016) *Gender and Digital Agenda*. Luxembourg: European Institute for Gender Equality.

²⁹ *ibid.*

³⁰ *ibid.*

- 18% of women (33% of men) use Internet to download software content (2013 data)
- 35% of women (41% of men) use Internet to listen to/watch radio/TV programmes online (2014 data)
- 42% of women (47% of men) use Internet for banking (2014 data)
- 17% of women (22% of men) use the Internet to sell goods
- 13% of women (20% of men) use the Internet to buy goods online

Studies have demonstrated differences in Internet deployment between men and women: the former use the Internet more for social interaction and relationship maintenance, while the latter tend to use it for more targeted activities, such as obtaining financial information or reading the news. Women also seem to have integrated text-based communication (e.g. email) more than men.³¹ For some, women's and men's online practices are different, due to intrinsic gender differences: Women tend to engage more in collaborative conversation, while men in more competitive communication.³²

A recent study examined the patterns of usage between boys and girls in 39 countries (including many EU ones) using a sample of fifteen-year-old students drawn from the 2006 PISA study. The results have shown that:

- Boys use computers at home more than girls in 34 out of the 39 countries; they also report using computers outside home or school in 36 countries
- Contrary to expectations and stereotypes, girls do not appear to be using ICTs for educational purposes more than boys in any of the 39 countries
- Girls use ICTs for communication purposes more often than boys in 19 out of 39 countries; boys do so more often than girls in 10 out of the 39 countries, while in the remaining 10 countries there is no clear difference between girls and boys
- Boys use ICTs more than girls for entertainment purposes in all 39 countries
- The more gender-neutral the policies of a country, the larger the gap between girls and boys regarding computer usage at home and ICT usage for entertainment, as well as the use of ICTs for educational purposes. The latter is interpreted as an indication that boys are underachieving to a larger degree than girls.³³

A number of initiatives have worked towards better availability of sex-disaggregated data, particularly in the developing context, with the intention of informing national policy and set international goals. They also seek to produce statistics that better reflect the reality of ICT usage by men and women.³⁴ The Task Group on Gender³⁵ of the Partnership on Measuring ICT for Development has produced a relevant report. One of the best practices in data collection that they mention is Research ICT Africa, which uses sex-disaggregated

³¹ Kimbrough, A.M, R.E. Guadagno et al. (2013) Gender differences in mediated communication: women connect more than men. *Computers in Human Behaviour* 29:896-900.

³² Tekobbe, C.K. (2013) A site for fresh eyes. *Information, Communication and Society* 16(3): 381-396.

³³ Drabowicz, T. (2014) Gender and digital usage inequality among adolescents: a comparative study of 39 countries. *Computers and Education* 74: 98-111.

³⁴ Hafkin, N. (2013) Stocktaking and Assessment on Measuring ICT and Gender for the Partnership on Measuring ICT for Development. Task Group on Gender of the Partnership on Measuring ICT for Development.

³⁵ Led by ITU and UNCTAD and including the UNESCO Institute for Statistics, the UN Economic and Social Commission for Asia and the Pacific and the UN Economic and Social Commission for Western Asia, the ILO, LIRNEasia, Research ICT Africa, Women in Global Science and Technology and the World Wide Web Foundation.

ICT indicators for individuals and households, covering computers, mobiles, but also e-government, e-health and e-banking. They also complement this data with qualitative data from focus group discussions.³⁶

Generally speaking, the factors affecting the degree and type of access can be simply economic (lack of funds), cultural (lack of participation of women in decision-making, or prioritisation of boys' needs in the family at the expense of girls), lack of public spaces where women can safely use ICTs, time constraints due to their caring duties or technophobia.³⁷

Various projects, notably in the developing world, have attempted to overcome barriers to women's access and use of ICTs. In India, the Indian Institute of Technology Chennai has organised a project where 80% of kiosks are run by women with little or no prior ICT acquaintance. The 'India shop' website in Tamilnadu is designed to sell products made by women's cooperatives. The Self-employed Women's Association has established information technology centres in Gujarat, India to provide ICT awareness and skills for women and improve their microenterprises. In Pakistan, a community-based water and sanitation project used video technology to include women in the design and planning processes. In Adhara Pradesh, India, the 'E-Seva' project has been run by women information leaders and has provided e-government services.³⁸

1.2.2. Gender gap in digital skills and education

Active participation in the information society requires, obviously, much more than ICT equipment. Indeed, there is a vast discussion on **information literacy**, which is defined as 'the ability to access, know where to find, evaluate and use information from a variety of sources. It involves communication, critical thinking, and problem solving skills'.³⁹

Education is seen as a crucial factor in ICT adoption as more educated individuals are more competent to understand the (increasing) complexities of technological artefacts, while they are also more exposed to the use of ICT in both personal and professional life.⁴⁰

Digital competence, defined generally as the capacity to acquire, process and communicate digital information, is affected by socio-cultural background, including the home environment, cultural capital and academic orientation; such factors explain differences in digital competence between students.

Studies in schools have produced results that counteract the common myth that young people are by nature extremely competent in digital technology; research evidence displays heterogeneous results, and a great degree of this heterogeneity can be accounted for by the socio-economic and cultural background of the student. More specifically, family cultural capital seems to be positively correlated with digital competence, while high academic aspirations correlate negatively. The explanation for the former might be that cultural capital at home is an indicator of interest in learning; for the latter, it might a case

³⁶ Data available at: <https://researchictafrica.net>.

³⁷ Hafkin, N. and S. Huyer (2007) Women and gender in ICT statistics and indicators for development. *Information Technologies and International Development* 4(2): 25-41.

³⁸ Patil, D.A., A. M. Dhere and C. B. Pawar (2009) ICT and empowerment of rural and deprived women in Asia. *Asia-Pacific Journal of Rural Development* XIX(1): 1-22.

³⁹ Dighe, A and U. Reddi (2006) *Women's Literacy and Information and Communication Technologies: Lessons that Experience has Taught us*. Commonwealth Educational Media Centre for Asia, p.4.

⁴⁰ Cruz-Jesus, F., M.R. Vicente et al. (2016) The education-related digital divide: an analysis for the EU-28. *Computers in Human Behaviour* 56: 72-82.

of difference in emphasis on ICT between the curricula of technical schools and those of schools which prepare students for academic studies. Gender differences have not been observed in certain studies. These results, however, are far from conclusive.⁴¹ Much more research is needed to have a better picture.

Digital competence and information or digital literacy has been operationalised in a number of ways. The Educational Testing Service includes in digital competence the ability to access, define, manage, integrate, evaluate, create and communicate information. The International Society for Technology and Education distinguishes between a) creativity and innovation b) communication and collaboration c) research and information fluency d) critical thinking and problem solving e) digital citizenship f) technology operations.⁴²

The OECD Skills Strategy provides a framework for investing in the development of skills that are fit for the digital economy. It advocates international mobility to fill skills gaps and cross-border policies, measures aimed at retaining skilled people, as well as creating a better match between skills and job requirements.⁴³ The European Union in 2006 proposed eight key competences for lifelong learning, one of which was digital competence, taken to involve ICT skills and learning and participation using ICT.⁴⁴ Subsequently, the Digital Competence Framework for Citizens, also known as DigComp, was published in 2013 by the European Commission. It is a tool to improve citizens' digital competence and help policy-makers formulate policies that support digital competence building through education and training initiatives towards specific target groups. DigComp also provides a common language and a common reference point for the key areas of digital competence across the EU.

A significant part of the population lacks the digital skills necessary to compete in the labour market. Statistics show that 47% of workers in the EU lack adequate digital skills. One in ten adults does not have even basic e-skills, while 57% of adults 55-65 years old do not know how to use a computer. In addition, one in ten individuals 16-29 years old lacks elementary digital skills. Such deficiency makes employability difficult and places these young people at a disadvantageous position, as they cannot use ICTs for job search purposes.⁴⁵

Clearly, the problem of (offline) illiteracy has a direct impact on online information literacy. Illiteracy, as it is well-known, is particularly acute in the developing world, e.g. in South Asia; its established link with poverty has made literacy central in the Millennium Development Goals agenda. As the relevant International Action Plan for implementing literacy states, 'it has become necessary for all people to learn new literacies and develop the ability to locate, evaluate, and effectively use information in multiple manners'.⁴⁶

⁴¹ Hatlevik, O.E. and K-A Christophersen (2013) Digital competence at the beginning of upper secondary school: identifying factors explaining digital inclusion. *Computers and Education* 63: 240-247.

⁴² Ibid.

⁴³ European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

⁴⁴ European Parliament and European Council (2006) Recommendation of the European Parliament and the Council on key competencies for lifelong learning. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006H0962&from=EN>.

⁴⁵ European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

⁴⁶ Quoted in Dighe, A and U. Reddi (2006) *Women's Literacy and Information and Communication Technologies: Lessons that Experience has Taught us*. Commonwealth Educational Media Centre for Asia.

Poverty, lack of time and socio-cultural factors affect literacy opportunities: for instance, reduced mobility often restricts the educational opportunities available to women both in the developing world and in Europe.

From a different perspective, many feminists argue that the ways in which ICT, and science, technology, engineering and mathematics (STEM) more generally, are taught is male-centred and does not account for the different learning styles of men and women, the former encouraged to experiment, the latter more gravitating towards a more systematic, ordered method.⁴⁷

The implications of lack of literacy for the digital divide are clear, as increased opportunities will enhance autonomy in personal and participation in social life, whilst their absence will widen the gap between information-rich and information-poor even more.

Often ICT-literacy is linked with particular tertiary education choices, where certain gender gaps are observed. The most recent Programme for 15-year-old International Students Assessment (PISA) shows that across OECD countries, 25% of boys and 24% of girls on average reported that they expect to work in a science-related occupation. However, girls see themselves as health and social science professionals more than boys, while there are almost four times as many boys as girls who envisage a career in ICTs, science or engineering. To a large degree such diversity in expectations is based on gender stereotypes about what constitutes masculine or feminine subjects, which need to be challenged through training and awareness.⁴⁸

The 2013 European Commission Women active in the ICT sector study notes that only 9.6% of women students in tertiary education study ICT-related degrees, compared to 30.6% of men. In terms of graduates, out of 1,000 women with an undergraduate degree in Europe, only 29 hold a degree in ICT (compared to 95 men), whilst only 4 actually will work in the ICT sector (based on 2010 Survey on Working Conditions data, which includes the EU27, Norway, Croatia, the Former Yugoslav Republic of Macedonia, Turkey, Albania, Montenegro and Kosovo).⁴⁹

This division is due to some extent to gender stereotypes (masculine and feminine subjects), which inform the ways in which ICT is taught, the frequency of use of ICT by male and female students, or the different expectations between male and female students. While there are very few differences in actual ability between girls and boys in maths and science, there are certain misconceptions about such abilities. The teaching materials present gender biases, while teachers often provide different motivations to girls and boys. Parents reinforce gender stereotypes by encouraging/discouraging boys/girls from pursuing a career in STEM subjects. The absence of female role models in science and technology also does not facilitate girls' career choices towards STEM and particularly ICTs.⁵⁰

A number of initiatives globally focus on enhancing literacy through the use of ICTs (and by consequence achieve some degree of ICT-literacy at the same time). In India, the Tata computer-based Functional Literacy Programme uses computers to deliver the lessons;⁵¹ the Bridges of the Future Initiative uses innovative ICT tools to promote adult learning; the

⁴⁷ Turkle, S. and S.Papert (1990) Epistemological pluralism: styles and voices within the computer culture. *Signs: Journal of Women in Culture and Society*. 16 (1): 128-157.

⁴⁸ OECD (2015) *PISA Results in Focus*. Programme for International Students Assessment. Paris: OECD.

⁴⁹ European Commission (2013) *Women Active in the ICT Sector*. Brussels: European Commission.

⁵⁰ European Parliament (2012) *Women in ICT*. Brussels: Policy Department C - Citizens' Rights and Constitutional Affairs Brussels: European Parliament.

⁵¹ See totaliteracy.com.

Commonwealth of Learning Literacy project in India and Ghana has deployed the 'technology-based community learning centre' model, where various ICT equipment are accessed, used and managed by members of the community and where local literacy manuals are developed.

Other attempts to challenge stereotypes and increase awareness include, for instance, the ITU Girls in ICT portal, which helps girls evaluate whether they already possess certain ICT skills.⁵²

A number of EU countries have also been concerned about digital skills in education. Recently, a study of schools in Europe demonstrated the need for infrastructure improvements and more integration of ICTs in teaching and teachers' development. It also revealed a slight preference towards computers from boys than girls at grade 11, though the reasons for this were not clear.⁵³

1.2.3. Gender segregation in the labour market

The ICT market has changed significantly and presents many opportunities for growth through the development of software products for a variety of purposes, the expansion of social media and other large corporate platforms, the development of new goods and services, the evolution of artificial intelligence and the Internet of Things, or the 'green growth' and the increasing demand for smart applications.⁵⁴

Globalisation has led to creation of employment opportunities for women but some reinforce traditional roles and tend to be low-skilled and low-paid. The deeper causes of gender inequality are linked with the promotion of 'growth' which is market-led and leads to certain political-economic relations and practices, such as financialisation, privatisation and production geared to short-term profits.⁵⁵

Despite increasing participation, women are still under-represented in the labour market (62.3% female labour force participation on average in OECD in 2012). They also occupy over 50% of central government jobs, but only 29% of top management positions. In addition, significant decreases in the proportion of women's participation in the ICT industry are observed throughout nearly all countries in Central Europe (up to 10 percentage points), but also in Austria, Denmark, France, UK and Ireland (3-5 percentage points). The only European countries where the proportion of women in STEM has actually increased marginally are Estonia, Belgium and Malta. But, more generally, females are under-represented in STEM careers and this trend is widening in many European countries.⁵⁶

Women tend to avoid ICT-related studies and are even less likely to choose 'digital' careers. In 2012 only 2% of all women in the labour market worked in the ICT sector, compared to 3.6% of men. Only around 32% of employees in the ICT sector are women. At the OECD level, trained female professionals are less than 20% of ICT professionals.⁵⁷ In

⁵² See www.girlsinict.org.

⁵³ European Commission (2013) *Survey of Schools: ICT in Education*. Directorate General Communications Networks, Content and Technology. Brussels: European Commission.

⁵⁴ ITU (2012) *A Bright Future in ICT: Opportunities for a New Generation of Women*. Geneva: International Telecommunications Union. Available at: <https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Documents/ReportsModules/ITUBrightFutureforWomeninICT-English.pdf>.

⁵⁵ Leach, M., Mehta, L. and P. Prabhakaran (2016) Sustainable development: a gendered pathways approach. In Leach, M. (ed.) *Gender Equality and Sustainable Development*. London and New York: Routledge.

⁵⁶ OECD (2014) *Enhancing Women's Economic Empowerment Through Entrepreneurship and Business Leadership in OECD Countries*. Paris: OECD.

⁵⁷ European Commission (2013) *Women Active in the ICT Sector*. Brussels: European Commission.

such a rapidly growing sector, improving women's literacy and skills would strengthen their inclusion in the labour market. In addition, given that ICT is a high paying sector, this inclusion would reduce the gender pay gap.

Furthermore, women remain under-represented in decision-making positions in both public and private sectors; in the EU females were less than 3% of CEOs and less than 18% of board members, with only five countries (Finland, France, Latvia, Sweden and the Netherlands) having a share of more than 25%. Women are also a minority as entrepreneurs (in 2010 in the EU27 only 25% of business owners with employees were women).⁵⁸ Financing gaps between men and women are seen as partly responsible, though financing discrimination against women is hard to prove. Still, there have been studies showing that female-owned firms had to pay higher interest rates or that female entrepreneurs had to provide more documentation to lenders.⁵⁹ At the same time, women tend to participate less in financial networks and be less confident in approaching venture capital firms, not being familiar with practices and/or fearing that they might be seen as inferior.⁶⁰

Likewise, women in ICT occupy low-level jobs and represent only 19.2% of managers in the ICT sector, compared to a much better share of 42.5% in the non-ICT service sector.⁶¹ The study *Women in ICT* explains this low representation of women in terms of stereotypes⁶² about women lacking relevant skills (including leadership skills and less aptitude for STEM studies and careers); work-life balance complexities; male stereotypes and networking culture; and lack of role models.⁶³

Howcroft and Richardson, in their examination of the service sector and of outsourcing of ICT-enabled service work in a developing context, have examined the ways in which gender, labour markets, service work, globalisation and ICTs intersect and produce new gender inequalities in the global service work arrangements. Being critical of the rhetoric of employment opportunities provided by ICT in services and the growing feminization of such work, they argue that women are predominant in industries with poor-quality employment 'where profit margins are protected by reducing labour costs, extending working hours or reducing the number of formal workers'.⁶⁴

Retaining women in the ICT sector is also a challenge, as women's participation decreases with age. The phenomenon of the 'leaky pipeline' (gradual exit of women as they move up their career ladder) is observed in ICT jobs, too, with women under 30 with a degree in ICT making up 20% of the ICT sector, this falling to 15.4% for women aged between 31 and 45 and reaching 9% for women over 45. The reasons behind this, among others, are work-life balance issues, organisational constraints and a lack of women role models; the leaky pipeline is an important reason why firms would want to engage in gender initiatives.

⁵⁸ OECD (2014) *Enhancing Women's Economic Empowerment Through Entrepreneurship and Business Leadership in OECD Countries*. Paris: OECD.

⁵⁹ Alesina, A.F., F.Lotti and P.E.Mistrulli (2008) Do women pay more for credit? Evidence from Italy. NBER Working Paper No 14202. National Bureau of Economic Research. Cambridge, US.

⁶⁰ Coleman, S. and A.M. Robb (2012) *A Rising Tide: Financing Strategies for Women-owned Firms*. Stanford, US: Stanford University Press.

⁶¹ European Commission (2013) *Women Active in the ICT Sector*. Brussels: European Commission.

⁶² Such stereotypes have been long challenged, for instance, through the 1995 Beijing Platform for Action, which encouraged a more balanced presentation of women in media.

⁶³ European Parliament (2012) *Women in ICT*. Brussels: Policy Department C - Citizens' Rights and Constitutional Affairs Brussels: European Parliament.

⁶⁴ Howcroft, D. and H. Richardson (2008) Gender matters in the global outsourcing of service work. *New Technology, Work and Employment* 23(1-2), p.56.

Labour market segregation exists despite studies suggesting that gender balance in high-value ICT positions, both in management and on company boards, improves business performance and leads to better financial results. Gender balanced teams make better decisions, and have less risk-taking and more successful outcomes.⁶⁵ Other reasons why businesses may be interested in having better overall female participation include the fact that the number of women receiving STEM degrees is on the rise and consequently they represent considerable talent. Also it has been established that greater diversity helps problem-solving in firms, while involving women (who are the main consumers) serves better the global market. Last but not least, the economic case for gender equality in the labour market is important from the perspective of addressing the demographic problems of ageing population and low fertility rates.⁶⁶

At the same time, and due to the demands for constant upgrading of skills posed in a knowledge economy, women in the ICT sector, but also more generally, might face adverse circumstances when their work-life balance situation does not allow them to find time for training demands. The implication of this will be that mid-career women are at risk of losing their jobs to younger and more competent workers.⁶⁷ The European Commission's roadmap 'New start to address the challenges of work-life balance faced by working families' aims at addressing the problem of reconciling family responsibilities with the increasing demands for skills' upgrading. The European Parliament, while welcoming such considerations and the opportunities provided by digitalisation, stresses the need to provide adequate social security, and ensure that flexible forms of employment comply with respectable working standards.⁶⁸

There have been plenty of initiatives to promote female ICT work and entrepreneurship. The ITU Girls in ICT Portal is designed to reflect women's interests and stimulate their interest in areas like healthcare, education and medicine, where the use of apps and remote learning make these areas stimulating and suitable choices for women to express their creativity.⁶⁹ The 'Grameen Bank Phones' in Bangladesh, for instance, is an ICT-enabled business with high numbers of women owners, who operate their phone business (selling wireless phone services to their villagers), while doing household or other work. In Malaysia, the project T-Centre (for Tele-networking and Telecommuting) has targeted women and the young to educate them in tele-working as a new mode of work; the E-Homemakers project has provided a platform for people (mainly women) to trade and exchange online from home.⁷⁰

⁶⁵ ITU (2012) *A Bright Future in ICT: Opportunities for a New Generation of Women*. Geneva: International Telecommunications Union. Available at: <https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Documents/ReportsModules/ITUBrightFutureforWomeninICT-English.pdf>.

⁶⁶ OECD (2014) *Enhancing Women's Economic Empowerment Through Entrepreneurship and Business Leadership in OECD Countries*. Paris: OECD.

⁶⁷ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme.

⁶⁸ European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. (2015/2007(INI) Brussels: European Parliament.

⁶⁹ ITU (2012) *A Bright Future in ICT: Opportunities for a New Generation of Women*. Geneva: International Telecommunications Union. Available at: <https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Documents/ReportsModules/ITUBrightFutureforWomeninICT-English.pdf>.

⁷⁰ Patil, D.A., A.M.Dhere and C.B Pawar (2009) ICT and empowerment of rural and deprived women in Asia. *Asia-Pacific Journal of Rural Development* XIX(1): 1-22.

1.2.4. ICTs, gender and cybercrime

Apart from connectivity and participation in the ICT labour market, there are other, more subtle barriers that might prevent women from benefiting from Internet access and use. Women might face difficulties in accessing the public facilities where ICT resources are located; such difficulties might have to do with social and cultural norms or with objective difficulties (e.g. related to safety or cultural reasons). In addition, online navigation might involve for women threats of harassment, intimidation, surveillance, illegal data retention, or cybercrime.⁷¹

Such threats will often reflect offline arrangements, including patriarchal forces which are uneasy about women's empowerment through ICT use and Internet access, repressive groups particularly targeting women, either through intimidation or negative campaigning, state authorities that might be retaining user data legally or illegally or aggressive and sexist hate speech feeding on traditional gender stereotypes.⁷²

According to the UN data mentioned by the Association for Progressive Communications (APC), 95% of aggressive behaviour, harassment, abusive language and denigrating images online are aimed at women and come from current or former male partners. Cybercrimes, particularly against women, have become common and range from defamation or hate speech in social media to surveillance of online activity, tracking user computers or hacking women's data.⁷³

Certain platforms even enable sexual exploitation of women and girls and commodification of women's bodies, as well as trafficking of women and minors. It is estimated that about 18% of EU women have suffered some form of harassment since adolescence.⁷⁴

The above often act as deterring mechanisms for women to use the Internet. A recent APC study examined the policies of three major Internet platforms, Facebook, YouTube and Twitter with respect to violence against women online. The study showed some common features among the three cases. There was an observed reluctance to engage with issues of violence related with technology before they became a public relations matter; there was a lack of clarity vis-à-vis reporting and redress procedures; there was no public commitment to human rights standards apart from free speech. As a counterpoint, though, these social media platforms have recently taken steps, such as engaging with stakeholder groups, or providing simpler reporting mechanisms. However, they have also demonstrated an unclear stance and lack of awareness regarding their responsibility to protect women from online violence, while they have systematically protected free speech, often at the expense of women's offence.⁷⁵

⁷¹ Mason, C. and S. Magnet (2012) Surveillance studies and violence against women. *Surveillance Studies* 19(2): 105-118. Available at: <https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/vaw>.

⁷² Green, E. and A. Adam. (1999) Special Issue on Gender and ICTs. *Information, Communication and Society* 2(4): 399-583.

⁷³ Association for Progressive Communications *How Technology Is Being Used to Perpetrate Violence Against Women – And to Fight It*. Available at: <https://www.apc.org/en/pubs/research/how-technology-being-used-perpetrate-violence-again>.

⁷⁴ European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. (2015/2007(INI) Brussels: European Parliament.

⁷⁵ Association for Progressive Communications *How Technology Is Being Used to Perpetrate Violence Against Women – And to Fight It*. Available at: <https://www.apc.org/en/pubs/research/how-technology-being-used-perpetrate-violence-again>.

2. EU POLICY AND PRACTICE

KEY FINDINGS

- Various EU bodies have been involved in policy-making to address the digital gender gap in information and communication technologies access and use, in digital skills and in the segregated digital labour market, using a number of initiatives in cooperation with Member States.
- Access and use of the Internet present variations across Member States, though the gender differentiations are not well-documented.
- Partnerships among stakeholders, such as NGOs, governments and other public agencies, educational actors and the industry have adopted measures to offer more ICT training and digitally-informed education, to provide incentives for ICT jobs and to increase awareness of young people towards ICT study and career.
- Relevant policy initiatives have been introduced to increase awareness vis-à-vis risk and threats associated with online activity.

The EU has adopted a number of Actions and initiatives to promote access to ICTs by women, to enhance digital skills, as well as to facilitate and encourage the participation of women in ICT and ICT-related employment.

The Social Investment Package (2020) asks Member States to ensure that women have adequate ICT access. It also promotes the deployment of ICTs to stimulate participation of women in the labour market, by encouraging ICT-enabled flexible working arrangements and the provision of childcare services. The EU e-skills for the 21st Century strategy aims at increasing the participation of women in ICT and STEM fields. It involves the implementation of the recommendations of the Helsinki Group on Women in Science, as well as the exchange of practices between Member States. It also addresses the issue of modernisation of the education systems and the necessary teacher training. The EU Agenda for new skills and jobs recommends to Member States certain labour markets interventions for better job quality and working conditions and job creation, as well as investment in digital skills.⁷⁶

2.1. Access and use of digital services and technologies

The European Commission and the European Parliament have repeatedly stressed the need for appropriate infrastructure for citizens (including women) to find employment opportunities, access services and contribute to public life. Such infrastructure should be available in urban and rural areas so that all citizens can be included in the digital economy and society.⁷⁷

In order to help policymakers obtain a macro-level view of the progress of EU countries towards a digital economy and society, the European Commission has developed the Digital

⁷⁶ EIGE (2014) *Good Practices in Women's Entrepreneurship*. Report from consultation meeting 27-28 February in Athens. Luxembourg: Publications Office of the European Union.

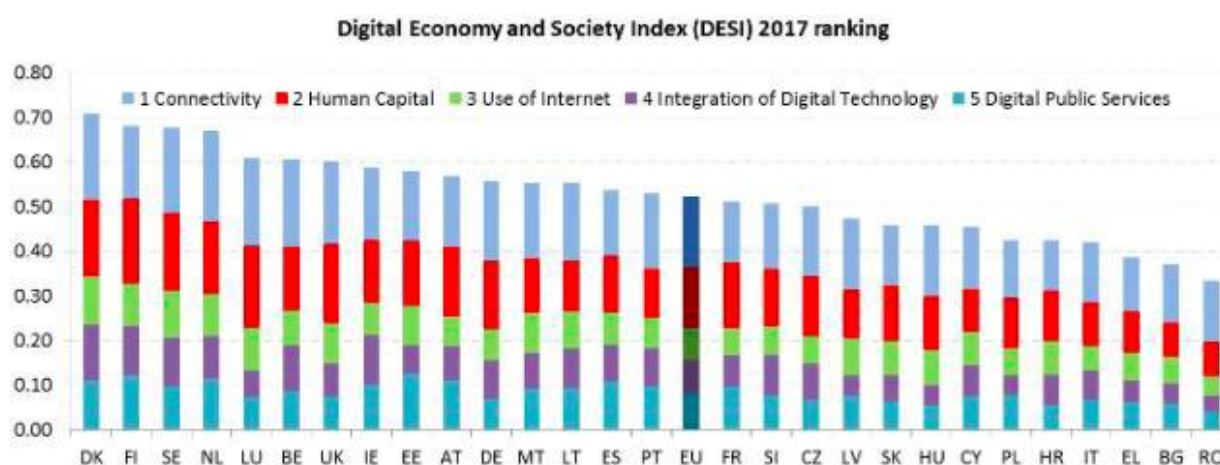
⁷⁷ European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. (2015/2007(INI) Brussels: European Parliament,

Economy and Society Index (DESI), which uses data from the European Union Survey on Internet Use in Households and by Individuals and displays how individuals have used the Internet in the last three months as a proxy for their digital skills. It comprises five principal policy areas which include overall 31 indicators in five groups: ⁷⁸

- Connectivity: Fixed broadband, mobile broadband, broadband speed and prices.
- Human capital: Basic skills and Internet use, advanced skills and development.
- Use of Internet: Citizens' use of content, communication and online transactions.
- Integration of digital technology: Business digitisation and e-Commerce.
- Digital public services: e-Government

Figure 1 shows the DESI ranking for 2017.

Figure 1: Digital Economy and Society Index (DESI) 2017



Source: <https://ec.europa.eu/digital-single-market/en/desi>

2.2. Digital skills and knowledge

The impact of digitalisation on the European economy and society cannot be underestimated.⁷⁹ The OECD reports that the potential of the digital economy has not yet

Beyond the economic benefits, digitalisation offers ample educational opportunities through online courses or open educational resources, which can be accessible by people with special needs and inhabitants of remote areas. ICT education is important for taking advantage of these opportunities but also necessary, as ICT-related flexibility contributes to a constant reconfiguration of the economy labour market and calls for lifelong learning and

⁷⁸ European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

⁷⁹ European Commission (2015) *A Digital Single Market Strategy: Analysis and Evidence*. Brussels: European Commission.

new digital skills.⁸⁰ Reforms in vocational education and lifelong learning are necessary in each Member State.⁸¹

A recent study attempts to explain digital divides across EU-28 states according to the different educational attainment of their populations. It correlates two factors, namely ICT adoption by individuals with e-learning, cross border e-commerce and civic participation across the EU-28. Overall the Northern and Central European states score higher in both dimensions compared to the Western and Southern European ones, though countries such as the Netherlands and Belgium present contradictory performance. However, these results mask significant differences among different segments of the population in each country and demonstrate the limitations of aggregate statistics.⁸²

To address the emerging and evolving needs in digital skills, the EU framework DigComp was published in 2013 by the Institute for Prospective Technological Studies of the European Commission's Joint Research Centre and was upgraded in 2016 through a consultation process to reflect contemporary changes in digital skills vocabulary. The result has been DigComp 2.0 (Table 1).

Table 1: DigComp 2.0: The Digital Competence Framework for Citizens

Title	
Information and data literacy	To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.
Communication and collaboration	To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity and reputation.
Digital content creation	To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.
Safety	To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.
Problem solving	To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.

Source: (European Commission 2016)

⁸⁰ European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. (2015/2007(INI) Brussels: European Parliament.

⁸¹ European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

⁸² Cruz-Jesus, F., M.R. Vicente et al. (2016) The education-related digital divide: an analysis for the EU-28. *Computers in Human Behaviour* 56: 72-82.

The framework serves three purposes, namely strategic support for policy formulation, instructional planning, and finally it can be used as an assessment tool. Various policy documents have used DigComp as reference.⁸³

Regarding instructional planning, DigComp has been deployed to inform education, skills, training and employment initiatives. The Department of Education in Flanders, Belgium, for instance, has developed eight educational programmes based on the competences derived from DigComp.

Teachers' professional development programmes in various EU countries have embraced the DigComp Framework.⁸⁴ Public entities have also adopted DigComp as a public and free assessment tool. The Ikanos project, for instance, by the Basque Government, offers a free diagnostic tool for assessing one's own digital competence.

In the above initiatives the gender dimension is largely absent. This is rather surprising as in parallel, key documents have stressed the gender gap in digital skills. As the emerging Digital Single Market appears to be polarised between medium-skilled workers, increasingly less needed on the one side, and lower-skilled or higher-skilled workers on the other, who will be needed more due to the digitalisation of labour, it is the medium-skilled workers who need to upgrade their digital skills.⁸⁵ Taking into consideration that this category is populated mainly by women employees, digital skills acquisition becomes an issue with clear gender dimensions, which makes the absence of the gender aspect in the DigComp and its national implementations even more surprising. The same argument applies when considering particular sectors, e.g. retail services, where women are over-represented and where there are not specific sectoral policies for digital skills.⁸⁶

It is also worth mentioning the Grand Coalition for Digital Jobs, introduced by the European Commission, a large-scale partnership with many stakeholders from the private and public sectors, including firms, NGOs, government agencies and educational actors. Its goals are: to offer more ICT training in collaboration with the industry, to implement job placement programmes, to provide more digitally-aligned degrees and educational/training curricula and to increase awareness and encourage young people to pursue ICT studies and careers.⁸⁷ It is coupled with national, regional and local coalitions bringing together ICT and ICT-using employers, education/training providers, education and employment ministries, public and private employment services, associations, non-profit organisations and social partners, who develop concrete measures to bring digital skills to all levels of society.⁸⁸

⁸³ For example, the Italian Coalition for Digital Skills has included it in its 2016 *Strategy and Roadmap for Digital Competence*, while the 2015 Italian National Plan for Digital School has used it as DigComp in its guideline document. Similarly, the Maltese Ministry for Education and Employment published the 2015 *Green Paper on Digital Literacy*. The *Operational Programme Digital Poland 2014-2020* refers to DigComp, among other frameworks for the implementation of e-integration social projects (European Commission 2016).

⁸⁴ For example, the Ministry of Education, Culture and Sports in Spain created has introduced new digital training materials for teachers based on DigComp. Additionally, the use of DigComp for professional development for teachers has led to digital competence programmes in Spain. In Portugal, the Directorate-General for Education of the Ministry of Education uses DigComp as an input for professional development courses for teachers since 2016. Likewise, in Lithuania the framework is also used since 2015 for professional development for teachers. In Croatia, the e-Schools project (2015-2022) is implementing DigComp as a key support for digitally-competent teachers (European Commission 2016). Since 2013 the Norwegian Centre for ICT has been using DigComp as a guide their national digital competence framework for guiding teacher training.

⁸⁵ European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

⁸⁶ Ibid.

⁸⁷ Ibid.

⁸⁸ See <https://ec.europa.eu/digital-single-market/en/national-local-coalitions>.

A question, however, remains how active these actually are and to what extent they integrate the gender dimension in their work. There are interesting examples: for example, in the UK, a network of firms called the Tech Partnership aims at encouraging young people and notably girls to pursue technological education and relevant careers. They have also set industry standards for accreditation of appropriate educational curricula and training programmes.⁸⁹

2.3. Gender segregation in the labour market

The Entrepreneurship 2020 Action Plan involves the creation of opportunities for entrepreneurship in the digital economy. The Small Business Act for Europe refers in particular to small and medium-sized enterprises (SMEs), identifying the need to improve their skills and competitiveness.⁹⁰

Lack of role models, **corporate, social and cultural norms** are among the biggest obstacles preventing women from reaching high positions in firms. Many companies, in response, are changing their HR practices (recruitment, promotion, remuneration, flexibility, mobility) to promote diversity. Some best practices pursued by firms include the following:⁹¹

- Middle and top management commitment to change the gender balance.
- Inclusion and diversity in the business strategy.
- Enabling framework in human resources and operational practices.
- Robust support for women executives, including training and development of leadership skills.
- Change organisational culture.
- Address the broader social context.

Other policies have to do with reducing the **institutional barriers** that prevent female entrepreneurship, for example the growth of female firms. In 2008 the European Commission adopted regulations that extend the granting of state aid to new firms created by women; in 2009 it inaugurated the European Network of Female Entrepreneurship Ambassadors, in 2011 the European Network of Mentors for Women Entrepreneurs and the European Network to Promote Women's Entrepreneurship, to provide relevant role models. In 2011, the European Parliament provided a series of recommendations to the European Commission, Member States and regional authorities on financial and educational support, networking opportunities and ICTs, whilst EIGE is also active in supporting exchanges of good practices in entrepreneurship.⁹²

There are a number of national policies to promote **female entrepreneurship**, including a gender-neutral legal framework for business, financing measures and financial literacy, access to consultancy and professional services. National initiatives include Ireland's 'Going

⁸⁹ <https://www.thetechpartnership.com/>.

⁹⁰ European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

⁹¹ OECD (2014) *Enhancing Women's Economic Empowerment Through Entrepreneurship and Business Leadership in OECD Countries*. Paris: OECD.

⁹² OECD (2014) *Enhancing Women's Economic Empowerment Through Entrepreneurship and Business Leadership in OECD Countries*. Paris: OECD.

for Growth', in which entrepreneurs meet once per month for six months under the mentorship of a female entrepreneur to exchange practices.⁹³

A number of initiatives have attempted to address the problem of **financing**. Public policy is important in improving conditions of firms under female ownership by improving access to financial resources, particularly in cases of SMEs. Policies are effective when they are complementary, i.e. when financing instruments are accompanied by training and consultancy to boost female confidence in accessing financial institutions or informal investors.⁹⁴

Financial independence empowers women and **financial literacy** is essential for them to take decisions related to business, investments, savings and career issues and ICT literacy is key to access to such kind of information. Women's business ownership is recognised as a very important contributor to the economy globally, although it varies significantly across countries. On average it accounts for 25% of all businesses with the exception of the USA where it is almost 40%, and it is on the rise.⁹⁵

Access to finance is key to unlocking the entrepreneurship potential of marginalised or disadvantaged social groups. A new category of financial products has emerged which can serve as tools for inclusion of women and which heavily depend on the internet. Technology brings lenders and borrowers closer; such forms of funding are crowdfunding and peer-to-peer lending. The former consists of a multitude of people investing small sums to projects via the internet and it is easy to follow up and low-cost, whilst the latter is suitable for non-bankable entrepreneurs and members of the same community.⁹⁶

Despite their proliferation and popularity these new forms of funding have very recently started to be regulated by the legislator and the lack of regulation had hitherto acted as a barrier. Another very popular form of funding among poorer entrepreneurs and predominantly women is microcredit. Access to information regarding business funding is mainly online and the rapid developments in financial technology, FinTech, are revolutionising the banking sector and marginalise soon high numbers of people who do not have the skills or financial means to cope; this will affect women and the elderly significantly.

The gender gap when it comes to financial knowledge in the EU is on average around 20 percentage points.⁹⁷ In a digitalised world productivity involves ability to generate, analyse and implement ideas, risk-taking, entrepreneurship, innovation and achievement of the set goals.

In addition, there are initiatives to increase **female representation on corporate boards**. Corporate governance codes are self-regulatory measures towards this direction. In the UK a 2011 government report asked the top 100 companies to aim for a minimum of 25% female representation; this had an obvious effect, as representation rose from 12.5% in 2011 to 20,7% in 2013.⁹⁸ In Denmark, the 100 largest firms are required to set a target

⁹³ Ibid.

⁹⁴ Ibid.

⁹⁵ Ekinsmyth, C. (2014) Mothers' business, work/life and the politics of 'mumpreneurship'. *Gender, Place & Culture* 21(10): 1230-1248, p.1231.

⁹⁶ OECD and European Commission (2014). *Policy brief on access to business start-up finance for inclusive entrepreneurship: Entrepreneurial activity in Europe*. Luxembourg: Publications Office of the European Union.

⁹⁷ Ibid.

⁹⁸ OECD (2014) *Enhancing Women's Economic Empowerment Through Entrepreneurship and Business Leadership in OECD Countries*. Paris: OECD.

for female representation, include in their annual report policies to achieve the target and report on fulfilling (or not) the target. Some countries in Europe have introduced mandatory quotas for publicly listed companies (e.g. Belgium, France, Italy, Ireland, the Netherlands, Norway and Spain). In Norway the effect was an increase from 9% in 2003 to almost 40% in 2008, though increase in board membership is not necessarily accompanied by increased female representation in top management.

National policies address also the more general social context; the OECD Gender Recommendation sets a policy framework for gender equality in education, employment and entrepreneurship by addressing **gender stereotyping** and the ways in which it informs education and employment/entrepreneurship. This framework feeds into national policies; for example, in Germany there is an attempt to break the stereotypes in STEM fields by organising national events such as the 'Girls and Boys Day', during which boys and girls are encouraged to explore career pathways that are not typical of their sex.⁹⁹ In addition, the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth has supported Pinkstinks, a campaign that aims at challenging gender stereotypes in the products, media and marketing by organising demonstrations; it has also established a YouTube-channel, where a girl gives explanations and advice for other girls and young women on finding an identity beyond the beautiful and sexy stereotype.¹⁰⁰

Likewise, in an attempt to encourage girls to study STEM, the Italian Ministry of Education, University and Research established in February 2016, in collaboration with the Italian Department for Equal Opportunities, the so-called 'STEM Month—Women want to count', which involves specific initiatives to combat gender stereotypes and discrimination at schools. In Malta, 11 February 2016 marked the first 'International Day for Women and Girls in Science', aiming at raising awareness against barriers disadvantaging women and girls and promoting positive female role models and setting up programmes to encourage girls to pursue careers in science.¹⁰¹

Other policies (e.g. in Germany, Spain and Sweden) have aimed at encouraging a positive gender balance within the ICT profession through encouraging ICT-related career paths and relevant education for young women.¹⁰² Social policies, for example the generous system of parental leaves in Scandinavia, together with the provision of day care facilities shape attitudes and career choices by enabling work and family reconciliation for both women and men.

Employment policies, which provide financial incentives to work, counselling and apprenticeship schemes, or enforce regulation for anti-discrimination and equal pay, together with labour law and collective bargaining are an important part of the landscape in which female employment is placed, with clear impact on the degree of gender equality in the labour market.

Informal corporate practices and the associated norms are more difficult to challenge and require participation of diverse partners, not least NGOs and media to increase awareness, as mentioned in the **Recommendations section** of this study.

⁹⁹ Ibid.

¹⁰⁰ See www.pinkstinks.de.

¹⁰¹ European Commission (2017) *Report on Equality between Women and Men in the EU*. Brussels: European Commission.

¹⁰² European Parliament (2015) *Employment and Skills Aspects of the Digital Skills Market Strategy*. A Study for the Directorate General for Internal Policies, Policies Department A: Economic and Scientific Policy. Brussels: European Parliament.

The European Code of Best Practices for Women and ICT, launched by the European Commission in 2009, aims to solve the **ICT skills gap** problem in Europe and also to retain and promote women who are already in the sector. The Code proposes different measures and activities, organised under four categories: a) Education: to break stereotypes and encourage ICTs through actions in schools and tertiary institutions b) Recruitment: to enhance recruitment of young females in the ICT sector c) Career development: to retain women in the sector by enhancing their potential d) Return to work after leave and allowing work/life balance: to enable women to return after leave or encourage other women to enter the sector.

To date it has been signed by 59 companies and associations mainly from the ICT sector (including Google, Microsoft, BT, HP, Sony, Cisco, BBC and many more).

The Code mentions: 'Attracting more women into ICT jobs will not just help to address a problem that risks damaging the whole economy but also contributes to realising equal opportunities goals and empowers women by enhancing their capacity to participate fully in the information society and shape its development'.¹⁰³

A recent survey of most of the signatory organisations of the Code has revealed that:

- most of the signatories offer flexible working conditions
- three of them have developed educational activities
- the largest companies have developed training programmes to promote women to their boards
- however, overall the Code is not seen as achieving the desired results¹⁰⁴

The EP study *Women in ICT* identifies certain best practices pursued by companies. RTÉ is an example of an Irish broadcasting company highlighted by the European Commission as a best practice in terms of recruitment policy. The company puts emphasis on equal opportunities, including positive discrimination in departments where women are underrepresented. Telia Sonera is an example of best practice in terms of career development, as it emphasises equal opportunities in leadership skills and promotion to managerial roles. The German institute Fraunhofer Gesellschaft is singled out as a good example of work/life balance; flexible arrangements are given as an option, while on-site childcare and after-school activities for children have played a role in its achieving a share of 30% of women among its researchers.¹⁰⁵

As far as women in leadership positions are concerned there are practices and tools to enhance gender diversity. Norway in 2006 mandated quotas for gender company quotes at 40% minimum. Setting such targets, as part of corporate governance codes, promotes board diversity. There is much room for improving the situation, but it depends on commitment of the management (OECD 2014).

¹⁰³ European Commission (2013) *Code of Best Practices for Women in ICT*. Brussels: European Commission.

¹⁰⁴ European Commission (2013) *Women Active in the ICT Sector*. Brussels: European Commission.

¹⁰⁵ European Parliament (2012) *Women in ICT*. Brussels: Policy Department C - Citizens' Rights and Constitutional Affairs Brussels: European Parliament.

2.4. Gender and cybercrime

Citizens will become more active prosumers (producers and consumers) and governance will take new forms, given the growing irrelevance of space and place. Information technology is instrumental in this transformation,¹⁰⁶ as it can be empowering in an interconnected world. Nevertheless, this new form of citizenship requires trust in the networks and reassurance that privacy and security will be guaranteed.

In early 2013 the EU launched the 'Cybersecurity Strategy of the European Union' as a means to safeguard the online environment, while providing the highest possible freedom and security, for the benefit of EU citizens.¹⁰⁷ It engages a number of stakeholders, not least end users, who play a central role in the security of ICT systems. It aims at increasing awareness of the risk that are present in online activity, as well as of suggesting steps to be taken to address these risks.

As part of its activities, the Cybersecurity Strategy established in October 2012 a 'European Cyber Security Month' campaign, a yearly event for increasing awareness in business, customers, and users.

The Istanbul convention on preventing and tackling violence against women is the first step towards addressing the problem, as it introduces harmonised legal definitions and prosecution of crimes related to ICTs, such as trafficking and stalking. Since November 2017, all EU Member States have signed the Convention, and 17 have ratified it. The European Parliament has called upon the Commission to present a European Gender Violence Strategy which tackles all new forms of online-based violence, such as cyber-bullying, obscene online images, violation of privacy in social media.¹⁰⁸

The European Union Agency for Network and Information Security (ENISA) is an agency of network and information security expertise, which collaborates with Member States, the private sector and citizens to provide advice and develop recommendations on information security. It assists EU member states in implementing relevant EU legislation, improves the resilience of critical information infrastructure. On 6 February 2018 – the international 'Safer Internet Day' – ENISA published a report providing organisations with practical tools and guidance to develop and maintain an adequate cybersecurity culture.

Increasingly, Member States develop a National Cyber Security Strategy (NCSS) to set strategic principles, guidelines, and objectives to promote cyber-security and mitigate risk associated with cyber-crime.

¹⁰⁶ Arnaldi, S., F. Boscolo, and J. Stamm (2010) Living the digital revolution: exploration into the futures of the European Society. *European Review* 18(3): 399-416.

¹⁰⁷ <https://ec.europa.eu/digital-single-market/en/news/communication-cybersecurity-strategy-european-union-%E2%80%93-open-safe-and-secure-cyberspace>

¹⁰⁸ European Parliament (2016) *Report on Gender Equality and Empowering Women in the Digital Age*. 2015/2007(INI) Brussels: European Parliament.

3. USING THEORY TO INFORM AND EVALUATE POLICIES

KEY FINDINGS

- Affordable and safe access and use of ICTs, digital literacy and relevant content are important issues from a gender perspective and must inform policies aiming at counteracting the digital gender divide and empowering women.
- Feminist approaches to technology have pointed out the need to expose gendered technological properties, processes and male/female stereotypes which they see as underlying causes of the digital gender gap.
- Such perspectives can lead to alternative principles and methods, whereby ICT artefacts, policies and initiatives are designed, put into practice and evaluated with women's needs in mind and with the participation of the women users themselves.

3.1. Theoretical perspectives

There are a number of feminist perspectives on technology that have attempted to address the structural features of inequality and the role of technology in this effort. For Henwood, technology is seen as culture: 'Technological meanings are not "given"; they are made. Our task trying to transform the gendered relations of technology should not be focused on gaining access to the knowledge as it is but with creating that knowledge. By this I mean to be involved at the level of definition, of making meanings and in creating technological culture'.¹⁰⁹

Mies offers an alternative, 'subsistence perspective' on technology, whereby she argues that power inequalities cannot be automatically resolved through technological solutions. Rather, she advocates for a multi-dimensional approach that involves ecologically sound, grassroots knowledge systems in which women have an active role, in the understanding that such systems do not reinforce existing inequalities, but, rather will increase social justice.¹¹⁰

Feminist theories of technology have adopted a variety of perspectives and have emphasized the gendered nature of technological design, development and implementation/adoption. One of the main contributions by feminists to sociological understandings of technology is that of technofeminism (Wajcman, 2004), which looks into the gender and technology relations avoiding the determinism of both technophobia and techno-enthusiasm and argues that feminist politics is the way forward towards gender equality.

Other feminists place the role of women, particularly grassroots women, in a discussion of the democratisation of communication. This is a process in which the individual is a subject

¹⁰⁹ Henwood, F. (1993) Establishing gender perspectives on information technology: problems, issues and opportunities. In Green, E, J. Owen and D. Pain (eds.) (1993) *Gendered Design? Information Technology and Office Systems*. London: Taylor and Francis. 32-44.

¹¹⁰ Mies, M. (1986) *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labour*. London: Zed Books.

and not an object in communication, where representation and participation is enhanced and where the exchange of messages is democratic.¹¹¹

Other approaches are grounded in the tradition of science and technology studies (STS) which looks into the ways in which social relations and institutions shape innovation in science and technology, while also keeping track of the technological properties that in turn affect social arrangements when put into practice. Such approaches are useful in a discussion of women and ICTs, as they move away from technological determinism but retain awareness of the transformative capacities that ICTs have. The question, of course, becomes which of these properties are built into the technology (here ICTs and the Internet), which of them will be activated and how they will interact with the context where the technology is put. Clearly such approaches call for cases of empirical evidence as the interplay between technology and social setting is not pre-determined and can be unpredictable.

Many feminists have argued that computers are dominated by male values and women need to engage in the creation of relevant technological resources for them. The implication is the necessity for women to be more visible in leadership positions, if an alternative version of ICTs and the Internet is to be envisaged.¹¹²

Green and Singleton are not impressed by what they see as exaggerated emphasis on the digital and the possibilities that it offers for flexibility and empowerment: 'In focusing too closely upon concepts such as fluid virtual identities and virtual spaces that potentially empower individuals to challenge gendered inequalities, we risk losing sight of the specific social contexts and changing social relations within which such individuals and virtual spaces are embedded'.¹¹³

Empirical research on gender and technology has shown that the offline social context is often one where relations of domestic labour and care are persistent, as are inequalities in the workplace (pay gaps or unbalanced representation of women in high positions in the ICT sector). These arrangements are often reshaped but not towards the direction of increased gender equality.

A case that illustrates such concerns is a particular type of women's business dependent on ICT knowledge and use, namely 'mom/mumpreneurship', which 'disrupts hegemonic dualisms', motherhood or career. Current trends towards work flexibility and blurred boundaries between workplace and home are enabled by ICT and many women decide to combine motherhood with business run from home. The phenomenon of mumpreneurship divides scholars. There are arguments for choice, i.e. women dealing with work-life balance and combining entrepreneurship and motherhood, and others that see this as enhancing traditional gender roles and degrading women's business roles or ghettoising them.¹¹⁴

Likewise, scepticism has been expressed as to whether the flexibility of teleworking that ICTs provide has empowering consequences, or on the contrary just reproduces the

¹¹¹ Riano, P. (ed.) (1994) *Women in Grassroots Communications: Furthering Social Change*. London: Sage.

¹¹² Wood, P. (2005) Gender and information and communication technology: towards an analytical framework. In APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme. 41-53.

¹¹³ Green, E. and C. Singleton (2013) Gendering the Digital: The Impact of Gender and Technology Perspectives on the Sociological Imagination. In K. Orton-Johnson et al. (eds.) *Digital Sociology*. London: Palgrave Macmillan, p.35.

¹¹⁴ Ekinsmyth, C. (2014) Mothers' business, work/life and the politics of 'mumpreneurship'. *Gender, Place & Culture* 21(10): 1230-1248.

traditional gender roles by enabling women to serve their homemaking duties through one practical arrangements. This is linked with the discussion on work-life balance and the associated measures adopted by national countries (e.g. parental leaves, flexible working arrangements), as well as the ways in which these measures need to be administered for gender equality to be promoted.¹¹⁵

This scepticism extends also to the discussion of the new forms of work that are associated with the digital economy. The European Foundation of Living and Working Conditions (Eurofound) has identified nine contemporary labour trends,¹¹⁶ including ICT mobile work and freelance crowd labour, which is organised using digital platforms.¹¹⁷ Terms such as 'gig economy', and 'platform economy', demonstrate the increasing importance of such forms of flexible work. While the gender proportion of these categories of workers is far from clear, their flexible character (providing autonomy and enabling work-life balance) together with their precarious nature (low wages and lack of regulatory framework) make them relevant to the discussion of the place of women in the unfolding digital economy and digitally-enabled employment.

3.2. Drawing on theory to address the barriers

Policies and interventions can either address short-term needs or target the long-term structural issues to create better conditions for gender equality. They can either be gender-transformative (they attempt to address, improve and possibly minimise existing inequalities); gender-specific (favouring one gender over another); gender-neutral (dismissing gender differences and seeking no transformation in gender relations, roles, work, allocation of resources etc.).¹¹⁸

The 2013 Broadband Commission report came up with certain recommendations, as follows (pp. 38-42):

- Integrate gender and national ICT and broadband policies
- Improve sex-disaggregated ICT statistics and measurement: this includes lack of adequate data on female entrepreneurship
- Boost the affordability and usability of ICTs
- Improve relevant and local online content
- Initiate an action plan to achieve gender equality in access to broadband by 2020

In March 2017, the Broadband Commission's Working Group on the Digital Gender Divide launched a report that outlines a set of recommendations for actions by stakeholders to address the digital gender gap. It reiterated the above recommendations and put emphasis on addressing the barriers:¹¹⁹

¹¹⁵ Davaki, K. (2016) Differences in Men's and Women's Work, Care and Leisure Time. A Study for Directorate General for Internal Policies, Policies Department C: Citizens' Rights and Constitutional Affairs, Gender Equality, European Parliament, Brussels.

¹¹⁶ Eurofound (2015) *New Forms of Employment*. Luxembourg: Publications Office of the European Union.

¹¹⁷ Examples are: Upwork, Amazon Mechanical Turk, Clickworker, Freelancer, Guru, PeoplePerHour, TaskRabbit.

¹¹⁸ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme.

¹¹⁹ Broadband Commission (2017) *Recommendations for action: bridging the gender gap in Internet and broadband access and use*. Available at: <http://www.broadbandcommission.org/Documents/publications/WG-Gender-Digital-Divide-Report2017.pdf>.

- Affordable access
- Threats that prevent access and use
- Digital literacy and confidence
- Relevant content, applications and services

Each category will be examined separately in the sections below.

3.2.1. Affordable access

Affordable access entails a number of questions, including location of the technology (household, work, or public place); ease of accessibility; ownership and control of the technology; cost; complexity of use and sustainability of the technological resources.

The above dimensions can intermingle in different ways and produce different outcomes. Assuming ICT resources in the classroom, for instance, there might still be differential access between girls and boys due to the ways in which the technological resources are controlled. As a result, boys can have more access than girls at school in specific contexts.¹²⁰ When it comes to access to ICT, research in Hong Kong shows that availability of a PC does not necessarily mean equal access to it by all members.¹²¹ This is an important point in terms of the focus of this study, as access to ICT may be determined by hierarchical relationships in the private sphere and girls/women may be disadvantaged.

The provision of public centres where ICTs can be accessed and used is indispensable. They can be part of other institutions, such as health, school or community centres. They need to be safe venues, have convenient opening hours and be accessible in terms of proximity and transport.¹²² It is imperative that free broadband Internet is made available in all public spaces free of charge.

Good practices, such as Hong Kong's 'Computer Recycling Scheme' which provides used computers to students who cannot afford buying them could be adopted on the local and national level.¹²³

¹²⁰ E.g. several cases in Africa, mentioned in APC WNSP (2005).

¹²¹ Yuen, A.H.K., W.F. Lau et al. (2014). Home computing and digital equity in education: a Hong Kong story. American Educational Research Association (AERA) 2014 Annual Meeting 3-7 April 2014, Philadelphia: Pennsylvania.

¹²² Patil, D.A., A.M.Dhere and C.B.Pawar (2009) ICT and empowerment of rural and deprived women in Asia. *Asia-Pacific Journal of Rural Development* XIX(1): 1-22.

¹²³ Yuen, A.H.K., W.F. Lau et al. (2014). Home computing and digital equity in education: a Hong Kong story. American Educational Research Association (AERA) 2014 Annual Meeting 3-7 April 2014, Philadelphia: Pennsylvania.

3.2.2. Threats that prevent access and use

Women tend to disclose more on line than men and this may be due to factors such as socialisation, gender stereotypes and attitudes but also ways of handling personal information. Women value interpersonal relationships more and tend to discuss online with their friends in greater depth and breadth than men.¹²⁴ Such behavioural patterns make them vulnerable to online threats and risks.

As often repeated in new media studies, the Internet both reproduces and challenges offline social arrangements and power dynamics.¹²⁵ It is therefore essential to counteract Internet-mediated threats and online violence. This is a rather sensitive issue, as censorship and surveillance mechanisms come up against freedom of speech and privacy.¹²⁶

A more constructive approach would be to address this with more benevolent Internet deployment and for socio-political mobilisation to tackle online violence and harassment against women. Indeed, there is a growing online presence of web campaigns, support groups and support services, which should be made more visible and active for the purposes of reducing online threats which discourage many women, particularly younger ones, from accessing the Internet, or suggest different ways of engagement to increase safety.¹²⁷

3.2.3. Digital literacy and confidence

As mentioned, the multiple opportunities and possibilities offered by ICTs and the Internet require a certain degree of skills on the part of the user. A question of relevance is in what ways these skills are in-built during the design phases of the particular technology and the implications of this fact for women's ability to use the ICT application, product or Internet content in question, given that they were designed by males.

Recent research into the Eurostat databases on Digital Economy and Society demonstrates that there are gender gaps in basic ICT skills but, when it comes to complex skills, gaps become very pronounced and access is not sufficient to close them. In lower skills, gender gaps are larger in the older and more disadvantaged groups. Technophobia and gender stereotypes are key factors preventing girls from pursuing training in higher ICT levels.¹²⁸

Social media, for instance, are among the most popular platforms that provide content for users and are often seen as major reasons motivating users to have Internet access (i.e. to obtain the capacity to access/exchange information through social networking sites). Notwithstanding the simplicity that such platforms offer, they require that the user possesses not only particular skills, but also specific ways of engagement and behavioural patterns. In her very interesting article on Pinterest, a social bookmarking site used

¹²⁴ Sheldon, P. (2013) Examining gender differences in self-disclosure on Facebook versus face-to-face. *The Journal of Social Media in Society* 2(1): 88-105.

¹²⁵ Fuchs, C. and M. Sandoval (eds.) (2014). *Critique, Social Media and the Information Society*. New York, NY: Routledge.

¹²⁶ Lyon, D. (2007) *Surveillance Studies: An Overview* Cambridge: Polity.

¹²⁷ Association for Progressive Communications *How Technology Is Being Used to Perpetrate Violence Against Women – And to Fight It*. Available at: <https://www.apc.org/en/pubs/research/how-technology-being-used-perpetrate-violence-again>.

¹²⁸ Martinez-Cantos, J.L. (2017) Digital skills gaps: a pending subject for gender digital inclusion in the European Union. *European Journal of Communication* 12(5): 419-438.

predominantly by women, Tekobbe argues that, contrary to other popular sites, Pinterest does not presuppose legacy (i.e. previous) knowledge; as such, it escapes the hegemonic design features that have been built in other social media sites and that might restrict women's use of them. Her study 'offers insights into some of the barriers between women and digital fluency that are inadvertently constructed by the tacit knowledge of those who develop technologies- knowledge that is often inaccessible to women'.¹²⁹

Indeed, it has been pointed out that the gender gap in e-literacy is to some extent socially-constructed through narratives of expectations about what women and men can and cannot do. Such narratives establish that women are mostly consumers or communicators, rather than creative users of ICTs. They are accompanied by practices which determine whether women can or should use ICTs, under what circumstances and for what purposes, all in accordance with the pre-determined and culturally-constructed expectations of women as social agents and technological users.¹³⁰

Clearly, debates around literacy will continue; a multi-dimensional approach to literacy can contribute to the discussion on digital literacy the following dimensions: a) literacy as an autonomous set of skills, particularly the cognitive skills of reading and writing, which are independent of context and background of the person b) literacy as applied practice (functional literacy): not as a technical skill, but as social practice embedded in social events; here context is important c) literacy as an active learning process, which brings in the learners' socio-cultural realities and makes literacy liberating; d) literacy as text, which looks into the texts and programmes produced and consumed.¹³¹

The above approach to literacy presupposes understanding the experience of women in their circumstances, using this to understand their literacy needs and generating the appropriate strategies and learning materials that would provide empowerment, as opposed to reflecting existing power structures and assumptions about women's roles. For this to happen, the participation of women themselves in literacy programmes is seen as essential.¹³²

Striking a balance between providing traditional literacy skills (writing, reading and numeracy), providing literacy for purposes of livelihood, and promoting empowerment through literacy seems to be a wise way forward. Low-cost training schools and institutes are needed to provide ICT training.

3.2.4. Relevant content, applications and services

In a way that is more or less obvious, content has to do with language. As English is dominant and a number of other languages (Spanish, French, Arabic, Chinese, Hindu) are clearly visible, a question is to what extent content can be available in those languages (or dialects) that are limited or even close to extinction. More generally, the issue is what language are women more likely to use in their daily livelihood activities and tasks.¹³³

¹²⁹ Tekobbe, C.K. (2013) A site for fresh eyes. *Information, Communication and Society* 16(3): 381-396, p.381.

¹³⁰ Ibid.

¹³¹ Dighe, A and U. Reddi (2006) *Women's Literacy and Information and Communication Technologies: Lessons that Experience has Taught us*. Commonwealth Educational Media Centre for Asia.

¹³² Ibid.

¹³³ Ibid.

Language barriers should be gradually broken down through the development of multi-lingual tools, databases, user interfaces, translation software and relevant programmes and devices.¹³⁴

But content is more than language and there are in this other important parameters, such as: profiles of women users, biases that the content addresses, organization of the content, accuracy and updating, interactivity, and group learning. Generally, content should reflect women's concerns and their local knowledge. Ideally, women who are information literate should be able to identify the needs of the other users.¹³⁵

Finally, with regard to Internet governance, the participation of multiple organisations (e.g. Internet Governance Forum, or APC) and joint efforts are required to shape the character of the Internet. Multi-stakeholder involvement is key to the success of all the above: ICT projects need to involve partnerships between organisations with a range of competencies: from technical expertise to communication, project management and connections with grassroots groups. Involvement of women themselves is perhaps the most critical of them all, not least because any successful ICT project has to be based on shared understanding of the goals and the ways to achieve them – and the involvement of different stakeholders is bound to bring many different perspectives, which need to be reconciled.¹³⁶

3.3. Evaluation methods and tools

The Association for Progressive Communications Women's Networking Support Programme (APC WNSP) is an international network of women and women's organisations promoting gender equality in the design, implementation, access and use of ICTs, as well as in the relevant policy directions and regulatory mechanisms and arrangements.

The APC WNSP agenda is to 'transform relations of inequality using ICTs as tools for social action and means to achieve positive social change'. In this spirit, they help women's access to ICTs, provide training, but also, importantly, promote participation of women in the design and distribution of ICTs.¹³⁷

Gender Evaluation Methodology (GEM) is a project and methodology, developed by the APC WNSP, which draws on gender evaluation, examining power and relations between men and women in circumstances of different class, race, socio-economic status, religion and other dimensions of inequality that have an impact on the position of women. Through collaboration with ICT researchers and specialists it has gradually become more sophisticated and has been used to evaluate a number of ICT projects from a gender perspective.¹³⁸

GEM is a very ambitious tool for ICT initiatives which takes into consideration the following of important dimensions of gender relations: a) that they are context specific b) that they

¹³⁴ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme.

¹³⁵ Patil, D.A., A.M.Dhere and C.B.Pawar (2009) ICT and empowerment of rural and deprived women in Asia. *Asia-Pacific Journal of Rural Development* XIX(1): 1-22.

¹³⁶ Dighe, A and U. Reddi (2006) *Women's Literacy and Information and Communication Technologies: Lessons that Experience has Taught us*. Commonwealth Educational Media Centre for Asia.

¹³⁷ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme.

¹³⁸ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme.

intersect with other social relations, such as class, race and age c) that they can and do indeed change in response to social changes d) that they can be resistant to change because of the ways they are embedded in pre-existing social institutions.

Adding the element of ICTs, GEM has the following aims:

- Understanding the dynamic relationship between any ICT initiative and the ways in which individuals, organization and communities change
- Undertaking a systematic examination of the different impact of the initiative on women and men, namely the different ways in which it interacts with power relations involved in class, race, ethnicity, age, occupation and similar dimensions
- Observing and reflecting on both the quantitative and the qualitative effects of ICT initiatives
- Examining the impact of ICTs in context and developing relevant indicators
- Linking evaluation with action and involving the grassroots and other stakeholders

GEM takes into account both infrastructural issues and the content of the information provided, as well as the ways in which it can affect women. It highlights women's roles, which, generally speaking, involve reproductive tasks (domestic, childbearing), productive tasks (generating income) and community roles (maintaining and contributing to collective resources such as health care and education). The general assumption behind it is that gender inequalities are mirrored in the terms of access and engagement with ICTs. And whilst ICTs do have transformative power they can also serve to reinforce traditional roles, for example when women who, through ICTs, are offered the flexibility to work from home end up undertaking more of domestic work.¹³⁹

GEM takes into account both quantitative and qualitative indicators; the former are about hard measurements, e.g. number of computers or telephones in a setting, number of people accessing them, frequency of use of the resources, or frequency of training events; the latter, are less tangible measures and often involve processes taking place over some time, e.g. changes in women's lives after the introduction of a technology. They are considered crucial in a deeper understanding of how change is experienced and to what extent empowerment happens as a result of the introduction of ICTs. At the same time, there has to be some standardisation and consistency on what these qualitative indicators measure, for purposes of comparability and understanding. Among other, GEM uses indicators on access, advocacy, democratic communication, democratic organization, and capacity building.¹⁴⁰

Empowerment is a central notion in the discussion of ICTs and women, and should be part of the evaluation of any project. However, a better understanding is paramount, as access to better information does not automatically lead to empowerment. For empowerment to be possible, patriarchal structures needs to be challenged. Longwe¹⁴¹ has developed an empowerment lens which involves five levels:

- Welfare, which is about providing benefits to women but not enabling them to produce them themselves

¹³⁹ Ibid.

¹⁴⁰ Ibid.

- Access, where women improve their own status through own work and organisation (using resources to which they have access to)
- Conscientisation, the process through which women become aware of discriminating practices that need to be removed
- Mobilisation, which is the action following conscientisation, and involves planning and collective action to overcome the discriminatory practices
- Control, where women assume control of decision-making and do not wait to be given resources; here communication and information processes are crucial.

These levels can be used to evaluate the degree to which ICT projects can lead to empowerment. Most projects can identify the problems associated with digital gender divide but not necessarily their underlying causes, while they restrict intervention to the first and second levels of welfare and access and do not provide solutions beyond these. Evaluations should take the above dimensions into account. Moreover, evaluation results should be communicated to the real context in order to provide advice as to how to improve the outcomes.¹⁴²

¹⁴¹ Longwe, S.H. (2005) Spectacles through seeing gender in project evaluation. In APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme. 35-40.

¹⁴² Ibid.

4. CONCLUSIONS AND POLICY RECOMMENDATIONS

Women's and girls' inclusion in policies related to the use of ICTs ought to take into account the intersections of different factors which impede the implementation of policy goals to achieve gender equality and enable them to show and develop their capabilities. To this end, initiatives must **recognise women's agency and knowledge** and include them in the design stage, opening pathways for development. Women and girls must be seen as co-authors of their own future, not as passive victims but as competent members of society with equal rights, knowledge and talent.

Pathways can generate multiple opportunities and ways for women and girls to use resources in new ways. 'Enriched through insights of several decades of feminist thinking and practice, especially in feminist political economy and political ecology, **the gendered pathways approach** offers guidelines to analysing current pathways of change, and multiple alternative pathways to sustainability that embrace gender equality'.¹⁴³

Such an approach may be the way forward with inclusion of women and girls in ICT, because pathways are dynamic and allow for negotiation and intervention when unintended gendered effects are produced. Recognition of the plurality of ways in which problems are framed and solutions are proposed is vital to the pathways approach, according to the views and interests of the different actors.

A complex landscape of **co-operation between all stakeholders** (state institutions, policy-makers, civil society, private sector organisations) will form alliances, strengthen gender equality and ensure realisation of women and girls' human rights to education, work and decent livelihood. Planning needs to be holistic. Consensus between public (EU, OECD, UNESCO) and private organisations has to be reached as to the competencies which are required for the 21st century and how they can be learnt.¹⁴⁴ Skills must be seen as part of school education. International exchange of experience is needed to balance the employment benefits against potential health and environmental costs.¹⁴⁵

States have a key role to play in ensuring **provision of public services in vital domains such as education, employment and health** in ways which enhance gender equality and equal access. Promoting market solutions often leads to suboptimal outcomes and co-optation.¹⁴⁶

This is precisely why it is imperative for **policy-makers to work closely with movements** and offer opportunities to women to express their concerns based on their everyday realities, which policies must reflect.

ICTs can be a tool for empowerment, but empowerment through ICTs will be maximised if conceived both as an individual and as a collective state of affairs.

¹⁴³ Leach, M., Mehta, L. and P. Prabhakaran (2016) Sustainable development: a gendered pathways approach. In Leach, M. (ed.) *Gender Equality and Sustainable Development*. London and New York: Routledge, p.33.

¹⁴⁴ Voogt, J., O. Erstad et al. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning. Special Issue 29*: 403-413.

¹⁴⁵ Wood, P. (2005) Gender and information and communication technology: towards an analytical framework. In APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme. 41-53.

¹⁴⁶ Leach, M., Mehta, L. and P. Prabhakaran (2016) Sustainable development: a gendered pathways approach. In Leach, M. (ed.) *Gender Equality and Sustainable Development*. London and New York: Routledge.

At the same time, as **stereotypes are central in the digital gender gap**, employment policies built on stereotypical assumptions should be treated with caution.¹⁴⁷ In the same way that of stereotypes about 'feminine' and 'women-appropriate' occupations and career paths are at work, girls' technophobia is enhanced by other stereotypes, such as that of the non-social 'computer geek' who is constantly in front of a screen in isolation from the real world. Such discourses are equally unappealing and detrimental to women's and girls' digital inclusion.

Development **programmes should be assessed from a gender perspective**: human rights and respect for the capabilities of women and marginalised groups; the impact of sustainable development policies on the unpaid work by women and men; the full participation of women in sustainable development.¹⁴⁸

In the same vein, proposals of civil society groups and women's organisations highlighting alternative views of sustainable development are worth taking into account. Howcroft and Richardson emphasise the gendered contradictions in the way in which capitalist societies operate, namely the contradictions between the goals and organisation of capitalist production processes and the goals and organisation of families/households.¹⁴⁹ The acknowledgement that **the underlying drivers of unsustainability and gender inequality are 'deeply interlocked'**¹⁵⁰ and that the importance of the role women can play in driving the economy towards a sustainable future is also made in the ITU report *A Bright Future in ICT*.¹⁵¹

States, international organisations and the global community have a key role to play to ensure that corporations act to empower women to realise capabilities. Measures such as progressive taxation on corporate profits, for example, would help a social contract about sustainable development with equality.¹⁵² What is important is that **women's businesses facilitated by ICT in flexible informal settings are proliferating** and attention must be paid to their downside which is related to the **blurred boundaries between work, care and leisure** and may come at the expense of women's physical and mental health and wellbeing.

In order for effective policies to be designed, a **context-sensitive assessment of the situation** is required. Nuanced gender statistics are also necessary to evaluate policy outcomes. This presupposes of course considerable investment on a national and international level in data collection, analysis and development of the necessary statistical capacities.¹⁵³

¹⁴⁷UN Women (2014) *Gender Equality and Sustainable Development: World Survey on the Role of Women in Development*. New York: UN Women.

¹⁴⁸ Asher, K. and B.S. Basnett (2016) *Gender equality as an entitlement: an assessment of the UN Women's Report on Gender Equality and Sustainable Development 2014*.

¹⁴⁹ Howcroft, D. and H. Richardson (2008) *Gender matters in the global outsourcing of service work*. *New Technology, Work and Employment* 23(1-2): 44-60.

¹⁵⁰ UN Women (2014) *Gender Equality and Sustainable Development: World Survey on the Role of Women in Development*. New York: UN Women

¹⁵¹ ITU (2012) *A Bright Future in ICT: Opportunities for a New Generation of Women*. Geneva: International Telecommunications Union, p.16.

¹⁵² Asher, K. and B.S. Basnett (2016) *Gender equality as an entitlement: an assessment of the UN Women's Report on Gender Equality and Sustainable Development 2014*.

¹⁵³ Razavi, S. and S. Qayum (2016) *Gender equality and sustainable development*. In Leach, M. (ed.) *Gender Equality and Sustainable Development*. London and New York: Routledge.

Only few government organisations collect ICT statistical data systematically and even fewer provide breakdown by gender. **Statistical data that are disaggregated by sex and age are necessary to get a better picture of the digital gender divide.**¹⁵⁴ While some progress has been made in recent years, there is room for improvement in statistics. Internationally comparable ICT gender disaggregated statistics can provide a number of insights¹⁵⁵, such as in the ways in which men and women experience ICT, the different patterns of engagement, and the work done by women, including unpaid care work.¹⁵⁶ At the same time, better indicators need to be developed, for example composite ones, which include connectivity, skills, content and participation.¹⁵⁷

Such indicators can capture subtle situations, e.g. identifying the female-headed and male headed households which might not be in a position to afford digital access, as opposed to generalising that all female-headed households are necessarily worse-off without considering their real financial situation.¹⁵⁸ **Better indicators can provide a more concrete picture both of the digital divide and of the effectiveness of policy measures to address it.** Moreover, the use of common indicators developed in a participatory way will increase the integration and communication between the different policy partners, not least between central and local government.¹⁵⁹

The circumstances of gender inequality in settings where ICTs are often placed might reproduce such inequalities or recast them in new forms. Ultimately, reducing and overcoming gender inequalities involves both reduction in the gendered assumptions behind the design of ICTs and changes in their context. **ICTs need to be seen in context.** Understanding the gendered dimensions of the use of ICTs in everyday life is crucial.¹⁶⁰ ICTs can promote gender equality provided that the gender dimensions of the information society and the knowledge economy can be understood and addressed.¹⁶¹

ICT policy for reducing the digital gender gap needs to move beyond access and look into decision-making and capacity building.¹⁶² Women should participate in **technology design** that goes beyond legacy technologies and provide a fresh view; in this way preconceptions about their naturally limited technological literacy will diminish.¹⁶³ Capacity building and training, removing legal or social barriers, enable women to take part in ICT planning, increasing access to and control of ICT resources through the provision of credit and skills-building. **ICT literacy should be participatory in training and methodology.** Likewise,

¹⁵⁴ Hafkin, N. and S.Huyer (2007) Women and gender in ICT statistics and indicators for development. *Information Technologies and International Development* 4(2): 25-41.

¹⁵⁵ Hafkin, N. (2013) Stocktaking and Assessment on Measuring ICT and Gender for the Partnership on Measuring ICT for Development. Task Group on Gender of the Partnership on Measuring ICT for Development.

¹⁵⁶ UN Women (2014) Gender Equality and Sustainable Development: World Survey on the Role of Women in Development. New York: UN Women.

¹⁵⁷ Hafkin, N. and S. Huyer (2007) Women and gender in ICT statistics and indicators for development. *Information Technologies and International Development* 4(2): 25-41.

¹⁵⁸ Ibid; many de facto female-headed households (in which the principal male is away) receive remittances and may be in a better financial situation than certain male-headed ones.

¹⁵⁹ Holman, N. (2012) Incorporating local sustainability indicators into structures of local governance: a review of the literature. *Local Environment* 14(4): 365-375.

¹⁶⁰ Green, E. and C. Singleton (2013) Gendering the Digital: The Impact of Gender and Technology Perspectives on the Sociological Imagination. In K. Orton-Johnson et al. (eds.) *Digital Sociology*. London: Palgrave Macmillan. 34-50.

¹⁶¹ APC WNSP (2005) *Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment*. Association for Progressive Communications Women's Networking Support Programme.

¹⁶² Hafkin, N. and S.Huyer (2007) Women and gender in ICT statistics and indicators for development. *Information Technologies and International Development* 4(2): 25-41.

¹⁶³ Tekobbe, C.K. (2013) A site for fresh eyes. *Information, Communication and Society* 16(3): 381-396.

indicators for evaluation of ICT projects, should be developed in a participatory way (i.e. be 'soft' rather than 'hard' and technocratic) and be relevant to the needs of the users.¹⁶⁴ Women should be using ICTs to achieve the goals established in their own projects.¹⁶⁵ This entails **doing away with dominant narratives** about the nature of women as Internet users and re-examine their online practices from the perspective of what they have achieved. The implication is to go beyond binary simplifications of the order men/digitally competent/creative vs. women not so digitally competent/sharing.¹⁶⁶

Top down strategies to promote equality include using the media to expose the significance of policy and intervention for gender equality and watchdogs to assess ICT impact; conducting empirical research and using it for lobbying purposes, collaboration with institutions to promote women's training; using gender analysis tools and methodologies.¹⁶⁷

Gender budgeting and mainstreaming should be part of any policy, including policies supporting ICT for development. Women-specific projects and an overall consideration of the gender perspective in the allocation of funds is helpful.¹⁶⁸

Decreasing the digital gender divide will ultimately lead to employing more human capital, skills and talent and bringing new female contributions to the economy and society, with positive impact for development. It will also provide perspectives that could challenge chronic problems such as environmental unsustainability and social polarization.

The field of education will have to undergo considerable transformation and encompass the new forms of learning using technology, as well as change the curricula **to integrate humanities and philosophy with technology and encourage critical thinking.**¹⁶⁹ Pedagogy, technology and content must be integrated into school curricula in a creative manner.¹⁷⁰ At the same time multiculturalism must also be reflected in the new teaching methods in the direction of recognition of difference, equal opportunities and tolerance. Educational systems must become more participatory and interdisciplinary.

The fact that educational systems become increasingly dependent on ICT requires **policy-makers to take the digital gender divide and the contextual factors into account and enable extensive learning.** In addition, educational systems will be evolving toward a more mixed (virtual/real) way of passing on knowledge and **peer-to-peer education will become essential.**¹⁷¹

¹⁶⁴ APC WNSP (2005). Holman, N. (2012) Incorporating local sustainability indicators into structures of local governance: a review of the literature. *Local Environment* 14(4): 365-375.

¹⁶⁵ Tekobbe, C.K. (2013) A site for fresh eyes. *Information, Communication and Society* 16(3): 381-396.

¹⁶⁶ Ibid.

¹⁶⁷ APC WNSP (2005). Also, for ILO gender guidelines for monitoring and evaluation see: http://www.ilo.org/wcmsp5/groups/public/@ed_mas/@eval/documents/publication/wcms_165986.pdf,

and also a relevant Online Gender and Information Module:

<http://www.ilo.org/public/english/region/asro/mdtmanila/training/homepage/mainmenu.htm>.

¹⁶⁸ Patil, D.A., A.M.Dhere and C.B.Pawar (2009) ICT and empowerment of rural and deprived women in Asia. *Asia-Pacific Journal of Rural Development* XIX(1): 1-22.

¹⁶⁹ Arnaldi, S., F. Boscolo, and J. Stamm (2010) Living the digital revolution: exploration into the futures of the European Society. *European Review* 18(3): 399-416.

¹⁷⁰ Voogt, J., O. Erstad et al. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning. Special Issue* 29: 403-413.

¹⁷¹ Arnaldi, S., F. Boscolo, and J. Stamm (2010) Living the digital revolution: exploration into the futures of the European Society. *European Review* 18(3): 399-416.

Policies must be holistic. The **participatory approach for evaluation** supports mutual learning, exchange of experiences and follow-up, networking and work/life balance. The dimension of **gender digital inclusion has to be part of all EU initiatives** and investments related to ICT, such as the 'smart villages' (see Annex).

More quantitative and qualitative research on the interaction of the different factors which impede women's and girls' digital inclusion is required. Data must be disaggregated and analysed in a multidimensional way.

Good practices must be shared. Some good practices promoting economic independence of women entrepreneurs and aiming at reducing inequalities, can be applied to different contexts and have potential in terms of learning and training. The criteria provided for the assessment of the good practices combine effectiveness and coherence together with the specific gender equality objective (economic independence and increase of women's access to the labour market).

ICTs need to be people-driven and not technology-driven. Technology (ICTs and the Internet in particular) is not an agent of change in itself, but it should not be underestimated either. It is a non-reducible field of social life, which interplays with the existing social, economic, political and cultural arrangements in ways that cannot be predetermined, giving outcomes that need ex post evaluation. The aim of policies and practices is that the outcomes of this interaction will be towards the direction of gender equality.

As Wajcman argues: '**Technologies reveal the societies that invent and use them, their notions of social status and distributive justice. In so far as technology currently reflects a man's world, the struggle to transform it demands a transformation of gender relations**' (Wajcman 1991, p.166).

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6. ANNEX

A promising development: Smart villages

Following a meeting in 2016 in Cork, 340 rural stakeholders from all over the EU decided to attempt overcoming the digital divide and build the villages of the future which will be connected, digitised, and use the strengths of their particular territory taking advantage of technological developments in ICTs. In this way jobs will be created, entrepreneurship will be boosted and local communities will have easier access to services, such as transport, and health, as well as unlock their potential.

There is not a uniform plan for all, as every village will take into account the geographic, socio-economic factors, culture and traditions, trade and activities of the community, which will be improved with attention to the impact on the environment. Investments will be made in terms of technical infrastructure. Through e-literacy the local economy will be supported through information about agricultural and business activities, tourism and cultural life will increase.

EU funding sources and policies include the Common Agricultural Policy which comprises funding initiatives and programmes (118 Rural Development programmes in the period 2014-2020) and LEADER (a bottom-up method aiming at the empowerment of local citizens to take ownership of the development of their area), to name but a few. The European Regional Development Funds' and the Cohesion Fund's focus is on innovation, ICT and green economy so as to create linkages between urban and rural areas and information exchange channels between small communities.¹⁷²

The digital gender gap is not mentioned in the relevant documents, despite their emphasis on ICT and the e-skills necessary for the implementation of those projects. Nonetheless, such initiatives would become the perfect hub for access to ICT and the relevant education for women and girls, as well as opportunities which can incorporate training for the older and female members of the rural communities through gender mainstreaming.

Smart villages' projects are underway in Germany (digital villages in Rhineland Palatinate focusing on innovation within a smart ecosystem, cross-sectoral solutions' development, collaboration between residents, local authorities and local industry and building of sustainable and affordable digital solutions); in Italy (the 'Strategy for Inner Areas' uses innovation to improve provision of essential services such as education, healthcare, vocational training, transport and local mobility, while promoting land management, local food products, renewable energy and natural and cultural heritage); or in France (inter-municipal cooperation called 'City-Countryside Reciprocity Contracts' Brest aiming at economic development, social inclusion, health, culture and services and environment and energy transition).

Such initiatives which attract considerable funding from the European Institutions could serve as a vehicle for women's and girls' digital inclusion, given that the technical infrastructure will be in place. Policies should target the education and training on women

¹⁷² European Commission (2017) *Report on Equality between Women and Men in the EU*. Brussels: European Commission.

and girls in the villages through schools and vocational training and enable rural women to run their own businesses and communicate with other communities. Smart villages can contribute considerably to ensure women and girls a better future. For more information, see https://enrd.ec.europa.eu/smart-and-competitive-rural-areas/smart-villages_en).

This study, commissioned by the European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs at the request of the FEMM Committee, attempts to reveal the links between the different factors (access, skills, socio-economic and cultural), which prevent women from having equal access to digital technology. It then suggests ways of dealing with online and offline inequalities to the effect of closing the digital gender gap and improving women's and girls' digital inclusion and future technology-related career paths.

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