



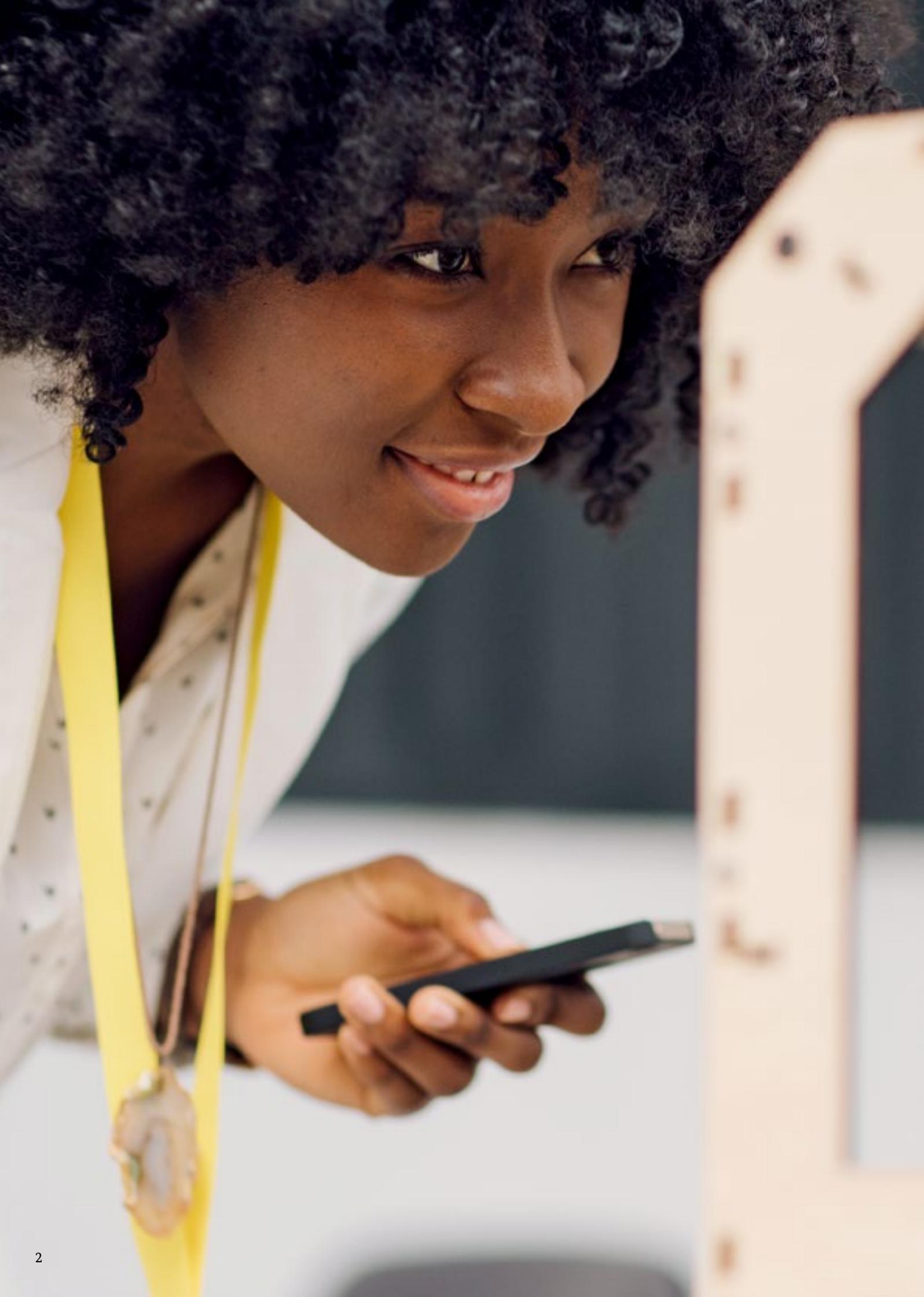
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# Women's Pathways to the Digital Sector: Stories of Opportunities and Challenges



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## DEFINITIONS

### Digital literacy

is the ability to use information and communication technologies (ICT) to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

### e-Skills

refer to the ability to use and develop ICT to adequately participate in an environment and economy that is increasingly dominated by access to electronically-enabled information.

### Employability

is the set of achievements, understandings and personal attributes that make individuals more likely to gain employment and to be successful in their chosen occupations. In today's society, e-Skills and STEM education are key to one's employability.

### Gender digital divide

is an economic and social inequality between women and men regarding access to, use of, or impact of ICT.

### G20

is an international forum for the governments and central bank governors from 20 major economies with the aim of studying, reviewing, and promoting high-level discussion of policy issues relating to global economic growth, international trade and financial market regulation as well as other issues of global significance.

### ICT

is an abbreviation for information and communication technology, refers to all equipment, applications and services that involve communication and information. Computers, mobile phones, televisions, radios and satellite systems are all part of ICT.

### ICT4D

refers to the use of ICT in the fields of socio-economic development, international development and human rights.

### ICT ecosystem

refers to all different agents involved in ICT (such as individuals, institutions and communities) and the broader systems in which they act (such as legal, technical and political environments).<sup>1</sup> In this report, the ICT ecosystem can mean all the different ways people are involved in ICT: as users, content creators, employees, entrepreneurs or leaders.

### ICT sector jobs

comprise all jobs "which are directly created through the production of ICT and through the intensive use of ICT" and include IT-specialists, but also users of advanced, often sector-specific, software tools (such as graphic designers, statisticians, data scientists) as well as basic users with competencies in using generic ICT-tools. It excludes ICT-enabled work that the World Bank (2013) has defined as work that arises from the digitization of the job search process and of work itself.<sup>2</sup>

### NGO

is a not-for-profit organisation.

### Policy maker

is a person, group or government responsible for or involved in formulating policies.

### Private sector

is the segment of a national economy owned, controlled and managed by private individuals or enterprises.

### STEM education

is an interdisciplinary approach to learning where academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make the connections between school, community, work, and global enterprise in order to participate effectively in the digital economy.

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1 Definition taken from the Principles of Digital Development: <http://digitalprinciples.org/community-insights-principle-2-understanding-the-existing-ecosystem/>

2 Definition taken from the OECD and the World Bank <http://documents.worldbank.org/curated/en/290301468340843514/pdf/809770WP0Conne00Box379814B00PUBLIC0.pdf>. In this report, we will sometimes use the terms "technology" "ICT" and "ICT sector" interchangeably.

## ACRONYMS

- BMZ** / Federal Ministry for Economic Cooperation and Development
- EC** / European Commission
- G20** / Group of Twenty
- GDP** / Gross Domestic Product
- GIZ** / Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
- GSMA** / GSM (Groupe Spéciale Mobile) Association
- HR** / Human Resources
- ICT** / Information and Communication Technology
- ICT4D** / Information and Communications Technology for Development
- ITU** / International Telecommunications Union
- LIRNEasia** / Learning Initiatives on Reforms for Network Economies Asia
- NGO** / Non-Governmental Organisation
- OECD** / Organisation for Economic Cooperation and Development
- PR** / Public Relations
- SDG** / Sustainable Development Goals
- SET** / Science, Engineering and Technology
- STEM** / Science, Technology, Engineering and Mathematics
- TVET** / Technical and Vocational Education and Training
- UN** / United Nations
- WISAT** / Women in Global Science & Technology

## ACKNOWLEDGEMENTS

We would like to express particular gratitude to the interviewed women for their insightful inputs that have enriched this report with vivid experiences from the field. These women have graciously shared their time, honest views, and recommendations to help ensure that many more women have the opportunity – if they so choose – to participate in the digital sector.

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#### About Panoply Digital Ltd

Panoply Digital are leading experts in ICT, education, and gender who focus on designing digital solutions to development challenges. Panoply Digital works with businesses, governments, NGOs and communities to provide strategic advice, impact assessment, learning design, training, and end-to-end project implementation.

#### About GIZ Sector Project

##### “Digitalization for sustainable development”

The use of digital tools has increased dramatically over the last twenty years. This has led to fundamental changes in social, political and economic structures, particularly in developing and emerging countries. With the increasing digitalization of society as a whole, new opportunities arise for the achievement of sustainable development objectives. The sector project supports the Federal Ministry for Economic Cooperation and Development (BMZ) in exploring new fields of action, practices and instruments for all areas of development cooperation, including education, health, economic development and good governance.

# Executive Summary



## THE GENDER DIGITAL DIVIDE

Throughout the past decade, the evidence base has grown that access to and use of Information and Communication Technologies (ICT)<sup>1</sup>, particularly mobile phones and the internet, can yield positive socio-economic benefits for societies around the world, but particularly in developing countries. At the country level, access to digital technology can help boost Gross Domestic Product (GDP) through job creation and greater productivity: Emerging markets in developing contexts can benefit from 1.2% more GDP for every 10% increase in mobile penetration. There is also evidence that broadband adoption (i. e. consistent high-speed internet usage) is associated with economic growth in terms of GDP. At the micro level, certain studies have identified a positive relationship between income generation, owning a mobile phone and internet use.<sup>2</sup>

Despite the big opportunities that digital technologies can bring, not everyone is benefiting equally. There is a gender gap in terms of ICT access and use, with women and girls at the bottom of the economic pyramid being disproportionately affected. Recent data by the International Telecommunications Union (ITU) suggest that, on average, 12% fewer women than men have access to the internet, and in fact, this number has increased over the last years.<sup>3</sup> This gender gap is prevalent across the whole ICT ecosystem: Women and girls are not only underrepresented as ICT users, but also within the ICT industry itself – in startups, technology companies and ICT jobs in general. In the development context, men are 2.7 times more likely than women to work in the digital sector.<sup>4</sup>

On the international level, the relationship between gender and ICT has started to gain attention: Sustainable Development Goal 4 (Education) and SDG 5 (Gender equality) are mutually reinforcing efforts aimed at ending the gender digital divide. Various initiatives directed towards women's economic empowerment through ICT play a critical role in turning the SDG pledges into reality. Examples for this include the Girls in ICT Day (ITU), the Digital Skills partnership of UN Women and Mozilla, the Connected Women Commitment initiative (GSMA) and the Women's Rights Online initiative (World Wide Web Foundation).

This study aims at understanding the role of ICT in realising women's rights, gender equality and women's economic empowerment in order to identify the challenges and opportunities for women and girls to partake in ICT education and employment. The following presents a two-fold approach, consisting of a desk study and biographical interviews. The 22 portrayed women work in different roles in ICT and come from developing as well as emerging countries from all continents.

## REMOVING THE BARRIERS TO WOMEN'S PARTICIPATION IN ICT

Digital technologies have huge potential to act as development enablers for women, as they bring new social, political and economic opportunities. However, the gender gap across the ICT ecosystem excludes women from these. Gender-based discrimination and disparities in the physical world are being replicated in the digital world.

Women face higher barriers when it comes to initial access, affordability of digital services and use of ICT. Particularly, lower levels of technical and digital literacy skills as well as lower confidence impact women's access to, and use of, ICT. In general, more women than men report difficulties in using mobile phones or the internet: Women are 1.6 times more likely to report lack of skills as a barrier to internet use. Women also tend to have little formal training in ICT skills compared to men. Typically, female users develop their skills at home, in the workplace or in trusted local community environments.<sup>5</sup> Another problem is that online content is often not catered to women and thus leave out topics – even languages – that speak to them: Women are far more likely to report that they do not see a reason for them to access and use ICT.<sup>6</sup> As a result, women are less likely to (1) develop confidence and complex digital skills such as coding, (2) use ICT to create content of their own, or (3) use ICT for their own entrepreneurial activities. Women are less likely to see themselves as employees of the ICT industry, let alone leaders.

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1 ICT and digital technologies are used synonymously throughout.

2 Deloitte, Value of connectivity: Economic and social benefits of expanding internet access, 2014

3 ITU, ICT Facts and Figures, 2016.

4 World Bank, World Development Report 2016: Digital Dividends, 2016.

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5 GSMA Connected Women and Digital Inclusion Accelerating Digital Literacy, 2015.

6 GSMA Connected Women and Digital Inclusion Accelerating Digital Literacy, 2015.

## KEY FINDINGS

Based on the data analysis and supported by more than 20 interviews with women in the digital sector, the following key findings emerged:

### Inclusive education systems

In general, digital literacy skills or even more advanced skills such as coding still find little representation in education systems. Even when this requirement is fulfilled, education systems do not always provide inclusive opportunities for girls to participate in science, technology, engineering, and mathematics (STEM) subjects. This contributes to girls deciding not to pursue STEM subjects beyond the minimum curricular requirements. In turn, that negatively impacts their transition to careers in the digital sector, which frequently rely on knowledge gained through STEM education. Moreover, digital literacy skills are infrequently taught in schools, and outdated curricula remain a challenge for both, girls and boys.

### Tertiary Education / Labour Market Transition

Labour market needs are not being addressed through the training provided in Technical and Vocational Education and Training (TVET) or tertiary education institutions. There is a skills mismatch between what students learn at university and the skills that employers seek.

### Non-formal education

There are too few opportunities that target girls outside of formal education. This contributes to girls being left out and not being exposed to technology until they are older, at which point it is usually too late to get them to reconsider ICT as a career.

### Access and affordability

Cost is one of the most significant barriers to initial access to, and use of, ICT for women. This is particularly apparent among women from rural and low-income groups. Moreover, they may only have restricted access to public ICT services such as cybercafés or telecentres. Culturally, these are seldom seen as safe places for women and girls. As they are traditionally male-only spaces, female users can feel uncomfortable and unwelcome. Accordingly, their parents, guardians or spouses may even forbid them to visit these places. However, access is only the first step in addressing the gender digital divide.



### **Content**

The challenges for girls and women participating in the digital sector are compounded by content considerations even when affordable technology access is possible. Firstly, there is a distinct lack of content, or content missing in local languages, which facilitates the development of digital literacy skills of either gender. However, women and girls are less likely to be literate, a prerequisite to engage with such content. Moreover, there is a dearth of localised content for women who are online, that really corresponds to their needs and interests.

### **Self-confidence**

The overall lack of support for girls' and women's engagement with ICT in every life stage can have a negative impact on their ability to develop the self-confidence needed to access and use ICT. Yet exposure to technology as young girls can bolster their curiosity about the wider digital sector. First encounters with technology can also help young girls build their digital literacy over time. During adolescence, girls can be encouraged to consider an employment in the digital sector through curricula that stress that STEM subjects are open to any student. The life cycle of girls' and women's relationship to ICT is therefore a crucial affective component with implications for their digital sector participation, no matter their age.

### **Cultural stereotypes**

Women contend with several socially constructed barriers which impact their ability to work in the digital sector. One such barrier is that STEM subjects, as a path to Technical Vocational Education and Training (TVET) or tertiary education, are often not seen as appropriate for them. Instead, they are steered towards more "feminine" subjects such as teaching. If they persist past this stage, they are sometimes perceived to be less capable of performing the same amount and type of work as their male colleagues simply because of their gender.

### **Working environment**

If a woman begins a career in the digital sector, the aforementioned cultural stereotypes remain pervasive. Additionally, workplace policies and practices that harm their progression and ability to break through the "glass ceiling", including being terminated for becoming pregnant or being excluded from projects with a technical focus, can contribute to their decision to leave digital sector jobs earlier and in greater numbers than their male counterparts. Many women still do not consider a career in the digital sector as attractive due to lingering gender-based discrimination.

### **Lack of sex-disaggregated data and gender statistics**

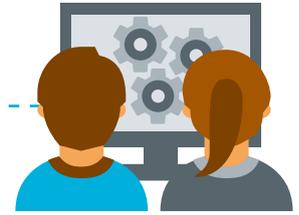
There is a need to initiate and increase the frequency of measurements for the gender digital divide in terms of access to and use of ICT. In doing so, evidence-based policy recommendations can be developed to help bridge this divide once its extent is known. Moreover, sex-disaggregated data can support programme impact monitoring for interventions that are linked to education, women, and their access to and use of ICT.

### **Collaborating for change**

The task of closing the gender gap in the digital sector's labour force is not the responsibility of any single entity but rather an undertaking which requires collective action. Besides female champions for change, male champions are also needed in local communities as well as in government, the private sector and civil society.

# Setting the Scene





On average, **12% fewer women** than men have **access** to the **internet worldwide**. In developing countries, the difference amounts to 16.8%.

ITU [2016] ICT Facts and Figures

Successful women working in the digital sector<sup>1</sup> are still a rarity – be it in Europe, Australasia, the American continent, or Africa. However, times are changing – albeit slowly. There are plenty examples of strong women around the world who are following their dreams despite the challenges they encounter along the way. Among these women is Isis Nyong’o Madison from Kenya, founder & CEO of MumsVillage, an online-platform (online village) that provides resources, support and expert advice to pregnant women and parents. In her opinion, “It’s very hard to be what you can’t see”. And Afua Osei, the Ghanaian co-founder of “She leads Africa” – a platform offering knowledge and support to female entrepreneurs – claims that, “We all need to do a better job of telling the stories of women who are making an impact in technology in creative ways.” Isis and Afua are two of the 22 women from different countries who were interviewed for this study. They represent examples of women who have had academic and /or professional success in the digital sector thanks to the skills they honed during their time as girls and young women. They all tell stories of the opportunities that let them realise their dreams in the digital sector – something that is not always possible for other girls and women around the world. Nevertheless, they also highlight the persistent challenges that need to be addressed if more women are to follow their own pathways into the digital sector.

By 2015, with the launch of the SDGs, global leaders confirmed their joint responsibility to contribute to the empowerment of women – also using the potential of ICT by including two related goals: Goal 4 for Quality Education aims to “...substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship,” (UN, 2015) by 2030. Linked to this, Goal 5, is a complementary target to end discrimination against women and girls, particularly in the economic sphere. In part, this is to be achieved by facilitating their use of digital technologies. Since the agreement of the SDGs, several studies have been conducted and data has been collected, also by private companies, to identify the sources of the gender digital divide.

Under Germany’s G20 presidency in 2017, the initiative #eSkills4girls was launched to improve the digital skills and employment perspectives for girls and women in emerging and developing countries. It covers different action fields, including an online platform and an international coding competition. This report commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) forms part of the initiative. Its aim is to identify the opportunities and challenges that women and girls encounter as users, employees, entrepreneurs, innovators and leaders in the digital sector. The report examines various factors that influence the pathways of girls and women who aspire to enter, are transitioning to, or are currently working within the digital sector.

The primary aim is to understand how the identified factors affect the development of skills that could eventually lead to employment in the digital sector. Which factors during their education and employment experience facilitated their ICT appropriation? Which factors hindered it? The analysis will draw connections between personal stories shared by the women and girls and the existing quantitative and qualitative gender and ICT-focussed data. In doing so, the 22 female storytellers become role-model representatives for millions of women and girls around the world. The report builds on previous work that has examined opportunities for and constraints on women’s and girls’ ICT access, including affordability, cultural norms, and gender-sensitive programming.

Beyond examining indicative statistics and reviewing existing literature, 22 interviews were conducted with girls and women to hear their stories about the elements that shape(d) their journeys into the digital sector. The girls and women interviewed were selected to represent a diverse range of country contexts, socio-economic backgrounds and accomplishments with respect to their education or careers in ICT. The findings of the literature review and the interviews were analysed to develop a series of actionable recommendations. The intention of these recommendations is the adoption of policies at a national level, particularly in developing and emerging countries, which can help to effectively cultivate a conducive environment for girls and women to pursue a pathway to participate in the labour force of the digital sector.

1 Here, the term digital sector will refer to workforce areas which involve skilled appropriation of ICT.

# Exploring the Gender Digital Divide



## WHY DOES ICT MATTER?

Throughout the past decade, the evidence base has grown that access to and use of ICT, particularly mobile phones and the internet, can yield positive socio-economic benefits for both the society and economy.

At the country level, access to digital technology can help boost GDP through job creation and greater productivity: Emerging markets in developing contexts can benefit from 1.2% more GDP for every 10% increase in mobile penetration.<sup>1</sup> There is also evidence that broadband adoption (i. e. consistent high-speed internet usage) is associated with economic growth at the macro level in terms of GDP. Moreover, the impact that can be realised through broadband growth is more apparent for low- and middle-income countries when compared to higher income countries such as Germany, Canada or the US: Higher broadband penetration in developing countries shows a much larger increase in GDP per capita (1.38 percentage points) compared to mobile phone penetration (0.81 percentage points).<sup>2</sup> In a 2014 report, Deloitte estimated that



by helping more people access and use ICT, approximately 140 million new jobs could be created in emerging markets – and many in some of the poorest areas of the world.<sup>3</sup>

At the micro level, there have been studies which have found a link between ICT and economic benefits: A study of 12 countries in Africa<sup>4</sup> and five countries in Asia<sup>5</sup> in 2012 identified a positive relationship between income generation, owning a mobile phone and internet use. The link suggested that having a mobile phone or using the internet can result in increased livelihood activities through building relationships (such as with customers, suppliers), coordination of livelihood activities, enhancing skills, and acquisition of knowledge and information. The World Development Report 2016 highlights an example from rural Peru where mobile phone access boosted real household consumption by 11% between 2004 and 2009, reduced poverty by 8 percentage points and extreme poverty by 5.4 percentage points.<sup>6</sup>

Digital technologies are key to sustainable development and have a decisive role to play when it comes to achieving the SDG contained in the 2030 Agenda for Sustainable Development. While ICT are only explicitly mentioned in four SDG sub-goals (education; gender equality; infrastructure, industrialisation and innovation; and partnerships), the innovative solutions they offer can and do feature in initiatives for achieving each of the 17 SDG. The benefits of ICT access and use include the facilitation and provision of life-enhancing valued-added services such as improved access to health services, agricultural information, and productivity enhancements.<sup>7</sup> ICT can also be used in the field of education (SDG 4) to facilitate lifelong learning opportunities and to provide girls and women with tailored opportunities to develop the skills needed to successfully transition to a different workforce. Women and girls adopting ICT can also facilitate the benefits of financial inclusion which could help achieve different

1 GSMA and Deloitte, *The Mobile Taxes and Fees: Toolkit of Principles and Evidence*, 2014

2 World Bank, *Information and Communication Technologies for Development: Extending Reach and Increasing Impact*, 2009

3 Deloitte, *Value of connectivity: Economic and social benefits of expanding internet access*, 2014

4 Research ICT Africa, 2012

5 Learning Initiatives on Reforms for Network Economies Asia (LIRNEasia), 2012

6 World Bank, *World Development Report 2016: Digital Dividends*, 2016

7 GSMA *Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries*, 2015; Web Foundation, *Women's Rights Online Digital Gender Gap Audit*, 2016; Alliance for Affordable Internet, 2015

*In Guinea, like in other countries in Africa, women have an economic power which is not enough valued nor recognized. We need to give them the credit and encourage them by offering them the possibility of making their dreams come true.*

Quotes are taken from the interviews conducted with 22 women for this report between October 2016 and January 2017. See detailed portrayals in chapter 4.

dimensions of gender equality. Specifically, it can increase their presence in the economic sphere by supporting their financial autonomy, expanding female presence in the labour force and furthering the efficiency of women-owned businesses.

Notably, women and girls are more likely to report an increased sense of empowerment once they gain access to ICT.<sup>8</sup>

ICT adoption also contributes to job creation across nearly all economic sectors.<sup>9</sup> Digital skills are increasingly seen as a “new literacy” essential for employability. The European Commission (EC) estimates that by 2020, 90% of all jobs in Europe will require digital skills.<sup>10</sup> However, within this same period, the EC have also predicted a skills gap of

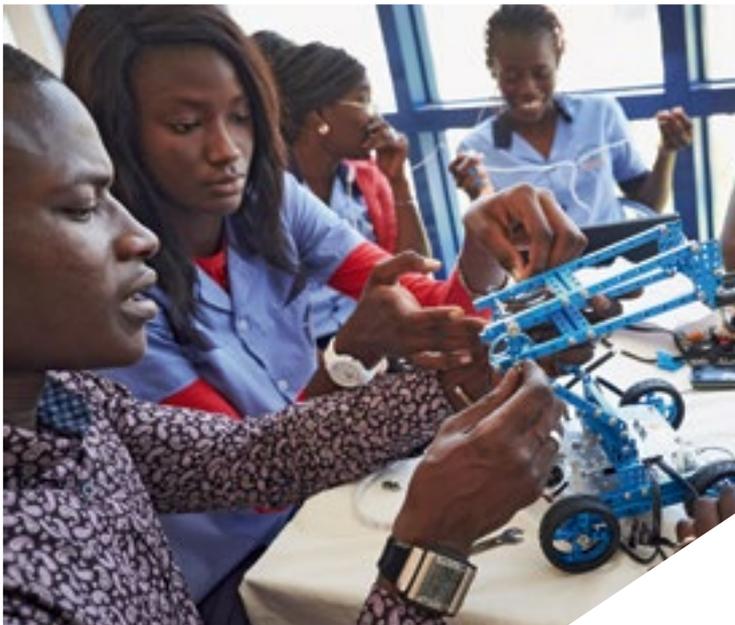
over 800,000 ICT jobs in Europe by 2020.<sup>11</sup> This allows the prediction that there will also be a demand for digitally literate, female employees. The data is only focussed on Europe, because data for other regions is scarce. Nevertheless, the literature suggests that these effects are valid for countries beyond Europe as well. Entrepreneurs who adopt digital technologies in their work to start, run and build their companies may observe that this contributes to their business development: Entrepreneurs in emerging markets can open bank accounts for the first time through their mobile phones. Entrepreneurs might also augment their business skills by participating in digital training courses. ICT can also be appropriated to promote entrepreneurs’ products and services online to new markets.

However, despite the opportunities ICT can help realise, not everyone benefits equally from ICT adoption. There is a gender gap in ICT access and use, and rural, low-income women are disproportionately disadvantaged in this area. This disparity is true for mobile phone as well as computer and internet access. The gender gap also extends to women’s representation and participation in the digital sector as employees, entrepreneurs, innovators and leaders.

## WHAT IS THE GENDER DIGITAL DIVIDE?

Globally, over 1.7 billion women in low and middle-income countries do not own mobile phones. On average, women are 14% less likely to own a mobile phone than men, which translates into 200 million fewer women than men owning mobile phones.<sup>12</sup> Knowing mobile phone ownership levels is relevant to understanding overall internet access because in many developing contexts, mobile phones serve as the primary medium for going online.

Between 2013 and 2016, the ITU measured an increase in the gender gap: The difference between the internet user penetration rates for males and females had increased to



8 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015; Web Foundation Women’s Rights Online Digital Gender Gap Audit, 2016

9 ITU, Coding Bootcamps: a strategy for youth employment, 2016

10 European Commission, 2014

11 Why a Girls in ICT Day? <http://www.itu.int/en/ITU-D/Statistics/Pages/publications/default.aspx>

12 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015

16.8% in developing countries and to 30.9% in least developed countries. The largest access gaps were observed in South Asia and sub-Saharan Africa.<sup>13</sup>

The evidence base also shows that, beyond access, there is a growing and persistent gap in women's use of mobile services and the internet. This gap increases as technological functionality becomes more sophisticated and cost of ownership becomes more expensive. Overall, women tend to use text- and data-based mobile services less frequently and for less amounts of time than men.<sup>14</sup> This is particularly true for women's use of the mobile web: More women than men report never having accessed the internet on their mobile phones. The mobile broadband access gender gap of 45% in sub-Saharan Africa, and of up to 50% in some parts of rural Asia<sup>15</sup>, illustrates the extent of this divide in developing contexts. Nonetheless, the gender digital divide exists in both developed and developing contexts to varying degrees, underscoring the need for global collaborative efforts to end the gender digital divide.

The gender gap exists not only in terms of access to and use of ICT but also extends to studying and employment in the digital sector. Illustrating this point, there are fewer women graduating from university in ICT-related subjects, and these graduation rates directly affect the number of women who work in the digital sector. For example, from a sample of 1,000 women with a bachelor degree in Europe, only 29 hold an ICT-related degree, compared to 95 men. Moreover, only four of the 1,000 women worked in the digital sector.<sup>16</sup> In the early 1980s in the US, 36% of female graduates majored in computer science, but this proportion dropped by half to account for just 18% of female graduates who majored in computer science in 2010.<sup>17</sup> Globally, women hold only 24%<sup>18</sup> of all digital sector jobs, and in developing contexts, men are 2.7 times more likely to work in the digital sector.<sup>19</sup> Men are also 7.6 times more likely than women to hold occupations that require



In developing contexts, **men are 2.7 times more likely to work in the digital sector.**

World Bank, World Development Report 2016: Digital Dividends, 2016

specific ICT skills:<sup>20</sup> When women do take up jobs in the digital sector, they tend to be concentrated in general roles that are administrative in nature, in human resources or in low-paid, low-skilled jobs.<sup>21</sup>

This gender gap also increases with seniority: There are far fewer women in senior leadership roles than men in the digital sector. In the mobile industry, for example, women hold less than 20% of senior leadership positions; for mobile operators in Africa, less than one in 10 of senior leaders are women.<sup>22</sup> Contributing to these circumstances is the fact that far fewer women remain in science, engineering and technology (SET)<sup>23</sup> in the long run: Although little data on this phenomenon from developing countries exists, a 2014 Center for Talent Innovation study found that 32% of women from the US, 22% from Brazil, 30% from China and 20% from India stated that they were likely to leave their job in an SET field within a year because of the significant gender bias and discrimination they experienced in their workplaces.<sup>24</sup>

Correspondingly, it is also clear that the gender gap means that women and girls are being excluded from numerous opportunities in the digital sector and beyond largely because of gender-based discrimination and disparities.

*There isn't a lot of exposure, direct exposure, to what the industry is and what it entails and what the opportunities are within there.*

13 Measuring the Information Society Report, ITU, 2016

14 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015

15 Alliance for Affordable Internet, 2015; Web Foundation, Women's Rights Online, 2015

16 European Commission, Women active in the digital sector, 2013

17 NPR, When women stopped coding, 2014

18 World Economic Forum, 2016. The Industry Gender Gap: Women and Work in the Fourth Industrial Revolution

19 World Bank, World Development Report 2016: Digital Dividends, 2016

20 World Bank, World Development Report 2016: Digital Dividends, 2016

21 Hill, Women in Wireless, 2014

22 AT Kearney and GSMA Connected Women, Accelerating the digital economy: gender diversity in the telecommunications sector, 2015

23 Use of the term SET is adopted only in this instance to align with the language used in the report from which the data was sourced; see footnote 25.

24 Center for Talent Innovation, 2014



By helping more people access and use ICT, approximately **140 million new jobs** could be created in emerging markets – and many in some of the poorest areas of the world.

Deloitte, *Value of connectivity: Economic and social benefits of expanding internet access, 2014*

adopt ICT. Gendered income differences also help explain why women tend to own basic handsets and are much less likely to spend airtime to use more sophisticated mobile services.<sup>26</sup> Females are also far less likely to access the internet because of the relatively high costs associated with doing so, especially where mobile broadband is the medium for this access.<sup>27</sup>

Presently, there are several information sources on the extent of the gender digital divide, which are cited in this report. However, reliable, sex-disaggregated statistics on ICT ownership, access, and usage in low- and middle-income countries are still limited. Reliable data on female access to and use of ICT is not only necessary to identify the gaps and areas for action, but also needed to help estimate where the most impact can be made in terms of transforming women's and girls' education and employment participation and experiences within the digital sector in the future.

## WHY DOES THIS GENDER DIGITAL DIVIDE EXIST?

Despite the relative lack of sex-disaggregated data, the evidence base provides insights into the reasons why the gender digital divide exists and persists. These insights are outlined below.

### Affordability

Financial independence is a chief barrier to girls' and women's initial access to and use of ICT. Cost barriers are prevalent amongst women from rural areas and from lower income groups. In developing contexts, women can be financially dependent on other people in their family or their community because of prevailing social norms which make this arrangement a necessity, generate less income (women on average earn between 30% – 50% less than men)<sup>25</sup> and tend to have less control over their finances. For these reasons, females are more price-sensitive than males, and this sensitivity can impede their ability to

### Relevant content

A lack of relevant content for women, including in local languages, is another barrier to female ICT adoption. When discussing barriers faced in ICT access and use, many women and girls report difficulty understanding content because it is in English or a language they do not know.<sup>28</sup> The challenges that women and girls can face with content are amplified by illiteracy or a weak foundation in their mother tongue due to the poor quality or lack of education they received.<sup>29</sup> The content that they do find and that is in a language they comprehend is seldom aligned with the type of information they seek. For example, women and girls have stated that they would like information about sexual and reproductive health and rights, but studies from African and Asian countries show a lack of digital content available in this area.<sup>30</sup>

Accordingly, women and girls also tend to have less knowledge of the potential and value of the various digital tools accessible to them.<sup>31</sup> Adding evidence to this assertion, Google found that over 30% of female non-internet users in Asia did not use the internet because they either did not know how to do the things they wanted to do online, or that they did not think the internet would help meet their needs.<sup>32</sup> Ultimately, female participation in the digital

26 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015

27 Alliance for Affordable Internet, 2015; Web Foundation, Women's Rights Online Digital Gender Gap Audit, 2016

28 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015

29 The Guardian, 2014

30 Web Foundation, Women's Rights Online Digital Gender Gap Audit, 2016

31 Web Foundation, Women's Rights Online, 2015

32 Google, Asia Pacific Insight Report: women and technology, 2015

25 Alliance for Affordable Internet, Affordability Report 2015, 2015



*You cannot control people's expectations of you, so the focus needs to be on excellence and delivery to push through the stereotypes and false perceptions.*

sector is affected by content availability, but girls' and women's attitudes towards and perceptions of the content they have access to is also important.

### **Digital skills<sup>33</sup>**

Lower levels of technical and digital literacy skills as well as self-confidence all have an impact on women's and girls' access to and use of ICT and, by extension, their participation in the digital sector. For example, more women than men report difficulties in using mobile phones and the internet. They also more frequently need assistance using complex technology features.<sup>34</sup> For these reasons, women are less likely to use relatively complex digital services such as mobile money or to explore the web on their mobile phones beyond simple use of search engines. A lack of self-confidence is often due to local norms, perceptions and attitudes about what women and girls can and cannot do with ICT and what they can achieve with these tools. The self-confidence needed for females to appropriate ICT is an ongoing process which occurs across their life cycles. As a result, early interventions to address girls' self-confidence are required. In many instances, the women interviewed for this report stated that there is a lack of safe spaces where girls can have their first encounters with ICT. As they become older, their self-confidence can come under further pressure as they pursue opportunities to enhance their digital literacy and technical know-how. One mechanism employed to cope with such hostile environments is girls and women teaching themselves coding in their spare time and in spaces they feel comfortable.

Women are 1.6 times more likely than men to report lack of skills as a barrier to their internet use.<sup>35</sup> Studies on digital literacy amongst women found that women tend to have fewer formal training opportunities that can help them develop ICT skills compared to men. Typically, female users develop their skills at home, in the workplace or in trusted local community environments such as telecentres, community ICT centres or cybercafés. Com-

pounding the issue is that most formal training tends to be theoretical in nature rather than practical and hands-on: Community-led ICT training courses for women and girls delivered by NGOs do not always focus on mobile- and computer-based internet skills development.<sup>36</sup> Initial and early mobile access can help lower access barriers for other ICT such as computers, and can further contribute to developing a female's digital skills in a manner which also increases her confidence.<sup>37</sup>

However, women and girls often have fewer opportunities to practice and develop their digital literacy skills than men. This is because they may not have individual access to their own digital device or their access to public ICT services such as cybercafés or telecentres may be restricted by local cultural norms which deem these places unsafe for women and girls. Thus, they may feel uncomfortable and unwelcome visiting a cybercafé or telecentre, or their parents, guardians or spouse may not even allow them to travel to these.<sup>38</sup>

### **Gender inequality in education and employment**

What is becoming increasingly clear is that gendered barriers to digital sector participation are related to wider inequalities in access to education. Unequal gender power relations, the lower value that girls' education is sometimes associated with and social norms that disadvantage girls' educational participation all contribute to low levels of educational enrolment and attainment amongst females in developing contexts.<sup>39</sup> The lack of education is compounded by the economic poverty females experience. This situation results in the perpetuation of a vicious cycle whereby a lack of financial and educational resources contribute to a widening gender digital divide that lowers the number of females who are employed in the digital

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33 Digital Skills and e-Skills are used synonymously throughout.

34 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015

35 Web Foundation, Women's Rights Online Digital Gender Gap Audit, 2016

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36 GSMA Connected Women and Digital Inclusion, 2015

37 Tyers, Women learning English through ICT in Bangladesh, 2012; GSMA Connected Women and Digital Inclusion, 2015

38 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015; The Web Foundation, Women's Rights Online Digital Gender Gap Audit, 2016

39 Web Foundation, Women's Rights Online, 2015. Women's Rights Online: Translating Access into Empowerment

sector.<sup>40</sup> Even so, research<sup>41</sup> has found that dismantling deeply embedded gender inequalities, including in education participation, can help initiate positive and effective societal transformations that benefit females and males alike. This makes it important to create and sustain collaborations between women, girls, men, and boys that can help yield desirable outcomes for all.

Examining the relationship between education opportunities and eventual digital sector participation more closely, it is observable that digital skills are not widely taught in schools. Whenever these skills are taught, the curriculum is sometimes outdated, particularly in developing contexts, or not well-aligned to the labour market needs. These two issues could negatively impact the digital literacy of boys and girls. However, because digital skills taught in schools within the formal curriculum or at after-school clubs use computer labs, social norms can have the effect that male students enjoy more frequent access than girls do.<sup>42</sup> The study of STEM subjects in schools helps to highlight the convergence of technology and science, engineering and mathematics.<sup>43</sup> However, girls and women are far less likely to study these (including ICT), which not only contributes to lower levels of digital skills among them, but also to the lack of women who establish careers in the digital sector.<sup>44</sup> Even when STEM subjects like Computer Science are taught and there are equal opportunities to access the instruction, the framing and delivery of the subject can still have implicit gender biases which make the participation a challenge for women and girls. However, by using a different approach, the gender balance can be improved as Harvey Mudd College (HMC) in the US demonstrated with its novel but simple method. The university increased the number of young women enrolled in its computer science major by redesigning its curriculum to be more collaborative in nature. Professors

*I think governments should include ICT programmes in their formal education system. And I don't just mean PC lessons. We need to have good conceptualised programmes using ICT.*

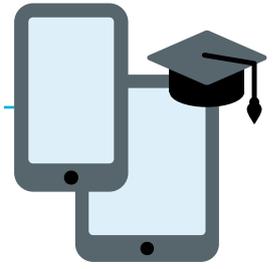
40 Research ICT Africa, 2012

41 OECD, Tackling discriminatory social norms to empower girls and women: lessons for a post-2015 framework, 2014

42 Tyers, Women learning English through ICT in Bangladesh, 2012

43 GESCI, ICT in STEM Education, 2016

44 AT Kearney and GSMA Connected Women, Accelerating the digital economy: gender diversity in the telecommunications sector, 2015



Out of **1,000 women** with a bachelor degree in Europe, **only 29 hold an ICT-related degree**, compared to 95 men.

European Commission,  
Women active in the digital sector, 2013

also removed references to common and negative stereotypes which favour young men and make women feel less welcome in class.

Through a range of marketing efforts, HMC has now grown its female computer science majors to 55 %, a marked improvement over the 10 % they registered just 10 years ago.<sup>45</sup> These efforts have now been formalised under an initiative called Building Recruiting and Inclusion for Diversity (BRAID) and is being extended to other universities across the US and could serve as a model in tertiary education in developing contexts. Nevertheless, even if a girl studies Computer Science at a tertiary level, research by the ITU shows that the tertiary education sector is not providing the skills that the digital sector needs, and numerous jobs remain vacant.<sup>46</sup> This shows that there is an opportunity for women and girls to contribute to their countries' economic development in the digital sector but that this potential is currently either untapped or under-explored.

The potential costs associated with failing to make workforces more diverse, including in terms of gender balance, was examined by two economists: Their findings<sup>47</sup> suggest that, in general, more diverse workforces often perform better than their rather homogenous competitors. According to the study, this has to do with the broader set of skills and experiences that a diverse group can draw on. Perhaps most significantly, the same is seen in matters of gender distribution among its employees: balanced staff could boost revenue by about 41 % when compared to offices that are more homogenous. This suggests that the lack of gender diversity in the digital sector, especially in specialist and technical positions, is likely doing more harm than good to companies seeking great performance and innovation to stay ahead of their competition. Social

45 Los Angeles Times, 2017

46 Coding Bootcamps: a strategy for youth employment, ITU, 2016

47 Journal of Economics & Management Strategy, 2014

norms can negatively impact the ability of girls and women to lead lives they value and hinder their participation in the digital sector. If they encounter high and numerous barriers to access and use ICT, this does not only affect them but society at large. Lower levels of initial access, and therefore use, means that girls are far less likely to develop the skills needed to explore whether the digital sector is something that interests them. To limit the negative outcomes that can arise from this early discouragement, the ITU launched the Girls in ICT Day initiative in 2011.<sup>48</sup> One of the main factors driving this initiative is the knowledge that numerous job opportunities exist for women in the digital sector. But if girls are not exposed to ICT and are not taught that ICT is an area of study that is open to them, they are less likely to pursue these subjects in secondary school and beyond. Without the confidence that an ICT career is a choice a girl can make, the gender digital divide is further exacerbated over time, both amplifying and prolonging the negative consequences of their exclusion in this area.

## WHO IS ADDRESSING THE GENDER DIGITAL DIVIDE?

Building on the research to help measure and understand the complexities surrounding the gender digital divide, in recent years there have been a few gender and ICT initiatives developed with the aim to enhance women's and girls' participation in a world increasingly pervaded by digital technologies. Many of these initiatives are long-running, scaled partnerships between the public and private sectors, such as the Women and the Web Alliance, which was designed to help bring more women online in South Africa and Nigeria.<sup>49</sup> Another example of a public-private partnership is the GSMA Connected Women<sup>50</sup> programme, which focuses on closing the gender digital divide in access to and use of mobile technology through the development of gender-sensitive mobile tools and resources.

Mobile network operators are also creating products and services aimed specifically at meeting the needs of female users: The Uninor "Sampak" project in India developed a product to help overcome social norms through strategic marketing to men and women. Uninor sold packs of two paired SIM cards with special tariff plans, meant for one

*I come from one of those families in Peru where most of the efforts are drawn to the boys in the family. It was never really in the cards for me to go to university.*

female and one male household member. The outcome was a 33% increase in female first-time SIM owners.<sup>51</sup> However, it is worth noting that merely helping a woman gain mobile access is not sufficient to sustain their continued use of the technology. Mobile network operators must also contribute to upskilling the digital literacy of women who go online and begin navigating the mobile web.<sup>52</sup>

In terms of digital skills development, the Digital Skills Partnership between UN Women and Mozilla was devised to implement activities that help upskill women and girls in several African countries so that they can properly use the web and web-enabled services.<sup>53</sup> Mozilla is also active in Asia and Africa to develop content that is locally relevant, especially for women.<sup>54</sup> Two exemplary girls' coding initiatives, Akirachix in Kenya and Epic Queen in Mexico, facilitate e-skills development opportunities for young women.<sup>55</sup> In India, Google has helped over 1.2 million women develop internet skills through their Helping Women Get Online programme. The governments of Kenya and Rwanda are integrating digital literacy and e-skills into their formal school curricula, with an emphasis on digital literacy skills for girls. An overview of other initiatives to promote women's and girls' digital sector participation can be found in the annex.



**Women are 1.6 times more** likely to report lack of skills as a barrier to internet use.

Google, Asia Pacific Insight Report: women and technology, 2015

48 [www.itu.int/girlsinict](http://www.itu.int/girlsinict) <http://girlsinct.org/>

49 <http://www.womenandtheweballiance.org/>

50 <http://www.gsma.com/mobilefordevelopment/programmes/connected-women>

51 GSMA Connected Women, Bridging the gender gap: Mobile access and usage in low- and middle-income countries, 2015

52 ICT Works, 2016

53 <https://learning.mozilla.org/en-US/clubs>

54 <https://www.mozilla.org/en-US/foundation/?v=a>

55 Coding Bootcamps: a strategy for youth employment, ITU, 2016

# The Storytellers: 22 Experiences Around the Globe



Although they may currently still be few, the number of women successfully positioned in the digital sector is increasing. In the following summarised interviews, 22 women recount how they overcame gendered barriers and stereotypes to pursue successful careers in the digital sector. All of the featured women are role models in their respective fields with rich stories to tell about their experiences and the journey from childhood to where they are today.



Industry



(Social) Start-Up



University / Research



NGO



Public Sector

## AFUA OSEI, GHANA CO-FOUNDER, SHE LEADS AFRICA



After deciding not to pursue her childhood dream of being a doctor, Afua explored other fields of interest: public relations, communications, law and business. The common theme among these professional areas was to be active in her community and to help other people. Afua was drawn to technology because of the potential to create content that transcends national borders and to give people the ability to feel part of a community, even if they are physically separated. Her first job in technology came about unexpectedly: She combined her university studies in political science, business and communications to earn a position with a mobile advertising firm doing business strategy. Afua started She Leads Africa inspired by her own experiences and recognising that despite not predicting the path she would take to where she is today, she was blessed to have people around her who guided her in the right direction. She laments that this is not the case for many girls.

*“I wanted to create something that would help young women like myself – and I knew how hard it is to figure out what you wanted to do, because I had no clue.*

*I’ve met so many other young women who don’t really have anyone who is pointing them anywhere and they really feel lost.”*

Afua believes that there are a few key ways we can ensure that technology is made relevant to and resonates with young female learners: by creating spaces for girls and women that are safe and inviting; urging companies to try harder when attempting to attract women in technology, and to encourage other successful women in ICT to tell



their stories and provide examples for others about how they can cultivate a career in the sector. Afua’s message to young girls and women who want to pursue a career in technology is:

*“Learn and soak it up as much as you can!”*

Afua taught herself how to code. She knows how overwhelming it can be. And she is convinced that technology can have a huge impact on society and communities as motivators for getting involved with social development.

**AMINA ABU KHALIL, GUINEA  
CHEF DE DIVISION  
COM.ET R.P EN CHARGE DE LA RSE,  
ORANGE GUINEE**



Amina had her first contact with technology when she was studying abroad. She got her first mobile phone when she was introduced to GSM technology by her father who worked in the telecommunications sector. But she knows that this is not the same story for all girls in her native Guinea. Girls often stop attending school because they need to help their mother at home, and they are also scared of the conditions that exist there. Amina says that most girls do not even dream about having a phone and that teachers need be able to pay attention to nurturing girls towards ICT. Beyond that, once girls have access to digital skills, there need to be universities and schools in all areas of Guinea that are accessible for girls.

*“A woman, her place is at home.  
We still have this culture that pushes us back.  
We have to break this image.”*

Amina wants to break through the stereotypes that exist for women. She says that women need equal pay and equal opportunities; and that governments could enforce policies that ensure equality and diversity through set quotas in the workplace.

*“In Guinea, like in other countries in Africa,  
women have an economic power which is  
not enough valued nor recognized. We need  
to give them the credit and encourage them  
by offering them the possibility of making  
their dreams come true.”*

Amina sees the importance of mentors and role models and believes that by valuing the women who have already succeeded, it will encourage all other girls and women to move forward.



**ANDREA JIMÉNEZ CISNEROS, PERU  
PHD CANDIDATE,  
ROYAL HOLLOWAY UNIVERSITY  
OF LONDON**



Parting from her childhood dreams of becoming an actress or a dancer, Andrea's desire to help people led her to social work and ultimately a career in Information and Communications Technology for Development (ICT4D). She was driven by her family's support but did not study STEM subjects at school. Nonetheless, she used her artistic talents, communication skills and development background to obtain an internship with a Peruvian NGO which teaches young people living in the jungle how to use technology. Andrea feels that for many women, the key challenge when pursuing education and a career in ICT is the lack of financial resources. Families often prioritise the education and career of the male offspring, meaning there is little, if any, financial investment in the girls.

*“I come from one of those families in Peru  
where most of the efforts are drawn to  
the boys in the family. It was never really  
in the cards for me to go to university.”*

Andrea believes that investing in girls along with mentors, role models and networks of women who can encourage more young women to enter technology is key. She sends a positive message to young girls to have faith in themselves, to keep working towards their goals and to believe that they deserve to be where they are.

## CATHERINE LÜCKHOFF, SOUTH AFRICA FOUNDER AND CEO, NICHESTREEM



Catherine's parent's treated her equally to her siblings and placed high expectations on all of them. They were keen to see their children tackle difficult and demanding subjects. Catherine Lückhoff has been a serial entrepreneur in the past and her latest venture is a streaming site for niche music. The first area is popular Afrikaans music but will

later extend to genres like Nigerian gospel. She is a member of the African Leadership Network and believes that when she was younger she should have taken more risks and trusted her gut more. Faced with gender barriers, she believes that women have to be determined and not give up too easily.

## GAYATRI BURAGOHAIN, INDIA EXECUTIVE DIRECTOR, FEMINIST APPROACH TO TECHNOLOGY (FAT)



Growing up in a peri-urban area of India pervaded by regional conflict, Gayatri Buragohain did not find it easy to encounter technology of any sort. Observing her father as he tinkered with and repaired the different devices in her home was what inspired Gayatri's interest in technology. This also led her to pursue a course in engineering rather than become a doctor. Given her relatively poor socio-economic background, she could not afford to attend a high-quality college. During her electronics telecommunications engineering studies, she found it difficult to learn because her college did not have a computer lab or other vital equipment to develop her e-skills.

*“An engineer is supposed to learn by doing. We didn't have teachers who could teach us hands-on work. We basically attended lectures, read our textbooks, and wrote exams. That's it.”*

The gendered barriers that Gayatri encountered exacerbated the infrastructure issues. These challenges included mobility constraints which prevented her from traveling outside of school hours to attend practical computer tutoring. She had to face sexist attitudes from her teachers, harassment from male peers, and safety concerns about being a girl outside after dark. Gayatri recommends using a feminist framework to introduce technology to women and girls, and advocates for strong outreach to girls located in more rural areas and those who are underprivileged. Her advice for policymakers in India, and the G20 more broadly, is to do more work to create gender-sensitive STEM curricula and to integrate vocational and technical training opportunities in the regular school system. This includes aligning more closely with the private sector to ensure training meets ICT labour market needs. She urges the private sector to launch girls-in-ICT efforts that encourage people from diverse backgrounds to enter the sector. Finally, for young girls, she offers the advice:

*“The base of structured learning happens at school. But, whatever you need to succeed in an ICT industry, the knowledge has to be self-taught. Use the internet, use every form of learning that you can. Do not just limit your learning to schools and textbooks.”*



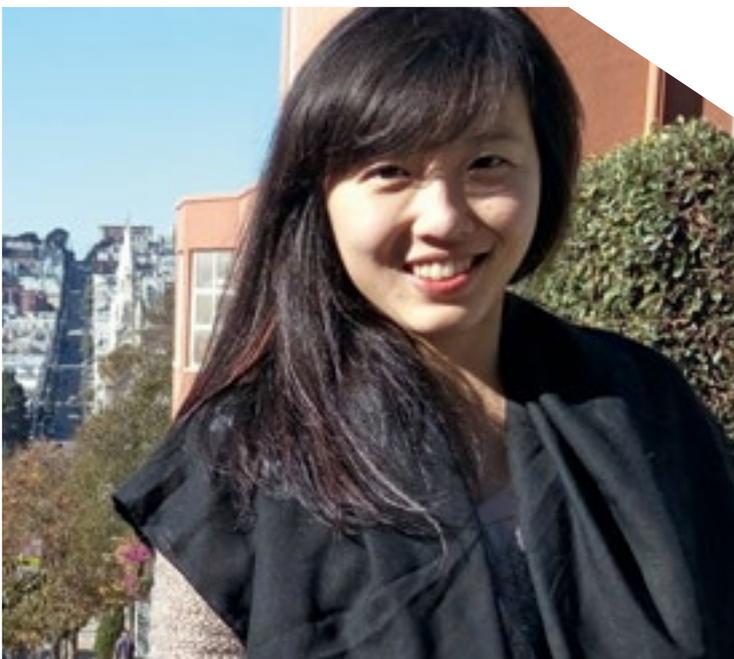
## HONG PHUC DANG, VIETNAM FOUNDER, FOSSASIA



Hong Phuc admits she was lucky her entire life not to have pressure or expectations placed on her by her parents. She says it is very important that girls and women have support from their families and the freedom to choose for themselves what they want in life. Whilst as a child she dreamt of becoming a flight attendant to fly around the world, she obtained a business degree, specialising in e-marketing. She based her decision on the industry demand and outlook of the job market. At her first job as a freelance translator at a FOSS-Bridge in Hanoi, Hong Phuc learned about open source. She eventually started to teach herself how to code with the help of her software engineer friends.

*“I guess one of the hurdles is our voice is not heard. Society doesn’t give us the credit that we are deserved.”*

Hong Phuc says that the two key hurdles girls and women face are social perception and inequality. For example, people think that women are not as good as men when it comes to technical topics. Additionally, Hong Phuc says that women unfairly get paid less than men for the same job. She believes that in order to promote more girls and women in ICT, governments and policymakers need to: support women who wish to pursue a degree in technology, provide resources to help grow the local female tech community, and create a chance for female role models to share their success stories.



## HTAIKE HTAIKE AUNG, MYANMAR EXECUTIVE DIRECTOR, MYANMAR ICT FOR DEVELOPMENT ORGANIZATION (MIDO)



Born and raised in Myanmar, Htaike Htaike was always amazed by technology. At the time, she felt lucky that her parents allowed her to attend computer classes in high school. On the other hand, actually owning a device was a barrier and thus it was difficult to keep up.

*“Ownership is one of the biggest barriers, especially for women, to become digitally literate.”*

Now working in the technology field, she says it is quite challenging being a female in a male-dominated industry. Htaike Htaike says the challenges exist because although women are able to study ICT subjects, when it comes to entering the workforce, they are discriminated against. Society does not perceive technology to be a good career for women as it is “too hard for them”. She says many of the jobs are not female-friendly, as, for example, coders and technicians have the perception that they need to work overtime which “is not very friendly for women”. Even if women do complete their degree, they do not enter into the workforce. Htaike Htaike says that it was only her passion for technology that drove her to pursue a career in tech despite the challenges but she felt that she missed having a role model and stressed how important it was to have one.

*“Accessibility is extremely important. I think this is the main stepping stone that could get women and girls into technology. Without it, how can you get women interested or passionate about it?”*

From a policy point of view, the government needs to look at the issues with a gender lens and ask: What are the needs, where are we now and why? They need to promote safe online spaces, rights, privacy and accessibility.

**IRÈNE INYANGE, RWANDA  
BUSINESS ANALYST, EVOLVE LTD**



*“The boys now see that we also need each other. If they can help us and teach us technology, we can support each other.”*

Irène was born in the Democratic Republic of the Congo, but returned to Rwanda in 1999 before beginning studies there in 2000. There she pursued a bachelor’s degree in educational technology because she wanted to make a change in her country. In her experience, she sees that girls often do not understand how the ICT sector can be a good one for them to join. As a result, some girls do not believe in themselves and their ability to do well in technology. Irène believes that the importance of girls’ confidence should not be underestimated when trying to increase their representation in the ICT sector.

*“Girls really need people to push them. Sometimes they don’t believe in themselves. Push them, help them, be there for them.”*

Irène felt that her university studies were difficult because there was an emphasis on theory without much opportunity for practice. For this reason, she thought it was hard to transition from studying ICT to an employment in ICT. She drew her encouragement to make the leap from kLab, a technology and innovation hub based in Kigali. While often dominated by males, the men and boys at kLab contributed to achieving equality. Nevertheless, Irène’s dream to further enhance her ICT skills may be blocked because



English is the predominant language in the field. She thinks that if women share their technology experiences with girls, then girls, too, can learn to excel with technology. She suggests that governments fund places for young girls to gain first-hand knowledge and begin familiarising themselves with technology. The government might also consider creating forums for girls in ICT or asking women with relevant experience to visit places outside of Kigali to teach. Asked to provide advice to girls who want to establish a career in ICT, Irène said:

*“When we hear something that we previously did not know about, we try to learn more. We can do it with technology. We are able to achieve, we just have to try.”*

**JESSICA COLAÇO, KENYA  
CO-FOUNDER, BRAVE VENTURE LABS & TED FELLOW**



The first time Jessica came across mobile phones was in 1999 when her dad bought a Samsung which had polyphonic ringtones. While Jessica was in her form two year at school, her mother bought a PC for her and she started playing around with MS dos. In addition to a lot of self-learning, Jessica also took some evening classes in programming around this time. She says she always had a passion for computers and used to do web design “just for fun”. She says that young girls’ preconception of computer science or coding is that it is hard, but if you actually take the time to learn, it can be fun and easy. Jessica says one of the main hurdles for women in the digital sector is that it is dominated by men overall. The number of women

in corporate positions is very low and society needs to encourage more women to get into this field. Jessica says as a young girl she was quite shy but was inspired by the mentors she had in her life.

*“We need more role models in this field. It goes back to having role models who are not only women but also men who act as role models. A lot of women in ICT look up to a lot of role models in the western world. I’d like to see a lot more local women for them to look up to.”*

**ISIS NYONG'O MADISON, KENYA  
FOUNDER & CEO, MUMSVILLAGE**



Like many of her female peers, Isis first dreamt of a more traditional career path as a doctor. Instead, she pursued a career in ICT after being exposed to the first modern technology boom in Silicon Valley while she was a student in California. She worked hard at school and was an all-round good student, but she excelled most in history classes. Isis defies the popular assumption that girls need more tech-related education to follow a career path in ICT. Despite this, she feels that there should be bigger efforts focused on encouraging girls to study STEM subjects and to provide the opportunities as well as develop their abilities so that they may independently explore their

interests in this field. Isis believes that hurdles for women arise from the fact that the ICT industry is still relatively nascent in Africa.

*“There isn't a lot of exposure, direct exposure, to what the industry is and what it entails and what the opportunities are within there.”*

To encourage young women, she says that the visibility of women in technology needs to be raised for it to encourage others who may wish to work in this area.

**JOVIA MARGARET NANYONJO, UGANDA  
ELECTRICAL ENGINEERING STUDENT AND VICE PRESIDENT  
OF THE ENGINEERING SOCIETY, MAKERERE UNIVERSITY;  
AFRICA CODE WEEK YOUNG AMBASSADOR TO UGANDA**



*“There is a lack of female role models in ICT in our country. Most female students who wish to take a technology course at university would want to look up to someone. They would say ‘Okay, there's this lady, and she has gone this far. I can also be like her.’”*

Jovia Margaret Nanyonjo first became interested in an electrical engineering career when she was young and helped her mother fix toys and gadgets at her workplace. Jovia credits her sister with her digital literacy development because she allowed her to borrow her personal computer and mobile phone once at university so that she could learn to use the devices to help complete her course work. This led Jovia to take an Android development class, where she was one of only three girls enrolled. While it was difficult to make her talents known in a class full of young men, she worked hard to keep up with her peers. She believes that having access to technology can help young women be more creative, to eventually transform their access to solve community problems and to tap into employment opportunities. Two actions she thinks the private sector can take to promote more females in ICT are lowering or eliminating the cost of ICT access for young girls and to make the hiring processes gender-blind to minimize discrimination against women. Jovia also



believes that governments can help girls by providing scholarships to study ICT and by ensuring more ICT trainers are female.

*“If you provide a good environment for the girls, I'm sure they can be encouraged to attend ICT trainings.”*

## IFFAT ROSE GILL, PAKISTAN FOUNDER, CODE TO CHANGE



Iffat's family is from Pakistan but she spent much of her early youth growing up in Libya. Exposed to technology and encouraged by her father who had recognised the potential of technology before it became mainstream, she taught herself different programmes on their home PC. Iffat says that, somehow, we have started believing that computers are for boys only and recalls her experience of being the only girl in her school's computer class. While she did not find this intimidating, she did often feel awkward and it was not an environment she could thrive in. Iffat believes that teachers are not as encouraging as they should be for girls who want to go into technology. Frequently, families also reinforce certain stereotypes.

*"It comes from teachers, the parents and of course the peers who also grew up in that same toxic environment where you must stick to the rules and you must go study this if you're a female gender, and boys must go and study this."*

Iffat quickly realised the importance of having computer skills. These accelerated her efforts to create a community technology centre in rural Pakistan – the first of its kind. She started teaching office skills and how to use computers in everyday life. Iffat says that "digital literacy is going to become the new literacy" and will deepen the gap between



the developed and the developing world. She believes that governments should include coding as a subject in their national curricula and that it should globally become the second language in every school. Iffat recognises that there is a huge pool of talented women where the skills gap needs to be addressed.

*"Women would have more economic independence if they had the tools to build solutions or to access the existing jobs."*

She says that some of the remaining key challenges in Pakistan are the lack of safe spaces and trusted teachers adding that they "still desperately need more role models and more success stories."

## SUADA HADŽOVIĆ, BOSNIA AND HERZEGOVINA EXPERT ADVISOR FOR LICENSING; COMMUNICATIONS REGULATORY AGENCY OF BOSNIA AND HERZEGOVINA (CRA)



As a child, Suada dreamt of being a writer but felt that a career in ICT was a better investment in her future. She believed that studying technology and pursuing it as a career was crucial for financial stability, especially given the high unemployment faced in her home country Bosnia and Herzegovina. Her family was supportive of the path she chose and assisted her financially as she completed her studies. Suada was grateful for her family's practical advice to study engineering given the high number of positions available in the ICT sector. Unlike other women we spoke to, she does not believe she encountered gendered stereotypes while studying tech-based subjects.

Suada advises young girls who are interested in a career in technology to "never give up", saying they will be rewarded if they just keep pushing towards their goals.





**MARIANA COSTA CHECA, PERU  
CO-FOUNDER AND CEO  
OF LABORATORIA**



*“There is a lot that you learn in the field by practising. I realised that you can actually learn (technology-related) things by yourself, and then implement them to see how they work.”*

From a relatively young age, Mariana Costa Checa was aware of the rampant inequality in her home country of Peru. Because of this, she wanted to work to support people who did not have the opportunities that she had growing up. Although she did not study an ICT-related subject at university, when she started a software company with her husband, she realised that many of the developers who applied to work for her company were self-taught. Inspired by this, she decided to create a training centre where low-income women could participate in skills development activities to help them launch a career in the ICT sector within six months. Through her experiences, she came to believe that lifelong learning is the key to success for women who seek to work in technology, whether as an entrepreneur like herself or in a more technical area like the developers her centre trains.

**PASSANT SOBHI, EGYPT  
RESEARCH ASSOCIATE,  
TECHNICAL UNIVERSITY OF BERLIN**



Passant was born in Egypt and spent much of her life growing up in Oman. After obtaining her degree in accounting, she wanted to work in the oil sector. Despite excellent grades, the field was not easy to break into and Passant pursued a different path. The first role she had in the ICT sector was with the Ministry of Education supporting the Egyptian government in reforming the TVET system through preparation of a TVET teacher national training policy. It was here that she realised the power of technology and in particular, worked to promote the integration of e-learning. She mixed learning solutions thus innovating to overcome budget limitations for expensive software.

*“I think governments should include ICT programmes in their formal education system. And I don’t just mean PC lessons. We need to have good conceptualised programmes using ICT.”*

Passant says that change needs to come from two sides: at the policy and social level. Governments should plan and create new programmes for women that are recognised in their current education system. As some women are mothers, she says that there needs to be support for women at home with children, for example via e-learning programmes. Beyond training for employment or entrepreneurship, Passant says that for many women, a connection to the internet is their only way of communicating. She says that the private sector has a role to play and could invest in the development of curricula to ensure that graduates entering the labour market have the right qualifications for the jobs that exist. Her message to the G20 is to provide support to all developing countries on how to integrate ICT programmes and how to make them sustainable. To young aspiring young she says,

*“catch your dream and go ahead,  
and don’t listen to society”.*

## ROKHAYA SOLANGE, SENEGAL RESPONSABILITÉ SOCIALE D'ENTREPRISE, SONATEL / ORANGE SENEGAL



Born in Senegal, Rokhaya says she never had the feeling that she was just a girl while growing up, only a child. Her father was a great influence on her interest in technology as he loved gadgets and ICT. Rokhaya started using mobile phones and the internet around 1997, and was self-taught, making new discoveries day after day. She recalls her first interaction with Google and her reaction being:

*“Wow! The world is now a village.”*

In her role in communications at Orange, she uses Facebook, Twitter and other forms of social media every day. While her own journey – undertaking studies in marketing and communications – is quite common for Senegalese women, Rokhaya says that girls must be encouraged to take alternative pathways.

She says that girls and women need to have mentors and be exposed to other women who are already in the ICT sector, so they have examples of what they can do and opportunities available to them. Rokhaya believes that women in Senegal are very entrepreneurial and if they can be empowered with ICT, it will help women promote their inclusion in income generating activities. She says that programmes targeting girls and women in ICT should run throughout the year, not just once off or annually. This can be done through increasing the number of incubators in all regions of the country. She says that already women in Africa are becoming more powerful in politics and in the economy. Now the goal must be to make women more powerful in ICT.

## TINYIKO SIMBINE, SOUTH AFRICA, CO-FOUNDER AND TREASURER, GIRLSCODE



*“If your dreams don’t scare you then they are not big enough.”*

Tinyiko sees the tech industry in South Africa as currently skewed towards men:

*“We don’t often see many women – in particular black women – in senior positions within the tech industry. And without female role models in these positions, young girls have no one to look up to and realise that they can also pursue careers related to tech”.*

## SAJEDA SAWALHA, PALESTINE, INFORMATION TECHNOLOGY UNDERGRADUATE STUDENT, AL-QUDS UNIVERSITY



*“I’m 19 and I work in a company. Do you know how weird that is? Jobs are really rare here. It is even harder for women to get jobs here.”*

Sajeda Sawalha grew up in a small village in Palestine, surrounded by her parents, two brothers, and four sisters. Because of the unresolved conflict between Israelis and Palestinians, she says that she has been limited in life opportunities and especially in education. Despite this, she scored a notable 97% on her high school exit exam, and others encouraged her to study medicine or engineering. However, she chose to study computers instead because her father enabled her to use computers when she was young and gave Sajeda her own laptop after receiving high academic marks in the 9th grade. She enjoyed trying to figure out how computers work and to get the machines to do what she needed. Sajeda eventually gained admission to a competitive dual studies university programme in Information Technology which combined theory and practice so that students could work and study at the same time. But she faces problems finding a place to live that is near her university and place of work. Sajeda now lives far away from her family, frequently moving between Ramallah and Hebron. Nevertheless, she thinks the diversity in the career paths one can take in the ICT sector is exciting. She suggests that governments provide more scholarships and employment opportunities for young women to help them become interested in technology. The private sector could also contribute to this goal by ending discriminatory hiring practices which favour men.

Along with Zandile Keebine, she attended a number of hackathons and found they were largely attended by men. They founded GirlCode ZA to provide a more inclusive platform but also as a space where women had a chance to flex their “tech muscles”.

She believes that more young women should take advantage of opportunities in the tech sector and grasp the opportunities that are beginning to open up.



### SELVARASA VAKHSALA, SRI LANKA



Selvarasa is 22 years old and is from rural Sri Lanka. Born into a conservative Tamil society, she was orphaned at a young age and went to live in an orphanage run by the LTTE, a Tamil separatist group in the north and east of Sri Lanka. When the Sri Lankan civil war ended, Selvarasa went to live in a Catholic convent, an all-girl boarding school and vocational training centre supported by the German government, where she still lives. She recently completed a vocational ICT training course run by the convent. As recently as 18 months ago, she had no digital skills and had never used a computer or the internet before. She has only used a mobile a few times but doesn't have one of her own as the convent does not allow it. Since completing the course and learning basic ICT functions such as Word, Excel and how to send emails, she has been working in an online web marketing company, first as part of a placement for her course, and now as a full-time employee.

The support of other women has been crucial to her. Having female mentors in her teachers and colleagues and a support network through her classmates has given her the confidence to learn digital skills as well as how to work in a male environment in a society with strong social norms around men and women working together:

*“If we have support then women can achieve in the ICT field... I thought I could never work (with men), but my female colleagues encouraged me.”*

Selvarasa feels that young rural women in Sri Lanka are very willing to study and work in ICT but society prevents this: There are security concerns for women going home after working late or finding places that are safe to study ICT (such as the convent). Her message to the G20 is to help young women like her be aware of how they can affordably access ICT, what sort of things they can study and where they can study that is also safe.

### ZANDILE KEEBINE, SOUTH AFRICA CHAIRWOMAN, GIRLCODE



Encouraged by one of her professors and supported by a very entrepreneurial family, Zandile was inspired to follow her own path instead of everyone else's. With qualifications in applied mathematics, she accepted an internship to become a developer and soon realised that technology is a field that appeals to her. After researching software engineering companies, Zandile soon acquired her first role at a start-up software development company. She believes that the main hurdles for women entering technology are the fact that jobs in this sector are dominated by men and because of this, some colleagues frequently assume women are not as capable as their male counterparts.

*“Your colleagues kind of expect you not to be as good as they are. So you are looked down upon and you're left out of projects because the males tend to take over and run with it. So I think a lot of females get disheartened by that and decide not to stay in the industry.”*

Zandile offers positive advice to young girls, saying that this male dominance should not be a deterrent: To be fearless and to dare to believe that you can create things and importantly, know that you are as capable as the men in the industry. She suggests that by having initiatives and forums for women to come together and discuss the challenges as well as the opportunities, they will be better prepared to join the industry. Mentoring can help bring young women into the sector by showing them how to perform different jobs, telling them that the industry is exciting and overall simply encouraging them. Zandile believes that women bring a new perspective to technology and can have different yet strategic perspectives when developing solutions to problems they are presented. By leaving them out, half of the population is not represented.

**MARY MWANGI, KENYA  
CEO, DATA INTEGRATED**



As a child, Mary wanted to be a teacher believing that the only career options available to women were teaching, nursing and secretarial work. She was first attracted to a career in technology when her were doing a course where they were learning shorthand with a typewriter and she realised that a PC was more interesting and you could do more with it. Mary's first exposure to technology in the workplace was helping a tech team move their accounting from one legacy system to a new one – with her business accounting skills, she assisted them with the transfer of data. Mary says:

*“The main hurdles that women come across when they are starting a career in technology is a lack of mentors. A lack of people to look up to and say ‘I want to do what that person is doing’. In Africa, a woman needs to balance her career and being a nurturing mother as is expected in Africa.”*

Mary feels strongly that women need mentors and that with the support of one, she tells young girls that if they work hard, “it’s no different, you can be just as successful as anyone else out there”. Mary’s message to the G20 is that they should provide mentoring programmes for young girls as well as they equipment they need to build their skills.



**TANIA MUKWAMU, DR CONGO  
CO-FOUNDER, MAXICASH**



When she was young, Tania did not have a set career goal. However, she always knew she wanted to be in business. Understanding the infrastructural challenges in Africa, she was attracted to technology use as a potential mechanism to overcome these. Her family was very career-driven, but it took Tania’s persistence for her parents to accept her chosen career path. Her first opportunity to work in technology came with Nokia, where she spent eight years before moving to Microsoft. She sees the main enablers for women in ICT as receiving equal treatment and being given opportunities to demonstrate that women can perform as well as their male colleagues in the sector. Tania advises young women today to “just go for it”.

*“You cannot control people’s expectations of you, so the focus needs to be on excellence and delivery to push through the stereotypes and false perceptions.”*

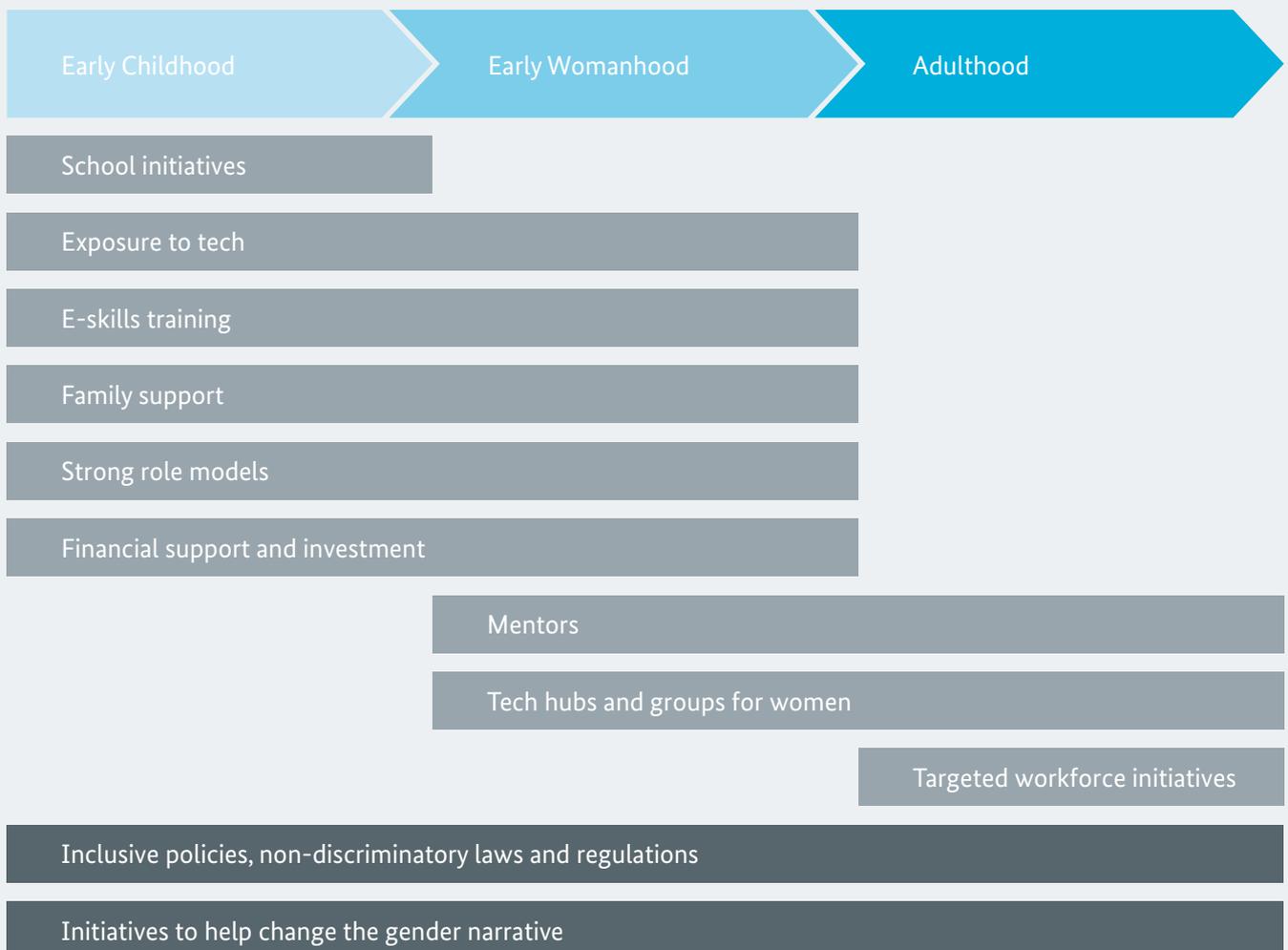
From a policy perspective, Tania says that more support should be given to schools to implement initiatives aimed to promote girls. She says that to encourage more women to consider ICT careers, they need to be exposed to diverse people in tech and to the opportunities that exist in the industry at an early age. Tania says it is not just about the boys or pleasing parents or partners. She encourages young women to ignore what is popular or what is accepted to ensure they follow the thing that they are actually yearning to do.

# Key Findings





Throughout the findings, it is seen that there are interventions that can promote girls' and women's participation in the digital sector throughout their lives. The figures below suggest certain stages during which interventions should occur to most effectively ensure that girls and women are supported and encouraged to explore their interests in digital technologies. By implementing strategies at each stage, barriers to women's and girls' ICT participation can be lowered or eliminated and can catalyse a shift in current paradigms that prevent girls and women from pursuing technology careers. While recognizing that certain interventions need to occur on a lifelong basis, actions should be taken as early as possible in girls' lives to maximise the potential for positive impact where digital sector participation is concerned.





## INCLUSIVE EDUCATION SYSTEMS

### KEY FINDING

In general, digital literacy skills or even more advanced skills such as coding still find little representation in education systems. Even when this requirement is fulfilled, education systems do not always provide inclusive opportunities for girls to participate in science, technology, engineering, and mathematics (STEM) subjects. This contributes to girls deciding not to pursue STEM subjects beyond the minimum curricular requirements. In turn, that negatively impacts their transition to careers in the digital sector, which frequently rely on knowledge gained through STEM education. Moreover, digital literacy skills are infrequently taught in schools, and outdated curricula remain a challenge for both, girls and boys.

### RECOMMENDATION

- From the primary level onward, education systems should lay the foundation for digital skills and lifelong learning for all learners.
- Given the various gender barriers that exist, education policies should emphasise digital literacy skills for girls and women and support their study of STEM subjects in inclusive and gender-neutral environments. Early exposure to technology can create opportunities for girls to experiment with technology at a young age, potentially increasing their confidence in working within the digital sector.
- Activities should be directed towards enhancing girls' psychological resources (such as self-efficacy, confidence, etc.) but must also target the provision of education and training opportunities (such as education / career counselling programmes or ICT “discovery days”).

### ACTION

- Education providers are strongly encouraged to integrate digital skills training topics into curricula and, given the speed with which technology develops, ensure these curricula remain up-to-date.
- Curriculum design should also include gender-sensitive learning materials for STEM subjects. This should include positive portrayals of girls' and women's achievements in STEM so that female role models are more visible.
- Learning environments for STEM subjects should be gender-neutral, and girls should have the same opportunities as boys to learn and understand whether any of those subjects might be of interest also for their future careers. After-school girls' clubs for digital technologies could be particularly useful for this.



## TERTIARY EDUCATION / LABOUR MARKET TRANSITION

### KEY FINDING

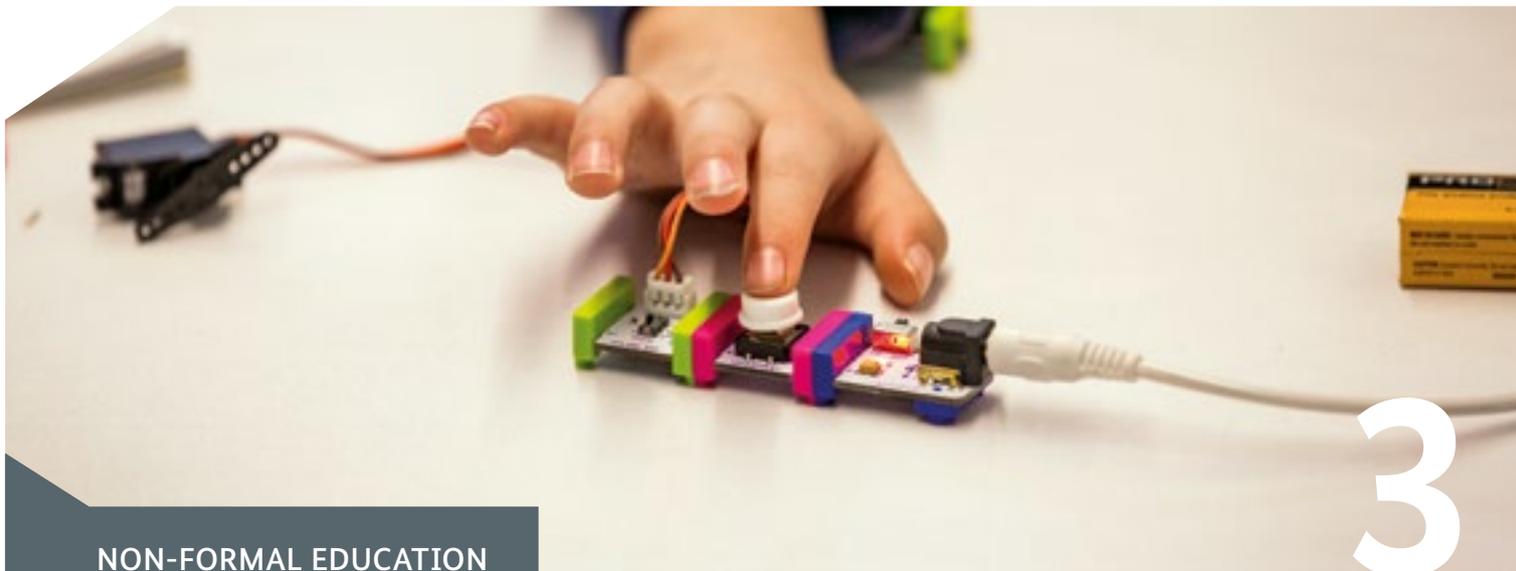
Labour market needs are not being addressed through the training provided in Technical Vocational Education and Training (TVET) or tertiary education institutions. There is a skills mismatch between what students learn at university and the skills that employers seek.

### RECOMMENDATION

- Ensure tertiary education offerings align with the the current and projected human resource needs in national ICT job markets.
- Create better transition mechanisms between formal education and employment in the ICT sector for women and girls who may be too intimidated to pursue a career in this area.
- Embrace new rapid skills training programmes, like coding boot camps, that teach both hard and soft skills and provide job placement support.

### ACTION

- Educators should be trained to play a more prominent role in students’ career counselling and to promote digital sector career opportunities by providing current information about job profiles in the field. Adding to that, national employment ministries could also share data with educators and career counsellors on digital skills shortfalls.
- ICT lectures should be reframed by building bridges to creative problem-solving and “real-world” experiences to make them more attractive to young women.
- A regular exchange with private sector ICT organisations should be established to further contribute to understanding their needs and support a closer linkage to the curricula (“pipeline between schools and employment”).



## NON-FORMAL EDUCATION

### KEY FINDING

There are too few opportunities that target girls outside of formal education. This contributes to girls being left out and not being exposed to technology until they are older, at which point it is usually too late to get them to reconsider ICT as a career.

### RECOMMENDATION

- Create educational opportunities for digital literacy and STEM subjects targeted to girls and women outside of the formal education system.
- Ensure initiatives reach women and girls who may be more disadvantaged because of their location or household income.

### ACTION

- Ministries of youth, women, ICT and /or employment are strongly encouraged to lead partnerships, including with the private sector, to launch targeted initiatives that encourage women and girls outside of the formal education system to pursue the digital sector. Such programmes could include tech camps, competitions, mentoring programmes and online courses that help these women return to education and could further develop their digital literacy and e-skills.
- Care must be taken to ensure these programmes are implemented within and outside of urban centres. Ideally, these opportunities should be provided at a low or no cost.

## ACCESS AND AFFORDABILITY

### KEY FINDING

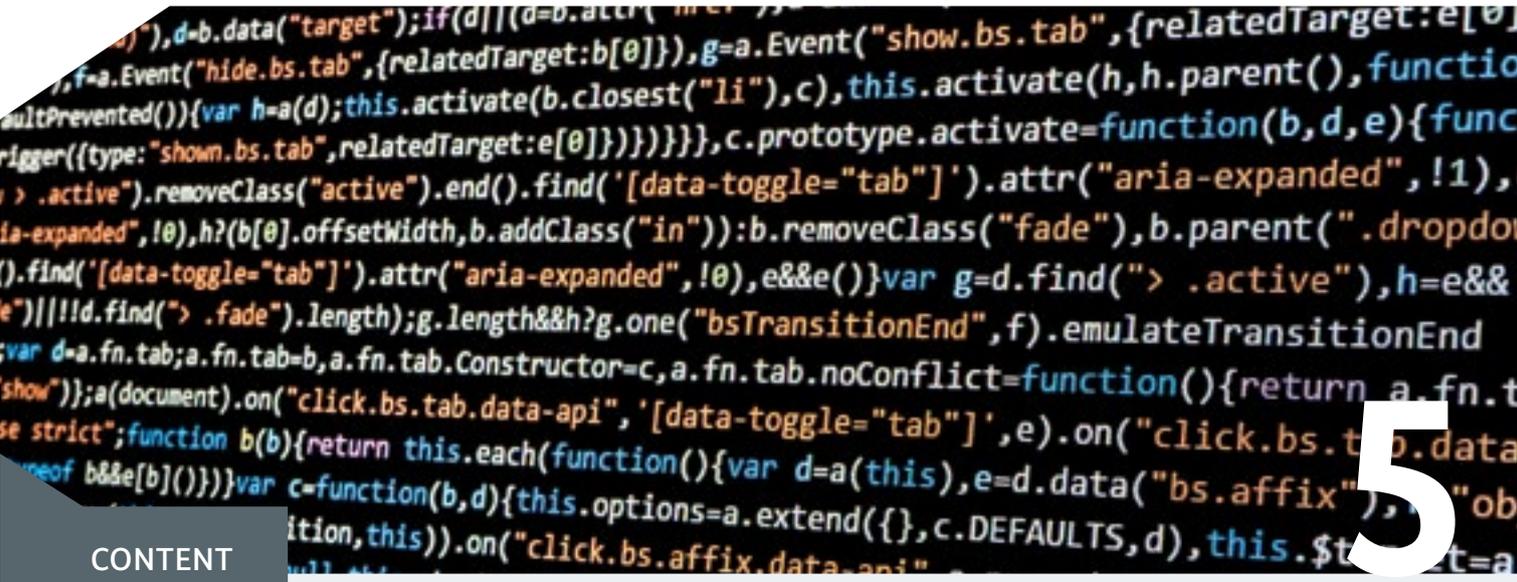
Cost is one of the most significant barriers to initial access to, and use of, ICT for women. This is particularly apparent among women from rural and low-income groups. Moreover, they may only have restricted access to public ICT services such as cybercafés or telecentres. Culturally, these are seldom seen as safe places for women and girls. As they are traditionally male-only spaces, female users can feel uncomfortable and unwelcome. Accordingly, their parents, guardians or spouses may even forbid them to visit these places. However, access is only the first step in addressing the gender digital divide.

### RECOMMENDATION

- Governments and the private sector are strongly encouraged to work to lower or remove cost barriers to help stimulate interest in ICT access amongst women and girls. Access serves as a prerequisite to help females develop digital literacy and the e-skills needed to work within the digital sector.
- They are also strongly encouraged to ensure the availability of safe public spaces where women and girls can access on ICT on a regular basis. Concurrently, there is a need to address and shift the cultural norms that prevent women and girls from freely accessing these places.

### ACTION

- Diverse access mechanisms to support ICT access for women and girls should be created, including by activating financial resources from universal service funds.
- Governments are strongly encouraged to give special attention to broadband network roll-outs in rural areas and to reducing the taxation burden in the mobile sector to support these efforts.
- Public-private partnerships that offer specialised incentives for female customers to adopt ICT could also be explored.
- Governments are strongly encouraged to work with NGOs and other local and international stakeholders to establish safe spaces for women and girls to access ICT and to shift negative stereotypes and perceptions about these.
- Integrating the various dimensions of exclusion, which contribute to the gender digital divide, into universal access policies would be an important step. This includes considerations of gendered differences in mobility, income, time constraints and local norms on female participation in ICT.



CONTENT

KEY FINDING

The challenges for girls and women participating in the digital sector are compounded by content considerations even when affordable technology access is possible. Firstly, there is a distinct lack of content, or content missing in local languages, which facilitates the development of digital literacy skills of either gender. However, women and girls are less likely to be literate, a prerequisite to engage with such content. Moreover, there is a dearth of localised content for women who are online, that really corresponds to their needs and interests.

RECOMMENDATION

- Ensure the availability of relevant, meaningful and appropriate content for women and girls in local languages. This can help stimulate demand to learn more about career opportunities in the digital sector.

ACTION

- Work with community stakeholders to create locally relevant content that meets women's and girls' needs.
- Support initiatives that facilitate women's and girls' ability to generate and disseminate their own content that reflects their viewpoints and experiences.
- Consider developing gender-sensitive content to help make the use and study of ICT more democratic.



Code like a girl.

6

## SELF-CONFIDENCE

### KEY FINDING

The overall lack of support for girls' and women's engagement with ICT in every life stage can have a negative impact on their ability to develop the self-confidence needed to access and use ICT. Yet exposure to technology as young girls can bolster their curiosity about the wider digital sector. First encounters with technology can also help young girls build their digital literacy over time. During adolescence, girls can be encouraged to consider an employment in the digital sector through curricula that stress that STEM subjects are open to any student. The life cycle of girls' and women's relationship to ICT is therefore a crucial affective component with implications for their digital sector participation, no matter their age.

### RECOMMENDATION

- Support programmes that facilitate guided exposure to technology at an early age. This can assist girls in building the confidence to study STEM subjects and eventually to pursue careers in the digital sector.
- Identify role models in STEM and the digital sector more broadly who may serve as mentors for girls as they consider their future career options. Seeing examples of successful girls and women can bolster girls' confidence about what they can achieve.

### ACTION

- Support the development of girls' confidence and attitudes towards using ICT.
- Connect girls and young women to active female participants in the digital sector.
- Provide space for knowledge exchanges, including peer-to-peer learning offered by women in technology networks.
- Feature successful women and girls from the digital sector in campaigns through which they can present their experiences and share diverse perspectives on how to pursue similar careers.



## CULTURAL STEREOTYPES

### KEY FINDING

Women contend with several socially constructed barriers which impact their ability to work in the digital sector. One such barrier is that STEM subjects, as a path to Technical Vocational Education and Training (TVET) or tertiary education, are often not seen as appropriate for them. Instead, they are steered towards more “feminine” subjects such as teaching. If they persist past this stage, they are sometimes perceived to be less capable of performing the same amount and type of work as their male colleagues simply because of their gender.

### RECOMMENDATION

- Create public awareness campaigns and school-level activities that challenge stereotypes related to gender and ICT. Over time, this can help shift prevailing attitudes about female participation in the digital sector and women studying STEM subjects.
- Private sector firms are strongly encouraged to actively combat the application of gendered stereotypes in the hiring processes as well.

### ACTION

- Governments, together with communities, parents, teachers and children, are strongly encouraged to help change attitudes around women and girls using ICT, studying STEM subjects and working in the digital sector.
- The private sector is strongly encouraged to engage in capacity-building around eliminating bias in digital sector job recruitment.



## WORKING ENVIRONMENT

### KEY FINDING

If a woman begins a career in the digital sector, the aforementioned cultural stereotypes remain pervasive. Additionally, workplace policies and practices that harm their progression and ability to break through the “glass ceiling”, including being terminated for becoming pregnant or being excluded from projects with a technical focus, can contribute to their decision to leave digital sector jobs earlier and in greater numbers than their male counterparts. Many women still do not consider a career in the digital sector as attractive due to lingering gender-based discrimination.

### RECOMMENDATION

- Establish enabling environments for women in the digital sector by inviting diversity in the hiring and promotion process.
- Create mentoring programmes in which women who have worked in technology can on-board other women new to the field and support their long-term retention.
- Implement workplace policies to identify and promote qualified women to senior roles, including with hiring responsibilities.

### ACTION

- Promote the UN Women’s Empowerment Principles, which define clear and transparent criteria for ensuring gender balance in recruiting, promoting and recognising women in the digital sector.
- The private sector is strongly encouraged to integrate these into human resourcing activities.



## LACK OF SEX-DISAGGREGATED DATA AND GENDER STATISTICS

### KEY FINDING

There is a need to initiate and increase the frequency of measurements for the gender digital divide in terms of access to and use of ICT. In doing so, evidence-based policy recommendations can be developed to help bridge this divide once its extent is known. Moreover, sex-disaggregated data can support programme impact monitoring for interventions that are linked to education, women, and their access to and use of ICT.

### RECOMMENDATION

- Advocate for sex-disaggregated data collection when implementing ICT initiatives.
- Promote capacity building for national statistics offices on sex-disaggregated data. These efforts will help establish benchmarks that can help discern progress in bridging gaps in women's and girls' ICT access and use. Such data will also be useful for understanding how and where women face challenges to participate in the digital sector.

### ACTION

- Work with international governmental and civil society organisations such as Women in Global Science & Technology (WISAT) as well as academic institutions to enhance capacity building around programme- and national-level ICT data collection.
- Include questions in annual household surveys that gather sex-disaggregated data.
- Coordinate data collection efforts to build a more accurate and comprehensive picture of the opportunities and challenges for women and girls to access and use ICT as well as their digital sector participation.

## KEY FINDING

The task of closing the gender gap in the digital sector's labour force is not the responsibility of any single entity but rather an undertaking which requires collective action. Besides female champions for change, male champions are also needed in local communities as well as in government, the private sector and civil society.

## RECOMMENDATION

- From a macro-level perspective, multi-ministry consortia are needed to bring about sustained change and should include ministries of ICT and education at a minimum.
- At the micro-level, women and girls need support from each other as well as men and boys in their contexts to realise the outcomes desired in digital sector participation.

## ACTION

- Governments are strongly encouraged to forge collaborations with the private sector and civil society organisations to amplify the potential to bridge the gender digital divide and increase women's participation in the digital sector.
- Launch multimedia campaigns which target men as agents for change who can help transform the circumstances surrounding women and girls accessing and using ICT and participating in the digital sector.

# Annex



## EXAMPLE INITIATIVES

| INITIATIVE                 | OVERVIEW   | COUNTRY | STAKEHOLDERS   |
|----------------------------|--|---------|--|
| Anita Borg Institute (ABI) | ABI provides key influencers, organizations, and individual women technologists with insight about the challenges that women face in technical careers, why this matters, the stories of women who are succeeding and the solutions necessary to build inclusive work environments.  | Global  | ABI and its partners (women technologists, academic institutions and companies)                          |
| Connected Women Programme  | The Connected Women Programme works with mobile operators and their partners to address the barriers to women accessing and using mobile internet and mobile money services.   | Global  | Multi-stakeholder initiative led by the GSMA and including global mobile network operators, NGOs, donors |
| Digital Skills partnership | Mozilla and UN Women are teaming up to teach digital skills to girls and women in Nairobi, Kenya and Cape Town, South Africa. The goal is to improve the lives of women in Africa by leveraging the power of the open internet.  | Global  | UN Women & Mozilla   |
| Empowerwomen.org           | A dynamic platform to improve the sharing of evidence, experiences and good practices on women's economic empowerment. Empower Women has also cultivated a global network of 410+ dynamic, influential champions for women's economic empowerment from over 70 countries. Together, they are taking action and driving change for women's economic empowerment both online and offline.  | Global  | UN Women   |
| GemTech Awards             | The GEM-TECH Awards, which are jointly organized by ITU and UN Women, celebrate personal or organizational achievements and innovative strategies to advance Gender Equality and Mainstreaming in the area of ICT. The GEM-TECH Awards provide a platform for advancing women's meaningful engagement with ICT and their role as decision-makers and producers in the technology sector. | Global  | ITU  |

## EXAMPLE INITIATIVES

| INITIATIVE                           | OVERVIEW  | COUNTRY | STAKEHOLDERS   |
|--------------------------------------|---|---------|--|
| Greenlight for Girls                 | Greenlight for Girls is an international organisation dedicated to inspire girls of all ages and backgrounds to pursue STEM subjects by introducing them to the world of science in fun and exciting ways. It organizes several activities around the world to achieve this goal including the provision of science books and scholarships or the organization of events and workshops. | Global  | Greenlight for Girls and its partners  |
| International Girls in ICT Day       | International Girls in ICT Day, an initiative backed by all ITU Member States, aims to create a global environment that empowers and encourages girls and young women to consider careers in the growing field of ICT, enabling both girls and technology companies to reap the benefits of greater female participation in the digital sector.   | Global  | International Telecommunication Union, all member states                               |
| Mozilla – Code Clubs                 | Mozilla Clubs are a global network of community members that share Mozilla’s mission to ensure the internet is a global public resource, open and accessible to all. Mozilla provides free training and resources to help clubs succeed and grow digital literacy in community spaces.  | Global  | Mozilla, global network of community members   |
| Technovation                         | The Technovation competition helps teams of girls cultivate digital skills they can then apply to develop mobile apps which address social problems that are important to them.   | Global  | Women working in tech and other private sector volunteer-Irisdescent and its partners  |
| The Smart Women Project              | The SmartWoman Project is a movement enabling women around the world to help, connect, share and empower each other.  | Global  | Various  |
| Women Enhancing Technology (WeTech®) | WeTech helps women and girls enter and succeed in technology careers, with the goal of enhancing women’s talent and skills needed to fuel technological and economic growth.  | Global  | Consortium of dedicated partners led by the Institute of International Education (IIE) |
| Women’s Rights Online initiative     | Women’s Rights Online initiative aims to drive women’s empowerment through the Web. Using a blend of fresh research, policy advocacy and storytelling, the initiative wants to see evidence-based national ICT and gender plans established in at least seven new countries within five years.  | Global  | World Wide Web Foundation  |

## EXAMPLE INITIATIVES

| INITIATIVE                            | OVERVIEW  | COUNTRY        | STAKEHOLDERS  |
|---------------------------------------|---|----------------|---|
| SAP Code Week                         | The aim of the Africa Code Week is to empower future generations with the digital literacy and coding skills they need to thrive in the 21st century workforce. It consists both of free coding classes for children and trainings for teachers so that they can organize coding lessons by themselves. In 2016, the Code Week took place in 30 countries, with a total of 426,758 children and youth. For Africa Code Week 2017 specific activities for girls are planned. | African States | Joint initiative by SAP, the Cape Town Science Centre and the Galway Education Centre |
| Searching for Martha                  | The Searching for Martha project aims to empower young African women entrepreneurs to successfully offer high-quality training to young African girls to confidently develop, sell and widely promote mobile apps especially targeting the 2030 SDGs and to create employment opportunities.  | African States | UNESCO  |
| Women Tech Makers / Abomey-Calavi     | Google's programme provides visibility, community and resources for women in technology.  | Benin          | Google  |
| Tech Need Girls                       | Tech Need Girls addresses the digital gender gap in Ghana through a mentorship programme. Its main objective is to teach girls how to code.   | Ghana          | Soronko Foundation  |
| Feminist Approach to Technology (FAT) | Feminist Approach to Technology (FAT) is a not-for profit organization that believes in empowering women by enabling them to access, use and create technology through a feminist rights-based framework.   | India          | FAT   |
| Helping Women Get Online              | The aim of the Google initiative is to bridge the gender gap by enabling women in villages to use the internet for their own or their community's benefit. These women are being equipped with skills and provided with internet-enabled devices.   | India          | Google  |
| Microsoft Women in Tech Initiative    | "Women in Tech" is an initiative aimed at bringing more women to the Indian IT industry. Through this programme, Microsoft will attract and retain female talent in the industry.   | India          | Microsoft   |

## EXAMPLE INITIATIVES

| INITIATIVE  | OVERVIEW  | COUNTRY      | STAKEHOLDERS   |
|---|---|--------------|--|
| UninorSampark   | UninorSampark aims to increase the number of female users by introducing schemes like the “Jodi” pack- a set of two SIM cards, one each for the male and female family member.  | India        | Uninor, GSMA   |
| AkiraChix   | AkiraChix runs a technical training programme that targets young women from poor social and economic backgrounds in Nairobi. The training programme aims at giving these girls IT skills that enables them to sustain themselves.   | Kenya        | AkiraChix  |
| Epic Queen  | Epic Queen is a non-profit organization that empowers more women through education and entrepreneurship to become leaders in the scientific and technological sector.   | Mexico       | Multi-stakeholder including AT&T, Google, Facebook, Disney, Telefonica |
| Laboratoria   | Laboratoria is a social enterprise that empowers young women from low-income backgrounds by giving them access to education and work in the digital sector.   | Peru         | Laboratoria  |
| GirlCode  | GirlCode’s mission is focused on providing opportunities for women to learn web and software development.   | South Africa | GirlCode   |
| Apps and Girls  | Apps and Girls is an NGO founded in 2013 with a vision “To give girls of Africa the skills, tools, self-esteem and competitive edge to become effective leaders and drivers in their communities while building sustainable social enterprises and information technology businesses that solve community challenges.” It established coding clubs in schools and organizes holiday events such as workshops, exhibitions, hackathons, boot camps and competitions. | Tanzania     | Apps and Girls   |
| Building Recruiting and Inclusion for Diversity (BRAID) | The BRAID initiative seeks to increase the percentage of women and students of colour majoring in computer science. Each university committed to a set of approaches to increase diversity within their computer science departments. Each department also committed to provide data for a research study that will document the progress made over the course of three years.  | USA          | Harvey Mudd College  |

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