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Women20 Study

„The Effects of Digitalization on the Gender Equality in the G20 economies"

Alina Sorgner, Eckhardt Bode, Christiane Krieger-Boden

With contributions by
Urvashi Aneja, Susan Coleman, Vidisha Mishra, Alicia Robb

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ABOUT

Women20

Women20 (W20) is the official G20 dialogue focussing on women's economic empowerment. W20 joins the global experiences of women's civil society organizations, women's entrepreneur associations and academia. W20 Germany is jointly organised by the National Council of German Women's Organizations (Deutscher Frauenrat) and the Association of German Women Entrepreneurs (Verband deutscher Unternehmerinnen, VdU).

The National Council of German Women's Organisations is the biggest women's lobby in Germany, serving as an umbrella organisation for over fifty women's associations and organisations nationwide. The Association of German Women Entrepreneurs is a cross-industry business association with international links which has been representing the interests of entrepreneurially active women in economics, society and politics for over sixty years.

Web: www.w20-germany.org | Twitter: @WomenTwenty_Ger

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Emerging Market Sustainability Dialogues (EMSD) is a network of change agents and decision makers from think tanks, multinational corporations, and the financial sector. EMSD members jointly develop and implement solutions for sustainable economic development in emerging economies through consultation, dialogue, and research. EMSD brings these solutions into national and international fora, contributing to the global sustainability transition and the protection of global public goods. EMSD is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ).

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PREFACE

This study is a joint project by the Women20 and the Think Tank 20 initiatives under the German G20 presidency, supported by Emerging Market Sustainability Dialogues (EMSD), which serves as international implementation partner of W20. This study is the final report. An executive summary has been published on occasion of the Women20 summit in Berlin.

The authors would like to thank Urvashi Aneja and Vidisha Mishra as well as Susan Coleman and Alicia Robb who contributed detailed case studies on women's empowerment in the digital age in India and South Africa and Strategies for Reducing the Gender Gap in Angel Investment in the United States, respectively. These case studies are included in Section 7 of this report.

The authors would also like to thank the YOUNG WOMEN NETWORK who provided an overview of initiatives addressing digital gender divide in Italy. Particular thanks go to Valentina Capogreco, Marialessandra Carro, Nicoletta Polano, Martina Romanelli, Martina Rogato and Lorena Suster. Finally, the authors would also like to thank Frank Bickenbach for helpful discussions and Antonia Birkeneder and Michaela Rank for valuable research assistance.

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EXECUTIVE SUMMARY

This study investigates how the digital revolution, which is characterized by artificial intelligence, big data, cloud computing and mobile robotics, will affect gender equality in G20 countries, and how governments and non-governmental initiatives may exploit the new digital technologies to narrow these gender gaps in the future. The study focuses on four areas to derive its policy recommendations. First, it assesses if digital technologies will affect gender equality in the foreseeable future by replacing women's jobs to a different extent than men's jobs. Second, it determines the state of the art in gender equality and gender-oriented policies in labor markets, financial inclusion and entrepreneurship in the G20 countries. Third, it identifies deficits in women's digital inclusion that may impair the effectiveness of digitally empowered gender policies. It also shows how digital technologies may empower women. And fourth, it provides three detailed case studies.

Two case studies, coauthored by Urvashi Aneja and Vidisha Mishra, zoom deeper into the options for digitally empowered gender policies in two selected countries, India and South Africa, while the third, coauthored by Susan Coleman and Alicia Robb, highlights digitally empowered strategies for reducing the gender gap in angel investment, a promising tool for fostering female entrepreneurship.

The estimates of the susceptibility of occupations to digitalization suggest that about 40-60% of jobs in developed G20 countries will face a high risk of being digitalized within the foreseeable future. These risks are not distributed evenly among women's and men's jobs. The good news is that new digital technologies will likely replace women's jobs to a lesser extent than men's jobs. This is primarily because many jobs typically held by low-skilled women, like those in health care or household services, are less easily automatized than the jobs typically held by low-skilled men, like machine operators or assembly-line workers. Many jobs typically held by low-skilled women require high non-routine manual or social skills that still constitute bottlenecks to automation. The bad news is, however, that women may, on average, not benefit to the same extent as men from the vast opportunities offered by new digital technologies, if they continue to be in a minority in those jobs that will likely benefit the most from digitalization. These jobs are, among others, in management, STEM occupations (Science, Technology, Engineering, Mathematics) and entrepreneurship where women are still strongly underrepresented in most G20 countries, as the analysis of the current gender gaps reveals.

The analysis of current gender gaps and gender-oriented policies reveals that the G20 countries differ widely from each other not only in the magnitudes of the gender gaps in labor markets, financial inclusion and entrepreneurship but also in the scope of the governmental and non-governmental programs and initiatives that address these gaps. The four "Anglo-American" countries among the G20, Australia, Canada, the United States and the United Kingdom, feature the greatest achievements in terms of gender equality of all G20 countries and address most of the remaining gender gaps by appropriate policy measures. However, they still feature wide gender gaps among highly qualified workers, notably among STEM graduates, entrepreneurs and managers.

Governments have launched initiatives to bring more women into STEM professions or entrepreneurship but have done less to break the "glass ceiling" that prevents women from advancing into leading management positions.

The three continental European G20 countries, France, Germany and Italy, show broadly similar patterns in gender gaps and gender-oriented policies as the Anglo-American countries. Governments appear to put more emphasis on breaking the glass ceiling for female managers through mandatory quota for women in supervisory boards of large companies, though. Japan and Korea still have to overcome cultural barriers to increase female labor force participation, guarantee women equal pay and grant them equal access to higher education and highly qualified jobs, especially in STEM and management occupations. The Japanese government appears to be more active in reducing these gaps than the Korean government.

China and Russia exhibit rather small gender gaps in labor market participation and financial literacy, compared to the other emerging economies among the G20. But the gender gaps among highly qualified managers and self-employed are wide, and remain largely unaddressed by governmental programs.

Unlike Russia, China additionally exhibits wide gaps in higher education, which are also largely unaddressed by policy to our knowledge. The three Latin American G20 countries, Argentina, Brazil and Mexico, feature comparatively wide gender gaps in labor market participation and unemployment, which their governments seek to address directly or indirectly by a variety of programs.

Gender gaps are also wide — and largely unaddressed by policy — among STEM graduates, managers, entrepreneurs and — in Mexico — professionals. The gender gaps and policies in South Africa are comparable to those in the Latin American G20 countries in several respects. However, South Africa features a wider gap in higher education, which is apparently insufficiently addressed by governmental programs.

India, Indonesia, Saudi Arabia and Turkey, finally, still lag significantly behind the other G20 countries in terms of gender equality. They arguably still need to overcome significant cultural barriers to reduce the large gender gaps in labor force participation and education, among others. While India, Indonesia and Turkey have enacted a variety of programs that appear to address these gaps, Saudi Arabia has, to the best of our knowledge, done very little.

The study also analyses the digital inclusion of women and reveals that gender gaps in the use of digital technologies and digital literacy are negligible in the Anglo-American G20 countries as well as in China, Russia, Japan, Korea and Brazil while they are widest in Argentina, India, Italy, Saudi Arabia and Turkey. In many countries, including those that feature no gaps, governments or civil societies have initiated specific programs for enhancing women's digital literacy. Similar programs are, to our knowledge, not available in Saudi Arabia and Turkey, where they are needed the most.

The results of the study corroborate several earlier studies in recommending the G20 to provide universal, affordable, secure and open broadband internet access; foster women's digital literacy; encourage more women to go into tertiary education and STEM occupations; facilitate web-based female entrepreneurship; and empower women financially through innovative digital finance tools and e-government. In addition to these recommendations, the study recommends the G20 to take action in the five following areas:

1 *Initiate more high-profile research on the consequences of digitalization on women's employment prospects especially in emerging and developing countries, and continuously monitor women's employment prospects in all countries to establish an early warning system that may spark timely policy responses if necessary.*

2 *Empower women in developing and emerging economies by assigning them more active and supportive roles in existing, preferably digitized government programs. Conditional cash transfer programs show that activating women's superior social skills may help increase both program effectiveness and women's economic and digital empowerment.*

3 *Help women access those jobs that will most likely thrive best in the digital age by providing more women with higher education and advanced digital skills. In combination with women's superior social skills, higher education and advanced digital skills promise particular high returns in the digital age.*

4 *Foster female entrepreneurship by supporting high-quality online platforms that provide training for novice female entrepreneurs and bring them together with incumbent female entrepreneurs who may serve as entrepreneurial role models.*

5 *Popularize innovative web-based instruments for female entrepreneurs to access financial capital, such as high-quality digital platforms for angel investors, venture capital investors or equity crowdfunding that bring together female entrepreneurs and female investors. Additionally promote innovative ways of risk assessment that rely more on transaction histories and other information from the web than on traditional forms of security guarantees.*

1. AIMS AND SCOPE

While gender gaps in economic, social and political participation have been narrowing considerably during recent decades, they are still far from being closed in many countries and many areas (e.g., UN Women 2015, WEF 2016b). Along with other governmental and non-governmental institutions and initiatives, the G20 has put gender issues high on its agenda. The G20 leaders agreed in reducing the gender gap in labor force participation rates by 25 per cent until 2025 and in closely monitoring progress toward this goal.[2] The G20 Ministers of Labor and Employment identified more specific areas on which to focus. These areas include women's access to education, qualified jobs, self-employment and finance, their career opportunities and wages as well as child- and family-friendly working conditions.[3]

The present study uses the G20's emphasis on these economic areas as a starting point for investigating how the digital revolution may help in reducing the gender gaps that still exist in labor markets, entrepreneurship and access to finance, and what policy should additionally do to better deploy the digital technologies for further reducing the gender gaps in these areas. The study focuses on two channels through which the digital revolution may affect gender equality. The first channel is changes in the composition of jobs. The automation of work processes, facilitated by digital technologies, may affect women's labor market inclusion by changing the demand for the jobs women prefer differently from that for the jobs men prefer. Robots and intelligent machines will likely replace many jobs in occupations like assembly-line production, machine operation, bookkeeping and clerical jobs. They will, by contrast, complement jobs in occupations like management, research, engineering or health care. The study investigates whether jobs currently held by women in the G20 countries will, on average, be less affected by the digitalization than jobs currently held by men. The second channel is innovations in digital services. Cloud computing, mobile money and other innovative digital services may help women sidestep traditional barriers to their full economic, entrepreneurial or financial inclusion. These new services may, for example, help them sidestep traditional mobility constraints by working from home, or traditional male-dominated forms of finance by resorting to online credit or crowdfunding. The study investigates to what extent gender gaps still exist in economic, entrepreneurial and financial inclusion in the G20 countries, to what extent gender gaps in digital inclusion still prevent women from using the new digital services to their own benefit, and which policy measures are available in the G20 countries to foster women's economic, entrepreneurial, financial or digital inclusion. Based on this stock-taking, the study develops several suggestions for additional policies to better deploy the digital revolution for achieving more gender equality in the G20 countries.

The study proceeds as follows. Section 2 takes stock of the current deficits in women's labor market inclusion in the G20 countries, and assesses to what extent the automatization of work processes facilitated by digital technologies will affect women's and men's jobs differently in the foreseeable future. The current deficits in women's labor market inclusion and the gender composition of jobs may curb women's future opportunities for benefiting from the new technologies, or make them more vulnerable to the adverse consequences of the digitalization of labor. The section identifies the current deficits by analyz-

[2] See paragraph 9 of the G20 Leaders' Communiques of the Brisbane Summit, November 15-16, 2014, and para-graph 7 of the G20 Leaders' Communiques of the Antalya Summit, November 15-16, 2015.

[3] See Annex D of the G20 Labour and Employment Ministerial Declaration, Melbourne, September 10-11, 2014.

ing a variety of statistical indicators on gender gaps in labor force participation, education, high-profile jobs, unemployment and wages, among others. Section 2 determines the effects of the automation of work processes on the gender composition of jobs by exploring for selected G20 countries if women's jobs are more susceptible to being automatized than men's jobs within the next one or two decades.

Section 3 takes stock of the current deficits in women's financial inclusion in the G20 countries and investigates the role of digitalization for women's financial inclusion. Based on the most recent Global Findex data, it identifies the current gender gaps in financial inclusion in general, and in the use of mobile and digital technologies to access financial services in particular. It also highlights the potentials of digitized financial products and services for a better financial inclusion of women.

Section 4 takes stock of the current deficits in women's entrepreneurial inclusion in the G20 countries and discusses particular obstacles for women to start their own businesses. With the digitalization creating numerous new entrepreneurial opportunities, gender gaps in entrepreneurial intentions and motivations, role models, entrepreneurship-relevant human capital, financial constraints or startups in knowledge-intensive sectors may indicate particularly severe obstacles for women to participate in reaping the benefits from digitalization. This section exploits data from the Global Entrepreneurship Monitor, the world's largest ongoing study on entrepreneurship and entrepreneurial dynamics.

Section 5 takes stock of the current deficits in women's digital inclusion. It reveals the gender gaps in the access to and use of mobile and digital technologies. It also provides some evidence on the reasons for these gaps, including the perceived barriers to using digital technologies.

Section 6 takes stock of existing policy measures and initiatives that aim at reducing gender gaps in the G20 countries. This section does not only survey the various political attempts to foster women's labor market, financial, entrepreneurial or digital inclusion. It also tabulates the existing gender gaps, identified in the previous Sections 2-5, against the policies to fight them in each country to give an impression about the extent to which governments or non-governmental entities do currently address the existing gender gaps in their countries.

Section 7 complements the analysis of the deficits in women's economic empowerment and the policies to reduce these deficits by three more detailed case studies. Two of these case studies, coauthored by Urvashi Aneja and Vidisha Mishra, highlight the potential role of digitalization for empowering women under the specific circumstances of two emerging economies, India and South Africa. The third case study, coauthored by Susan Coleman and Alicia Robb, focuses on a specific initiative for establishing a network of female investors to improve women entrepreneurs' access to finance in a developed country, the "Rising Tide U.S. Angel Training Program".

Finally, Section 8 formulates policy recommendations for further empowering women in the digital age. Based on the insights from the previous sections, it complements the earlier recommendations by various authors or institutions by focusing on exploiting the potentials digital technologies offer for enhancing women's economic, entrepreneurial or financial inclusion in G20 countries and beyond.

This section identifies the current deficiencies in women's labor market inclusion in the G20 countries (Section 2.1) and gives an outlook on expected future effects of digitalization on labor market inclusion of women in selected G20 countries (Section 2.2). The current deficiencies and future trends shall serve as focal points for the subsequent evaluations of existing governmental and non-governmental programs in the G20 that aim at reducing gender gaps (see Section 6), and the policy recommendations for more effective promotion of women's labor market inclusion in the digital age in Section 8.

2. LABOR MARKET INCLUSION

2.1 Current deficits

We identify the deficits in women's labor market inclusion in the G20 countries by analyzing various facets of inclusion separately rather than presenting a composite index of labor market inclusion. Constructing composite indices such as World Economic Forum's Global Gender Gap Index (GGGI; see WEF 2016b) or UNDP's Gender Inequality Index (GII; see UNDP 2015a)[4] has been popular because they facilitate country rankings. Summarizing several facets of labor market inclusion within a single number per country, they appear to show directly which countries perform comparatively well in terms of gender equality, and which still have a long way to go. But such indices have three major drawbacks. First, they implicitly assume that facets of labor market inclusion may substitute for each other. Deficits in one facet may be masked by good performances in other facets.

Second, the rankings of countries are fairly sensitive to the detailed choices of the underlying indicators. Adding or dropping a single indicator may affect the rankings significantly. And third, the rankings are rather sensitive to relative weights assigned to the individual indicators in the overall indices. In the absence of theoretically founded or widely accepted rules on which facets of labor market inclusion are more and which are less important, the choices of the weights are necessarily ad hoc.

We investigate current gender gaps in six facets, (i) labor force participation, (ii) skills, (iii) advancement, (iv) self-employment, (v) unemployment and (vi) pay, using available, internationally comparable statistical indicators. Combined with the analysis of entrepreneurial, financial and digital inclusion (Section 3 – 5), these facets draw a comprehensive picture of the current gender gaps in the G20 countries. The main advantage of analyzing the individual facets separately is that we can focus directly on the country-specific deficits in each facet. This also facilitates deriving policy suggestions tailored specifically to the facets and the countries.

[4] UNDP (2015b) compares a variety of composite gender inequality indices. While most of these indices are highly correlated with each other, they differ in details due to their specific emphasis.

Labor force participation:

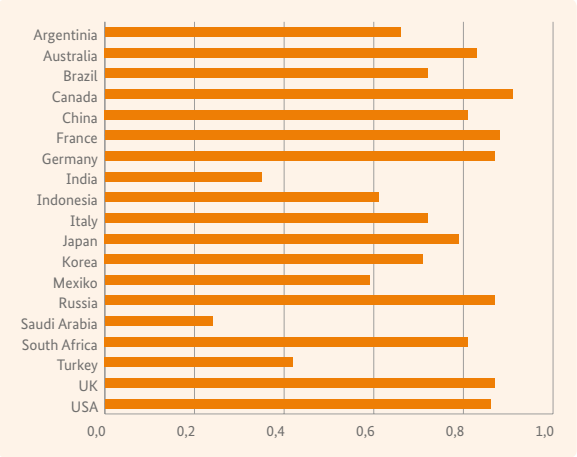
Gender gaps in labor force participation still vary greatly across the G20 (Figure 2.1.1), ranging from a female-male ratio in participation rates of 0.91 in Canada (74% for women relative to 81% men) to only 0.44 in Turkey (33% / 77%), 0.34 in India (28% / 82%) and 0.26 in Saudi Arabia (21% / 80%).

In general, the more developed countries in Northern America, Europe as well as Australia tend to have rather moderate gender gaps with female / male ratios above 0.8 while poorer countries tend to have wider gender gaps. According to the International Labour Office (ILO), the largest gender gaps are in Middle Eastern and Northern African countries as well as on the Indian subcontinent, suggesting that they are rooted in countries' cultural specificities.

There are a few exception from this general tendency, however. One exception is Russia and China who, like most of the highly developed countries, feature only moderate gender gaps in labor force participation. This is because most of the former communist countries had put great emphasis on fully integrating women into their labor markets in the past.

Another exception is Italy and Japan who feature significantly higher gender gaps than the other highly developed countries. Traditional cultures appear to still play a larger role in these countries.

Figure 2.1.1: Gender gaps in labor force participation in G20 countries: Female / male ratios



Ratio of female / male labour force participation rates, measured as the proportions of the countries' working-age populations that engage actively in the labour market, either by working or looking for work.

Source: ILO (2016a).

Some countries, including Germany, Japan, Korea, Turkey and the United Kingdom, have made considerable progress in reducing their gender gaps in labor force participation since 2012 (ILO et al. 2016: 8–9). By contrast, the two G20 countries with the highest gaps, India and Saudi Arabia, have made virtually no progress. And Canada, Russia and the United States, all of which are among the countries with the lowest participation gaps, have even experienced a widening of gender gaps.

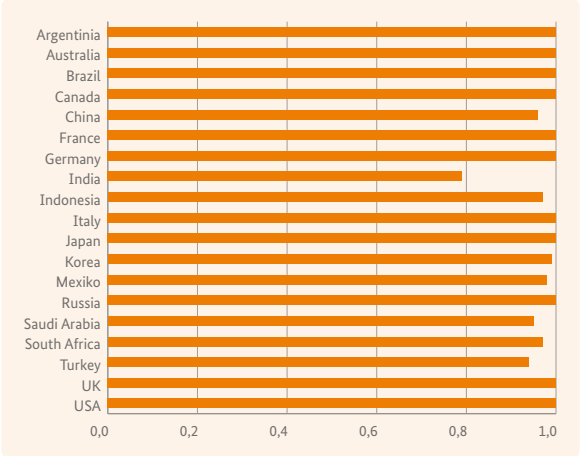
Skills:

Gender skill gaps in general education are generally fairly low, not least so due to successful gender education policies in the past, but increase with educational attainment (Figure 2.1.2). Gaps in literacy rates between the female and the male populations are even reversed to date in most of the G20 (graph a). Only India still features a notable gender gap in literacy rates of 0.84 (63% women / 81% men).

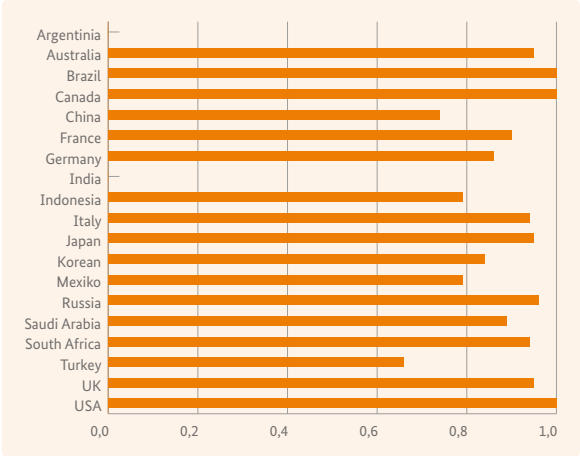
The gender gaps are somewhat higher but still moderate in most countries for the populations with completed upper secondary education (graph b). Only in China, Indonesia, Turkey (and most likely India, where data is not available) the female / male ratio of adults (aged 25+) with at least upper secondary education is below 0.8.

Figure 2.1.2: Gender skill gaps in G20 countries: Female / male ratios

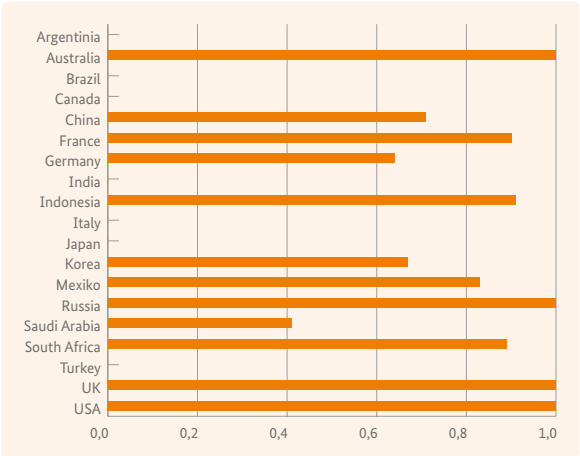
(a) Literacyrate



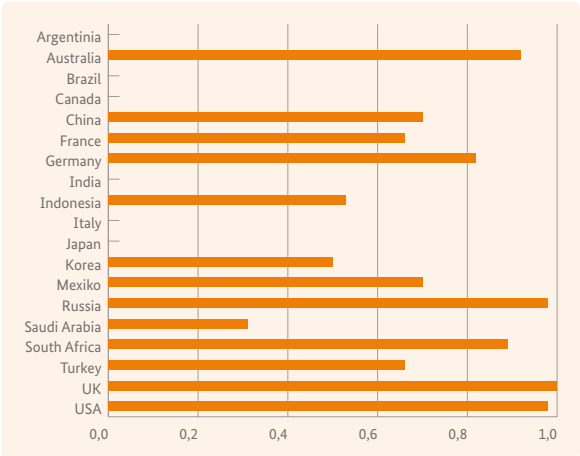
(b) Completed upper secondary education



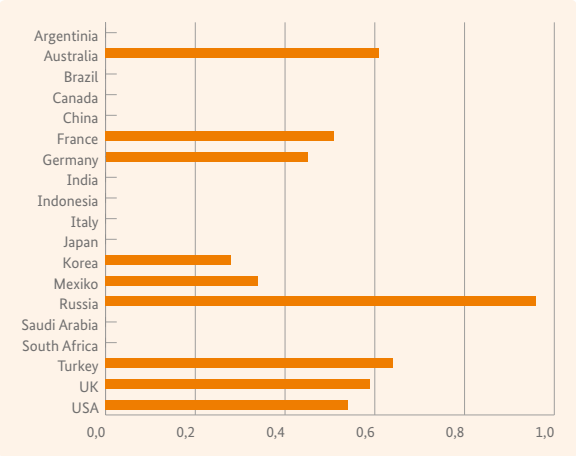
(c) Bachelor degree



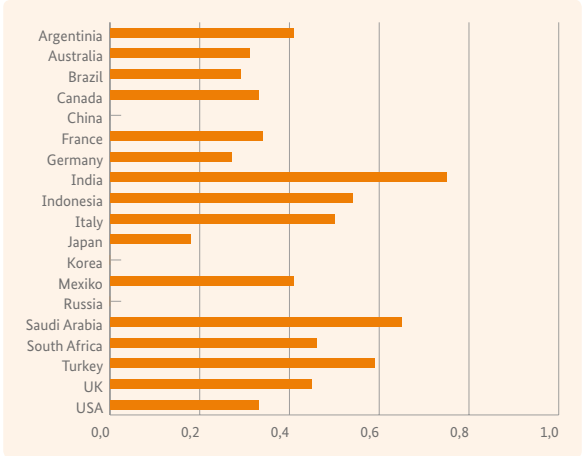
(d) Master degree



(e) Dectoral degree



(f) STEM graduates



(a) Literacy rate: Ratio of female / male literacy rates, population 15+ years. (b) Completed upper secondary education: Ratio of female / male shares in populations 25+ with at least completed upper secondary education (cumulative). (c) Bachelor, (d) Master, (e) Doctoral degree: Ratios of female / male shares in populations 25+ with at least completed bachelor, master or doctoral degree, respectively (cumulative). Ratio of female / male shares of tertiary-level (ISCED 5-8) graduates in Science, Engineering, Manufacturing and Construction studies in all tertiary-level graduates. All data are from 2015 or the latest available year, and are truncated at 1.0.

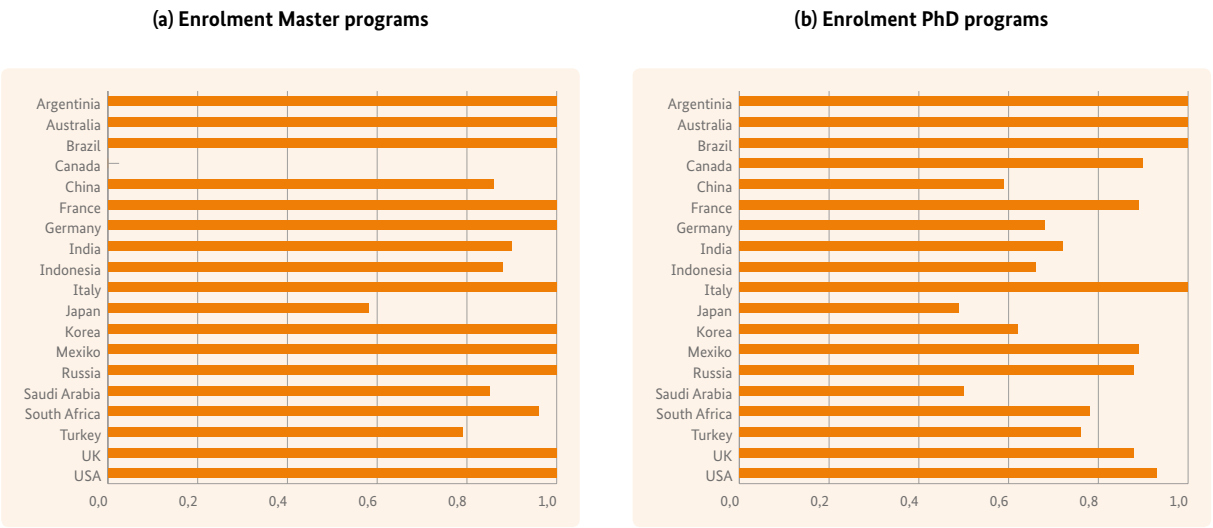
Source: UNESCO (Education indicators, database); United Nations (World Development Indicators).

For university graduates, however, the gender gaps increase considerably with increasing degree in most G20 countries. In Australia, for example, the share of the adult population (aged 25+) holding a Bachelor degree is still higher among women than among men (graph c). But the share of those holding a Master degree is already lower (female/male ratio: 0.94; graph d), and the share of those holding a PhD is rather small (0.61; graph e). Only Russia has attained almost full gender equality even among those holding a doctoral degree (0.96). All other countries for which data is available score below 0.66, meaning that the share of doctors is 50% higher among men than among women. The available data suggest that the gender gaps among university graduates are particular high in Saudi Arabia and Korea.[5] In Korea, for example, the share of persons holding a doctoral degree is even four times higher among men than among women.

This data on gender gaps in the entire adult population partially reflect historical gender gaps among students, of course, which may have been closed in recent years. In fact, data on student enrolments at universities show generally smaller gender gaps among Master and PhD students in recent years (2013 or 2014) in virtually all G20 countries (Figure 2.1.3). The numbers of female Master or PhD students do even exceed those of male students in Argentina, Australia, Brazil and Italy. However, most of the other G20 countries, most notably Japan, show still moderate or even large gender gaps among Master students. And the gender gaps are even higher among PhD students. In Japan, for example, the female /male ratio for Master students is 0.58, implying that only 37% of all Master students are women. And the ratio for PhD students is even smaller at 0.49, implying that only 33% of all PhD students are women. China, Germany, India, Indonesia, Korea and Saudi Arabia also still have some scope for reducing the gender gaps among PhD students.

[5] The large gender gap among Bachelors in Germany is likely due to the fact that the Bologna system was established in Germany only fairly recently in the late 2000s.

Figure 2.1.3: Gender skill gaps in enrolment in higher education in G20 countries: Female / male ratios



Ratios of females / males in enrolment in tertiary education: (a) Master (ISCED 7) programs, (b) PhD (ISCED 8) programs.

Source: UNESCO (Education indicators database).

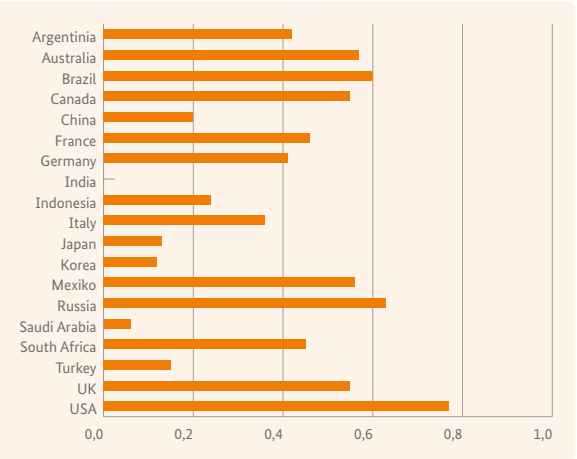
There are also still large gender gaps among university graduates in STEM professions (Science, Technology, Engineering and Mathematics; see Figure 2.1.2. graph f). Interestingly, the gender gaps among STEM graduates show a significantly negative correlation across countries with the gender gaps in literacy rates (see graph a). Countries that still have some gender gaps in literacy rates tend to show lower gender gaps among STEM graduates. These countries include India, with a female/male ratio of the shares of STEM graduates of 0.75, Saudi Arabia (0.65), Turkey (0.59) and Indonesia (0.54). Another skill type where gender differences are significant and important is social skills. While conclusive, internationally comparable data on social skills by gender is not available, a variety of country-specific and case studies show that women frequently exhibit higher emotional and social intelligence, scoring higher in facets of personality like compassion, politeness, cooperation, compliance, sociability, gregariousness, empathy, and experiences of positive emotion. See Deming (2015: 34-36) for a concise review of this literature. Empirical evidence also suggests that social skills have been gaining significantly in importance in work life during past decades, have been increasingly better paid, and have been contributing to narrowing the gender wage gaps (Borghans et al. 2014, Weinberger 2014, Deming 2015). Notably, Deming shows for the US that women have benefited disproportionately from technological changes during the past about three decades. This is not only because female-dominated occupations have expanded disproportionately due to these technological changes. It is also because the employment shares of women increased in these occupations with higher social skill requirements, such as health services, while they decreased in occupations with higher routine task intensities that can more easily be automatized.

We believe that their better social skills is one of the women's most important competitive advantages in the labor market. Several of our policy recommendations in Section 8 below suggest exploiting these advantages to a greater extent.

Advancement:

Women's career opportunities appear to differ even more across the G20 than their educational achievements. One facet of these opportunities is representation in management jobs (ISCO-08 major group 1; Figure 2.1.4), i.e., in jobs that typically involve planning, directing, coordinating and evaluating activities in private firms or public entities, that require high skills and that come with responsibility for staff. Here, we observe a broadly similar gender gap pattern as for labor market participation in general. The gender gaps are lower in highly developed Western countries than in countries in the Middle East, Northern Africa and on the Indian subcontinent. In addition to this, the gender gaps in management jobs are also high in Far Eastern countries like Korea (0.12 = 10% women / 90% men), Japan (0.13 = 11% / 89%) and China (0.2 = 17% / 83%) where overall labor market participation rates are as high as in highly developed western economies.

Figure 2.1.4: Gender gaps in management occupations in G20 countries: Female / male ratios



Ratio of female / male shares of workers in major group 1 (Managers) of the ISCO-08 classification in total employment.

Source: ILO (2016a).

Self-employment:

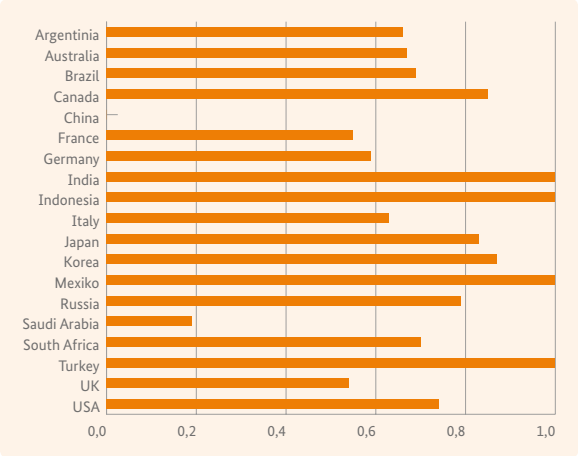
While self-employment[7] may be considered a facet of general labor market advancement, the gender gaps among self-employed (Figure 2.1.5) differ considerably from those among managers (see Figure 2.1.4 above). The gender gaps among self-employed are not only smaller than those among managers. They also differ less across countries, and do not show similar regional concentrations. In India and Turkey, for example, where the gender gap among managers is huge, female self-employed have even a majority over male self-employed, which is partly due to necessity-driven start-up decisions. And in Korea and Japan where the gender gap among managers is similarly large, the gender gaps among self-employed are smaller than almost all highly developed Western economies. While this section focuses on the "stocks" of entrepreneurs in the entire workforce, we will show in section 4 below that women who have recently started, or have been intending to start, an entrepreneurial career still face significantly larger obstacles to becoming self-employed than men.

Unemployment:

Gender gaps among unemployed are reversed in the richest G20 countries, meaning that the unemployment rates among women are lower than those among men, and are comparatively small in the other countries (Figure 2.1.6, graph a). The only notable exception from this general rule is Saudi Arabia, where the unemployment rate is 20% among women but only 3% among men. In Argentina and Brazil, the gap is also fairly high, with unemployment rates among women being about twice those among men. In Turkey, we observe a large gender gap among long-term unemployed persons (graph b). The rate among women is roughly double that among men.

[7] Following the ILO, the World Bank defines self-employed workers as "those workers who, working on their own account or with one or a few partners or in cooperative, hold the type of jobs defined as a „self-employment jobs." i.e. jobs where the remuneration is directly dependent upon the profits derived from the goods and services pro-duced. Self-employed workers include four sub-categories of employers, own-account workers, members of pro-ducers' cooperatives, and contributing family workers" (see http://data.worldbank.org/indicator/SL.EMP.SELF.ZS).

Figure 2.1.5: Gender gaps in self-employment in G20 countries: Female / male ratios

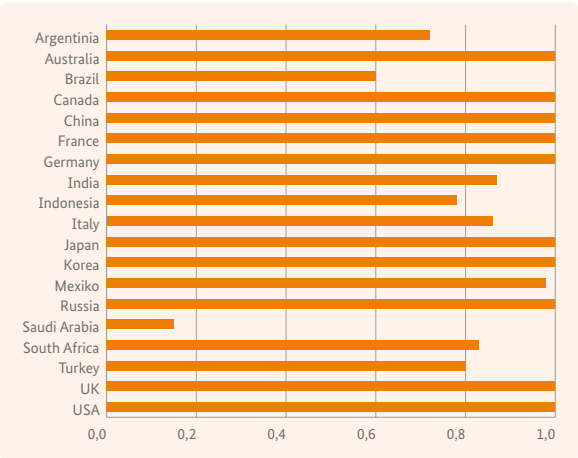


Ratio of female / male shares of self-employed in total employment.

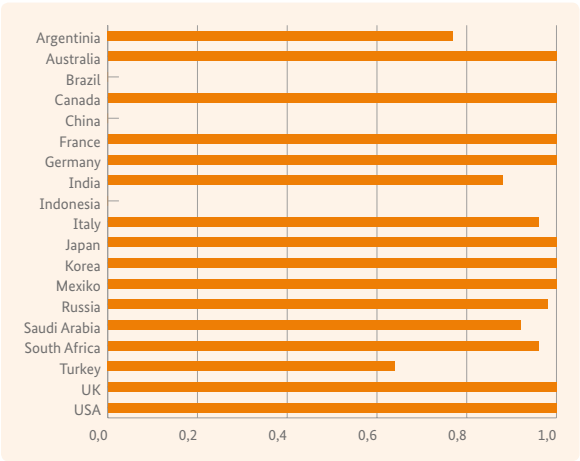
Source: United Nations (World Development Indicators).

Figure 2.1.6: Gender gaps in unemployment in G20 countries: Female / male ratios

(a) Unemployment



(b) Long-term unemployment



(a) Unemployment: Ratio of female / male unemployment rates. (b) Long-term unemployment: Ratio of female / male rates of long-term (one year or longer) unemployment rates.

Source: United Nations (World Development Indicators).

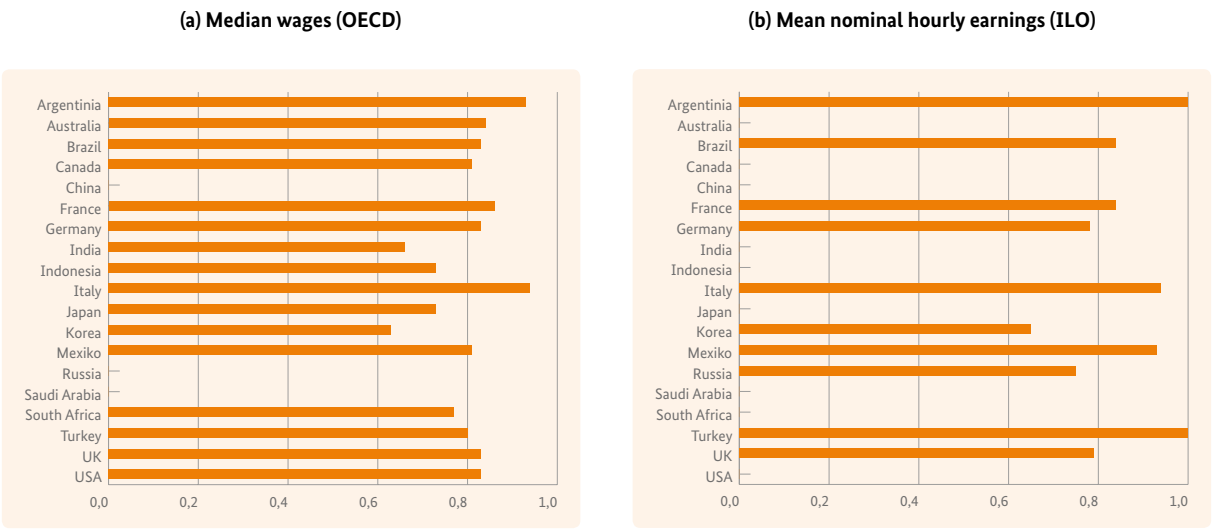
Pay:

Available information about gender pay gaps is highly ambiguous. Many of the indicators that are calculated from public statistics do not focus on gender differences in hourly wages for comparable work but rather relate an estimated fraction of annual GDP created by women to that created by men. The informational content of these measures about pay gaps is questionable because they are biased by gender gaps in labor market participation rates, the occupational composition of employment, working hours and skills.

The international statistics that get closest to gender differences in hourly wages for comparable work are OECD's gender wage gap indicator (Figure 2.1.7, graph a), which is calculated from monthly earnings of full-time employees, and ILOstat's data on "Mean nominal hourly earnings of employees by sex and occupation" (Figure 2.1.7, graph b). Both indicators are at least approximately robust to gender gaps in labor market participation rates, the occupational structure of employment and working hours but likely not to gender gaps in skills. The ILO data on mean nominal hourly earnings is available for only 10 of the G20 countries, however.

The data in graphs (a) and (b) suggest that women still earn less than men in virtually all G20 countries even though the ILO indicator of mean nominal hourly earnings in graph (b) suggests the opposite for Argentina and Turkey. The average gender gaps appear to be comparatively wide (female/male ratio below 0.8) in India, Indonesia, Japan, Korea, and maybe Russia while Argentina and Italy appear to have the lowest gaps, according to the two statistics.

Figure 2.1.7: Gender pay gaps in G20 countries: Female / male ratios



(a) Median wages: Ratio of female / male median wages, calculated from monthly earnings (weekly earnings of regular employees for India) of full-time employees (usually persons working at least 30 hours per week (OECD). (b) Mean nominal hourly earnings: Ratio of female / male hourly earnings of employees (ILO).

Source: ILO et al. (2016); ILOStat.

The observed gender pay gaps have been traced back to a variety of causes in empirical studies. These causes include gender differences in education, work experience and productivity as well as a penalty for having children and lower promotion rates. These causes also include factors that are arguably rooted in different personalities (see above), such as sorting into occupations, e.g., in health care, that require better social skills but are less well paid, higher risk aversion, a lower attitude toward competition, less aggressive negotiation methods, and lower reservation wages (Altonji and Blank 1999, Bertrand 2011, Caliendo et al. 2017).

In addition, Goldin (2014) finds out that the gender gap in pay could be considerably lower or might vanish altogether, if firms did not have an incentive to disproportionately reward workers who labored longer hours and worked particular hours. In summary, the G20 countries face different challenges on their ways to full labor market inclusion of women:

- India, Saudi Arabia and Turkey still lag significantly behind in terms of gender equality, like many other countries in the Middle East, Northern Africa and on the Indian subcontinent. They still need to overcome significant cultural and religious barriers to reduce the large gender gaps in labor force participation and education, among others.

- Argentina, Brazil and Mexico should put specific effort on reducing gender gaps in labor force participation and those among highly qualified workers, especially STEM graduates. Argentina and Brazil should additionally combat female unemployment more decisively.

- Australia, the United States and the United Kingdom feature great achievements in terms of gender equality but should put effort in further reducing remaining gender gaps in labor market participation, among highly qualified workers: STEM graduates (particularly Australia and United States), managers (particularly Australia and United Kingdom), and self-employed (particularly United Kingdom). The United Kingdom should additionally address its gender pay gap.

- Canada has also attained great achievements in terms of gender equality but should continue working on remaining gender gaps especially in education as well as among managers and self-employed.

- China and Indonesia should consider further closing its gender gaps in education and management jobs. Indonesia additionally needs to increase female labor force participation.

- France and Germany should put more emphasis on addressing their gender pay gap. They should also reduce the remaining gender gaps in higher education as well as those among highly qualified workers (STEM graduates, managers and self-employed).

- Italy needs to increase female labor force participation in general, and its significant gender gaps among highly qualified workers, especially managers and self-employed.

- Japan and Korea have, like several emerging economies, still to overcome cultural barriers to increase female labor force participation, grant women equal access to higher education and highly qualified jobs, especially in STEM and management occupations, and—at least concerning Korea—guarantee women equal pay.

- Russia is among the few G20 countries that achieved almost full gender equality even in higher education. It needs to address its significant gender pay gap as well as its low share of female managers.

- South Africa, finally, features low gender inequality in education, including higher education, but might greatly benefit from increasing female labor force participation and from granting women equal access to highly qualified jobs, especially in STEM and management occupations.

2.2 Future prospects

How will women and men be affected by the future digitalization? Similar to the technological changes in the recent past, future technological changes will be task- and skill-biased (Brynjolfsson and McAfee 2011, Bode et al. 2016). They will increase the relative demand for those tasks and skills they complement, and reduce the relative demand for those tasks and skills they substitute for, i.e., they can replace. The computerization of workplaces during the last about 3 decades has been complementing primarily non-routine abstract tasks typically performed by high-skilled workers, including managers and professionals, but has replaced routine tasks typically performed by medium-skilled workers, including clerical and assembly line workers (Autor et al. 2003, Acemoglu and Autor 2011, Autor 2015). In addition to this, it has increased the demand for so-called non-routine manual and interactive tasks that are performed mostly by low-skilled workers, including services workers in health care, security and domestic households.

Some rough indication of the directions of future technological changes may be obtained from recent work by Frey and Osborne (2017). Frey and Osborne quantify the expected susceptibility of occupations in the U.S. to digital technologies. Consulting robotics and machine learning experts, and exploiting O*Net, a rich dataset on detailed task contents of occupations, they estimate digitalization probabilities for 702 occupations.

High digitalization probabilities close to one suggest that the respective occupations will be largely automatable in the foreseeable future of 10-20 years while low probabilities close to zero suggest that occupations will not be automatable. Occupations with the highest digitalization probabilities include many clerical occupations or machine operating and tending occupations, for example. Occupations with the lowest digitalization probabilities include teaching occupations, nurses, STEM occupations, or arts and design occupations. We combine these digitalization probabilities with data from a large international survey of adults, OECD's "Programme for the International Assessment of Adult Competencies" (PIAAC), to investigate the extent to which workers' skills and competencies are systematically related with the susceptibility of their occupations to digitalization, and the extent to which these relationships differ between women and men.

The only interface between Frey and Osborne's dataset on digitalization probabilities and the PIAAC dataset is occupations. PIAAC reports occupations only of those respondents who were employed at the time of the survey in 2012. We do not observe the occupations of persons who were unemployed, in education or not active in the labor market at all. We thus have to restrict our analysis to those persons who were in employment or self-employed at the time of the survey. In addition, PIAAC provides a variety of respondents' personal characteristics, skills and competencies. From Frey and Osborne's data, we observe digitalization probabilities only at the level of occupations. We have no information about possible variations of these probabilities across jobs within these occupa-

tions, which may be considerable (see Autor and Handel 2013, Fedorets et al. 2015).

The available PIAAC data covers only half of the G20 countries: Australia, Canada, France, Germany, Italy, Japan, Korea, Russia, Turkey, the United Kingdom and the United States. We include eight of these countries in our analysis. We have to drop Canada because the Canadian sample does not report occupations. We also exclude Australia and the United States because access to this data is subject to significant restrictions.

We note that our results may be less reliable for Russia and Turkey than for the other countries. Transferring the computerization probabilities, which were estimated for occupations in the US by Frey and Osborne, to similar occupations in other countries requires assuming that the occupations' task contents do not differ across countries. This assumption may not be too restrictive for highly developed countries like the western European countries or Japan. But the task contents of, say, 'process control technicians' or 'sales workers' may differ more substantially between highly developed countries like the US and emerging economies like Russia or Turkey.

In what follows, we report the results of our analysis for all workers taken together, and then for groups of workers differentiated by educational attainment[8] and age.

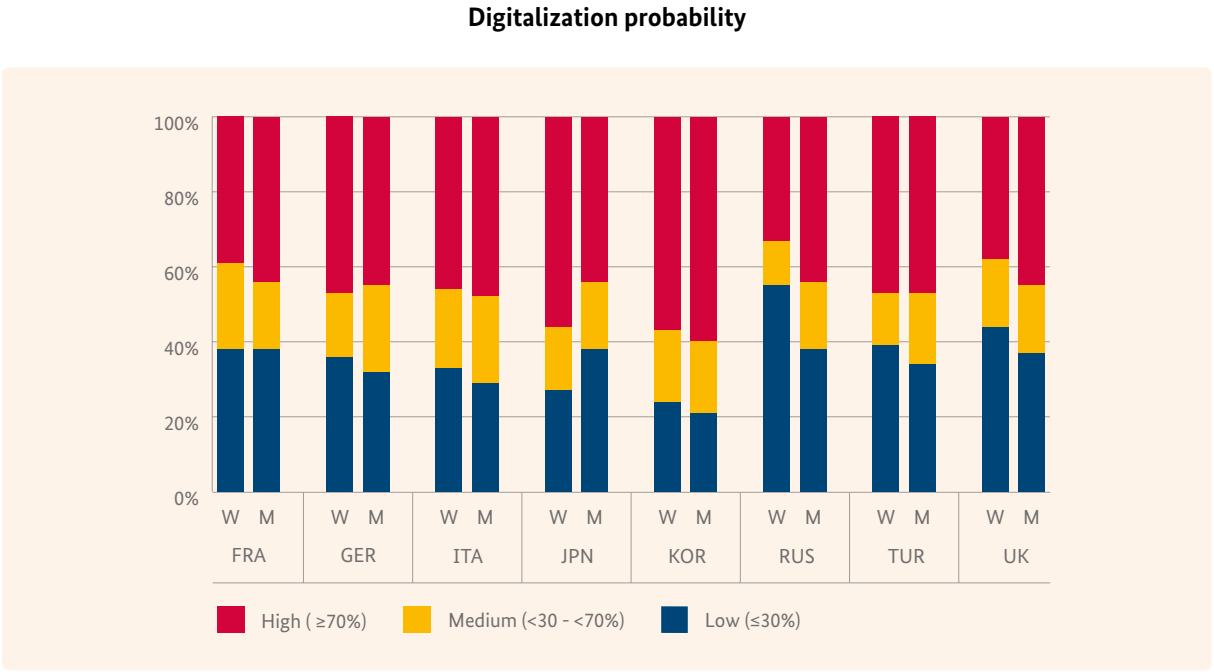
Figure 2.2.1 shows the fractions of women and men who, at the time of the PIAAC survey in 2012, worked in occupations with low, medium and high estimated susceptibility to digitalization. Following Frey and Osborne (2017), we classify occupations with estimated digitalization probabilities below 30% as having low susceptibility (red bars in Figure 2.2.1) and those with estimated digitalization probabilities above 70% as having high susceptibility (blue bars). The figure shows, first, that there are considerable differences between countries irrespective of gender. Relatively more workers are active in occupations with comparatively high susceptibility in Germany, Italy, Japan, Korea and Turkey than in France and Russia.

Second, women appear to be slightly less susceptible to digitalization than men in most countries.[9] In the UK, for example, 44% of the women but only 37% of the men worked in occupations with low digitalization probabilities (below 30%; blue) in 2012. In addition to this, only 38% of the women worked in occupations with high digitalization probabilities (above 70%; red), compared to 45% of the men. Japan is a stark exception, though. In Japan, only 27% of the women face low digitalization probabilities, compared to 38% of the men, and no less than 56% face high digitalization probabilities, compared to 44% of the men. Germany is special in that the susceptibility to digitalization is more polarized for women than for men. Women in Germany are more likely to face either a low or a high susceptibility.

[8] We also differentiated workers by proficiency in numeracy skills, literacy skills, and the so-called "problem solv-ing skills in technology-rich environments" (see Figures A2.2.1-A2.2.3 in the Appendix). We expected especially the results on problem solving skills to yield interesting additional insights because this set of items assesses workers' proficiencies in using computers to solve work-related problems. They should thus be informative about workers' digital skills. However, neither the analysis of numeracy or literacy skills nor that of problem solving skills yields important additional insights relevant for the present study. All three facets of cognitive skills turn out to be very highly correlated with educational attainment.

[9] This result contrasts with that reported by the World Economic Forum in its 2016 "Future of Jobs" study, accord-ing to which digitalizati on will contribute to widening rather than narrowing the gender gaps (WEF 2016a, Chapter 2). WEF estimates that job losses will be about equally distributed across men and women while job gains will be concentrated in male-dominated occupations and industries. This result should be interpreted with great caution, however, because it is not based on representative data. The underlying employment data comes from only 366 of the largest companies in 15 countries. Large companies are well-known to preserve larger gender gaps. In fact, only 30% of the about 13.5 million employees of the surveyed firms are women (WEF 2016a: 4).

Figure 2.2.1: Susceptibility to digitalization among female and male workers in selected G20 countries



Shares in all employed women, resp. men aged 26-65 whose current (2012) occupations face a low, medium or high estimated probability of being digitalized within the next one or two decades. FRA: France, GER: Germany, ITA: Italy, JPN: Japan, KOR: Korea, RUS: Russian Federation, TUR: Turkey, GBR: United Kingdom; W: Women, M: Men.

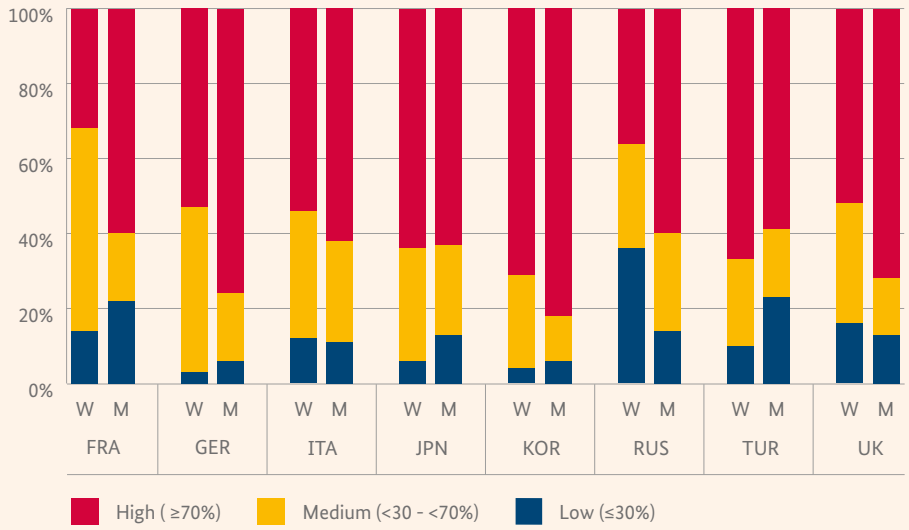
Source: OECD (2016d), PIAAC; Frey and Osborne (2017); own calculations.

Differentiation by educational attainment shows that, on the one hand, susceptibility to digitalization generally decreases with education for both women and men, and that, on the other hand, the gender gap in the aggregate susceptibility to digitalization comes mainly from low-skilled workers. Figure 2.2.2 depicts the fractions of women and men in occupations with low, medium and high estimated susceptibility to digitalization separately for low-educated (upper left graph), medium-educated (upper right graph) and high-educated workers (lower graph). It shows that high-skilled workers generally face lower digitalization probabilities than low- and medium-skilled workers. This is true for both women and men. The fractions of workers in occupations with low digitalization probabilities (blue bars) are markedly higher, and those of workers in occupations with high digitalization probabilities (red) are smaller. This is in line with the findings for the era of computerization during the 1990s and 2000s when high-skilled workers were complemented, rather than substituted, by digital technologies (Autor 2015). Frey and Osborne suggest that this complementarity will continue into future decades. In contrast to the findings for the 1990s and 2000s, there seems to be less of a gap between low- and medium-skilled workers, however. In the 1990s and 2000s, jobs of medium-skilled workers, including many clerical and production jobs, were found to be affected disproportionately by computerization because they involved routine tasks that can be coded fairly easily in computer software. Jobs of low-skilled workers, including those in personal and health care services, were found to be less susceptible to computerization because they required non-routine manual work or personal interaction that computers were not able to do. This lower susceptibility of low-skilled workers will apparently not continue into the future. For most countries, the fractions

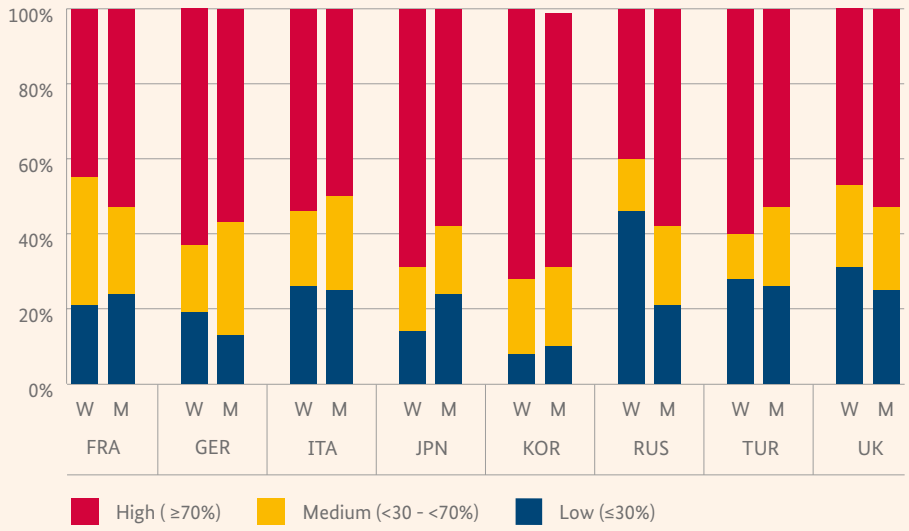
of workers who face high digitalization probabilities (red bars) are higher among low-skilled (upper left graph) than among medium-skilled workers (upper right graph). The fractions of workers who face low digitalization probabilities (blue bars) are correspondingly lower.

Figure 2.2.2: Susceptibility to digitalization among female and male workers in selected G20 countries, by educational attainment

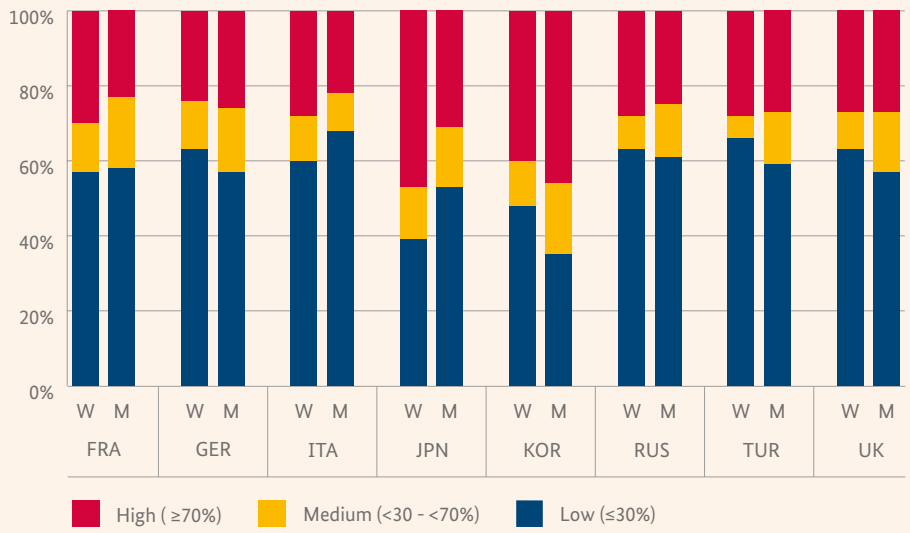
Digitalization probability: Low-skilled



Digitalization probability: Medium-skilled



Digitalization probability: High-skilled



Shares in all employed women, resp. men aged 26-65 in the respective skill group whose current (2012) occupations face a low, medium or high estimated probability of being digitalized within the next one or two decades. Education groups: Low-skilled: Up to lower secondary (ISCED 0-2), Medium-skilled: Upper and post-secondary (ISCED 3-4), High-skilled: Tertiary (ISCED 5-8). FRA: France, GER: Germany, ITA: Italy, JPN: Japan, KOR: Korea, RUS: Russian Federation, TUR: Turkey, UK: United Kingdom; W: Women, M: Men.

Source: OECD (2016d), PIAAC; Frey and Osborne (2017); own calculations.

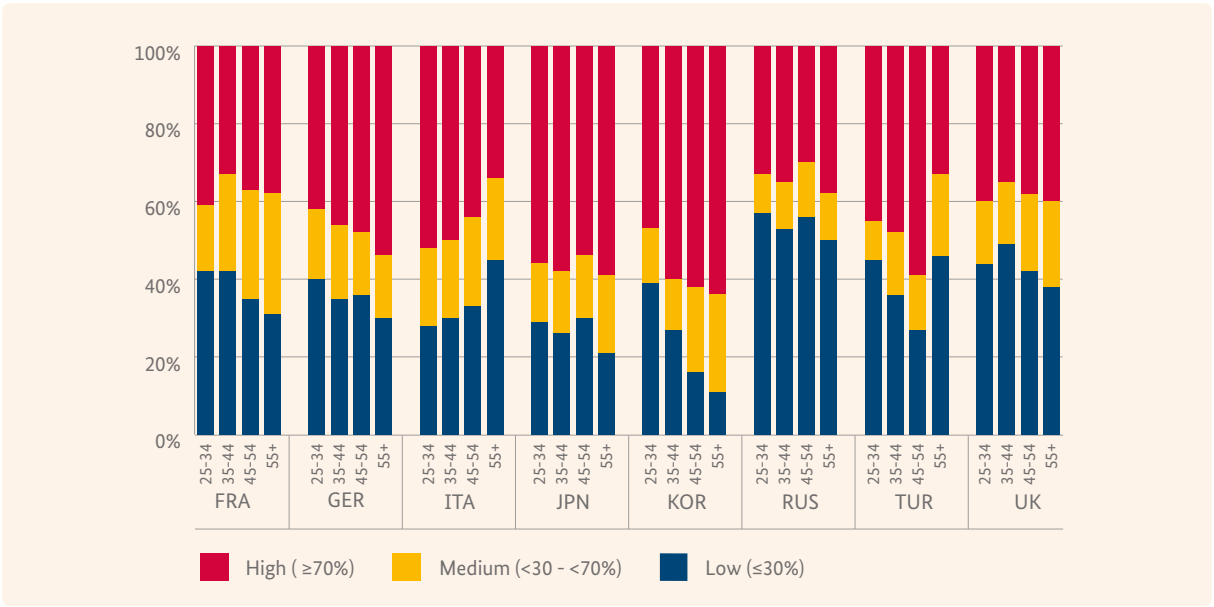
Figure 2.2.2 also indicates that the lower aggregate susceptibility to digitalization of women, inferred from Figure 2.2.1, results mainly from a lower susceptibility of women among the low-skilled workers in all countries except Japan and Turkey. In Germany, France, the UK, Italy, Korea and Russia, low-skilled women tend to be less susceptible to digitalization than low-skilled men. This gender gap is significant in several countries. In France, for example, about one third (32%) of the low-skilled women but almost two thirds (60%) of the low-skilled men worked in occupations with high digitalization probabilities (red). For high-skilled workers, the gender gaps are rather small for most of these countries, except for Korea where high-skilled women are significantly less susceptible to digitalization than high-skilled men. In Japan, the only country under study where women are on average more susceptible to digitalization than men, the higher susceptibility extends through all skill groups. This gender gap is even larger for high-skilled than for low-skilled workers.

Susceptibility of women and men to digitalization in the future is also a matter of the **workers' age**, even though there appears to be no uniform regularity across all countries. Figure 2.2.3 depicts this susceptibility separately for four age groups. The upper graph focuses on women, the lower on men. For women, the susceptibility appears to increase more or less continuously with increasing age in several countries, including Germany, France, Japan and especially Korea. In Italy, by contrast, it appears to decrease with increasing age. In the UK, middle-aged women appear to be more susceptible than younger and older women, while it is the other way around in Turkey. For men, the differences between age groups are estimated to be somewhat smaller than for women in most countries. Only in Japan and Russia, age plays a larger role for men then for women. In Japan, it is the younger and older men who are more susceptible to digitalization. And in Russia, older men are considerably more susceptible than younger men.

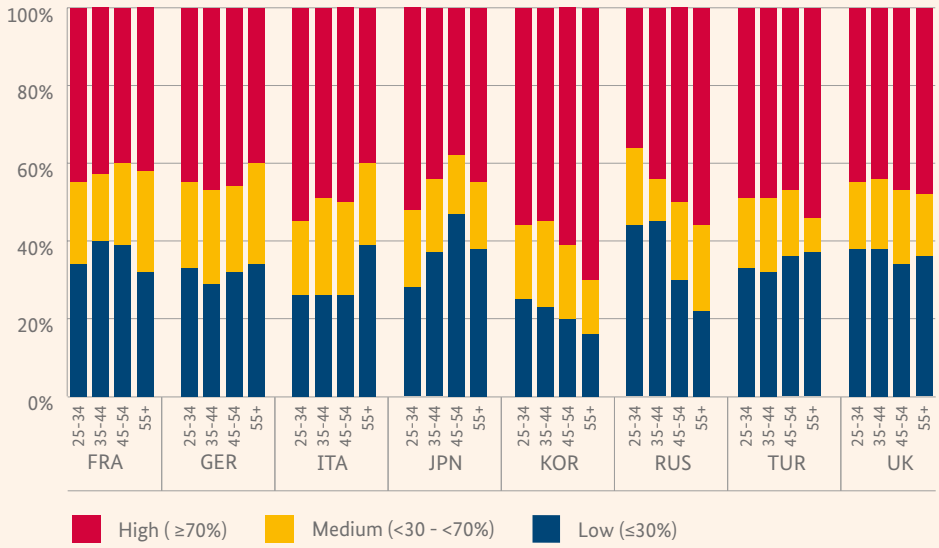
On aggregate, however, many of these age differences are rooted in skill differences. Figure A2.2.4 in the Appendix, which differentiates employed women simultaneously by educational attainment and age, indicates that the differences in the susceptibility across skill groups are typically much more pronounced than those across age groups. This figure should be interpreted more cautiously because the numbers of available observations are fairly small in some education-age cells. Still, the cross-tabulation by education and age in Figure A2.2.4 offers an additional interesting insight. The susceptibility of medium- or high-skilled workers to digitalization tends to decrease with increasing age in several countries. It tends to decrease especially for medium and high-skilled women and men in Italy, for high-skilled women and men in Turkey, and for high-skilled men in Japan. These disadvantages for the youth appear to be at least partly rooted in labor market regulations that favor older workers.

According to the PIAAC sample, many of those high-skilled workers in Italy, Japan or Turkey who face a high susceptibility to digitalization actually work in private-sector clerical or professional occupations for which they are overqualified. Older workers, by contrast, are more concentrated in typical public-sector occupations in education or health care, which require tertiary education and are less susceptible to digitalization.

Figure 2.2.3: Susceptibility to digitalization among female and male workers in selected G20 countries, by age group



Men



Shares in all employed women, resp. men aged 26-65 in the respective skill group whose current (2012) occupations face a low, medium or high estimated probability of being digitalized within the next one or two decades. FRA: France, GER: Germany, ITA: Italy, JPN: Japan, KOR: Korea, RUS: Russian Federation, TUR: Turkey, UK: United Kingdom; W: Women, M: Men.

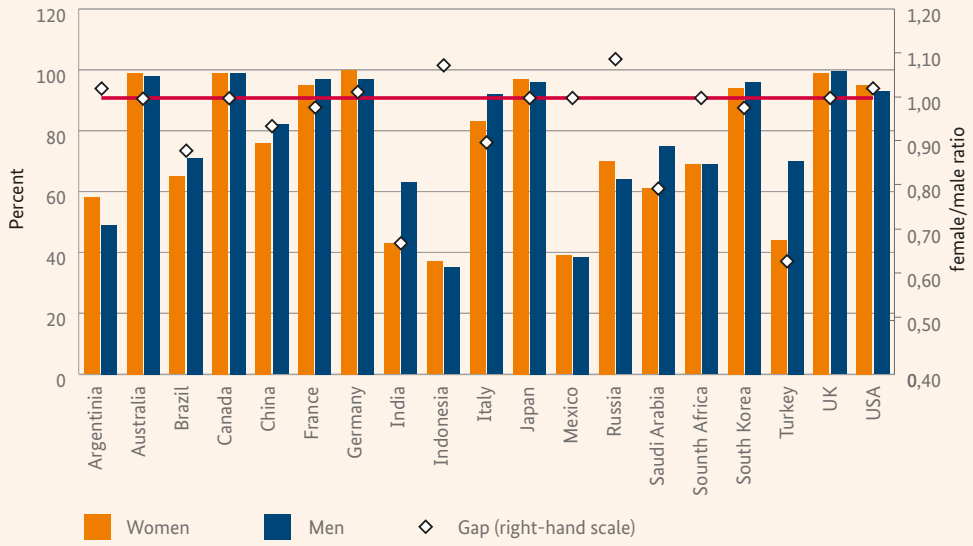
Sources: OECD (2016d), PIAAC; Frey and Osborne (2017); own calculations.

3 FINANCIAL INCLUSION

The Global Financial Inclusion database (Global Findex) is the world's most comprehensive set of data providing consistent measures of how people use financial services, save, borrow, and process payments across economies and over time. The latest, 2014 version of the Global Findex database provides more than 100 indicators that can be differentiated by gender. The indicators are based on interviews with about 150,000 nationally representative and randomly selected respondents older than 15 years in more than 140 economies. Financial inclusion is commonly measured by means of account ownership at a financial institution.

The most recent Global Findex data suggest that gender gaps in account ownership are small in many G20 countries (Figure 3.1). The gender gaps are particularly pronounced in India (the female-to-male ratio is 0.7), in Turkey (the female-to-male ratio is 0.64) and in Saudi Arabia (the female-to-male ratio is 0.8). Smaller gaps can be observed in Brazil, China and Italy where the female-to-male ratio is about 0.9. There is potential for more financial inclusion for both men and women in Argentina, Indonesia and Mexico, where the shares of both men and women who own an account are only about 50 percent, 35 percent and 38 percent, respectively.

Figure 3.1: Gender gaps in account ownership at a financial institution in G20 countries



Percentage of respondents (age 15+) who report having an account at a bank or another type of financial institution.

Source: Global Findex Global Financial Inclusion Database, 2014; own calculations.

Digitalization of financial products and services provides opportunities to greatly advance financial inclusion for everyone, including women (Box 3.1). Availability of digital financial services, as well as the access to and use of new digital and mobile technologies for financial purposes (e.g., mobile transfers through mobile phones and e-money) is particularly beneficial for women for several reasons. Firstly, it allows reducing cultural barriers significantly that hinder women's access to financial services and that prevent them to autonomously manage their finances. For instance, in regions where women are not accepted as financial

managers of households, the gender gap in financial inclusion is particularly pronounced.[10] Secondly, digitalization of financial services helps overcome mobility constraints, especially for women who live in remote regions, in which traditional financial institutions are underrepresented. Thirdly, digitized financial services provide more confidentiality than traditional financial services. They reduce discrimination against women and promote autonomous decision making. Fourthly, digital financial services enable women to increase their creditworthiness by constructing alternative risk assessments through debitors' transaction histories. This is especially relevant since women are less likely to own collateral than men.

Box 3.1: Key mobile and digital technologies to enhance financial inclusion

Mobile and digital technologies provide unique opportunities to access formal financial services for the poor and unbanked and to improve financial inclusion for anyone.

Digital currencies, such as mobile money, e-money, and bitcoin, will remove many hurdles that prevent people from participating in the formal financial system. One of the largest benefits of digital currencies is that it can easily be used as a digital payment and money transfer tool, which can dramatically reduce the cost of financial transaction and, thus, can be used for cost effective micropayments. Many financial institutions are exploring the opportunities offered by cryptocurrencies and blockchain. Within its "Financial Services for the Poor" program, the Bill and Melinda Gates Foundation has launched the Level One Project (https://leveloneproject.org), a framework for governments, NGOs and private sector actors to create national digital payments systems that are inclusive for anyone. Given that mobile signal coverage is very high worldwide, digital financial services can reach a broader share of population than financial services by traditional financial institutions that are not evenly distributed over space. Successful examples of mobile money platforms in emerging markets include, for instance, M-Pesa and Tigo Pesa in Kenya, bKash in Bangladesh, GCash and Smart Money in the Philippines, Easy Paisa in Pakistan and WING in Cambodia.

Crowdfunding is important for small and medium-sized enterprises that face difficulties in obtaining finance from traditional financial institutions. It offers more flexibility and relies on alternative information to provide access to finance for entrepreneurs. Women-owned businesses may particularly benefit from equity-based crowdfunding, because it provides them with an opportunity to escape male-dominated traditional financial institutions that are more likely to invest in men-led businesses. Equity crowdfunding attracts female investors that strongly prefer to fund firms led by females (Vismara et al. 2017).

Big Data analytics of e-commerce, mobile transaction histories and social networks, for example, can complement traditional methods of client identification and credit risk assessment. Fintech companies use non-traditional data to provide financial products and services, such as micro loans for specific purposes, to the low and middle-income customer segment in developing economies (e.g. MyBucks, Lenddo). Female entrepreneurs can particularly benefit from big data analytics as a means of credit risk assessment, because they often lack collaterals necessary to get a loan from traditional financial institutions (Alibaba's Ant Finance in cooperation with Goldman Sachs and International Finance Corporation).

Biometric identification, such as fingerprints and iris scans, allows providers to meet due diligence requirements for customers with insufficient traditional forms of identification, e.g., due to lack of literacy. Biometric identification also increases security of financial transactions. For example, facial recognition is already widely used in China for money transfer (e.g., Face++, Alipay and Baidu).

[10] See Alliance for Financial Inclusion (2016)

Governments and businesses can help women enter the formal financial system, get bank accounts and increase account use, for instance, by means of shifting money transfers of wages and social benefits from cash to accounts. This can also lead to significant increases in the amounts and the security of savings (Demirguc-Kunt et al. 2015). To further facilitate the use of digital financial services and, thus, help people benefit from financial inclusion, digitizing payments such as utility bills is a promising option. They improve the efficiency of processing payments by increasing the speed, reducing the transaction costs and improving the transparency of payments.

However, the enormous potential of the digitalization for better financial inclusion has not yet been fully realized. In the two countries exhibiting the lowest shares in total population of owners of an account at a financial institution (India and Turkey), this is partly because the governmental transfers are poorly digitized. In India, only about 3.5 percent of population (both women and men) report receiving government transfers to an account (Table 3.1). A similarly low share of population in India report that their wages are transferred from an employer to an account.
Remarkably, women are less likely than men to use an account at financial institution to receive wages in all G20 countries, with an exception of Germany and Japan. On average, about 27 percent of women in G20 countries receive their wages on an account, as compared to about 35 percent of men. The gender gaps are particularly pronounced in Saudi Arabia, India, Indonesia, and Turkey. These large gaps can only partly be explained by the gender gaps in labor force participation (see Figure 2.1.1).

Along with the availability of digital financial services, the use of mobile and digital technologies for financial transactions is an important precondition for fully exploiting the chances offered by digitalization for promoting financial inclusion. Global Findex database provides insights with regard to gender-specific differences in the use of digital and mobile technologies that can promote financial inclusion. As indicated in Figure 3.2, gender gaps in the use of the internet for paying bills or buying things exist in many of G20 countries. The gender gaps are less pronounced or even absent in high-income economies such as Australia, Canada, UK, Korea, and Japan. These countries demonstrate rather high shares of population using internet for financial transactions. Remarkably, in China women are more likely than men to use internet for paying bills and buying goods and services (21 percent and 17 percent respectively), but the average level remains rather low.

The data for India reports extremely low shares of both men and women who use internet for financial transactions, which is largely due to low levels of digital inclusion there (see Section 5 and case study in section 7.1).

Table 3.1: Gender gaps in the use of an account at a financial institution in the G20 countries

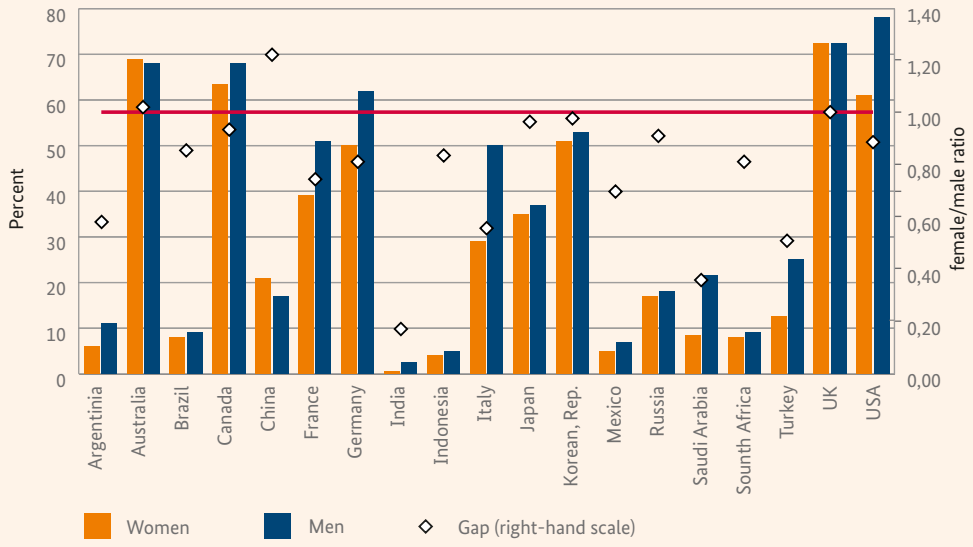
	(a) Used an account at a financial institution to pay utility bills			(b) Used an account to receive government transfers			(c) Used an account to receive wages		
	Female	Male	Ratio Female/ Male	Female	Male	Ratio Female/ Male	Female	Male	Ratio Female/ Male
	% aged 15+			% aged 15+			% aged 15+		
Argentina	3.81	8.29	0.46	15.80	4.08	3.87	14.06	22.64	0.62
Australia	65.40	62.72	1.04	43.27	37.51	1.15	51.92	59.58	0.87
Brazil	6.77	12.12	0.56	17.70	8.34	2.12	15.96	30.35	0.53
Canada	71.06	67.65	1.05	32.07	24.81	1.29	49.94	55.05	0.91
China	14.17	16.08	0.88	7.64	11.27	0.68	15.55	19.78	0.79
France	69.98	71.39	0.98	18.51	14.05	1.32	41.25	55.85	0.74
Germany	71.00	74.60	0.95	10.60	12.18	0.87	46.86	47.51	0.99
India	2.27	4.51	0.50	3.71	3.53	1.05	2.41	5.54	0.43
Indonesia	2.84	2.98	0.95	3.95	2.09	1.89	3.93	9.31	0.42
Italy	38.45	50.78	0.76	7.12	6.44	1.11	24.14	41.23	0.59
Japan	61.66	70.05	0.88	11.01	10.14	1.09	44.75	41.23	1.09
Mexico	3.83	6.85	0.56	11.09	9.89	1.12	14.92	19.69	0.76
Russia	14.17	9.64	1.47	18.27	8.70	2.10	36.59	39.60	0.92
Saudi Arabia	5.86	35.43	0.17	8.06	4.71	1.71	2.34	15.00	0.16
South Africa	11.73	12.67	0.93	32.74	23.13	1.42	25.95	27.67	0.94
South Korea	56.15	48.33	1.16	11.61	17.94	0.65	33.42	42.59	0.78
Turkey	16.45	20.48	0.80	5.10	5.83	0.87	7.38	26.05	0.28
UK	71.18	71.94	0.99	21.97	15.38	1.43	43.52	59.78	0.73
USA	64.51	61.93	1.04	21.07	15.21	1.39	42.12	44.41	0.95
G20 average	34.28	37.29	0.85	15.86	12.38	1.43	27.21	34.89	0.71

(a) Percentage of respondents (age 15+) who report making a payment in the past 12 months for water, electricity, or trash collection directly from an account at a bank or another type of financial institution; (b) percentage of respondents (age 15+) who report receiving any financial support from the government directly into an account at a bank or another type of financial institution, into a card, or through a mobile phone in the past 12 months; (c) percentage of respondents who report receiving a salary or wages directly into an account at a bank or another type of financial institution, into a card, or through a mobile phone in the past 12 months

Source: Global Findex Global Financial Inclusion Database, 2014; own calculations.

Similar gender gaps exist in the use of mobile phones for money transactions from an account at a financial institution (Figure 3.3). In contrast to transactions via internet, payments via mobile phone are, on average, less widespread in almost all G20 countries, though. Exceptions are China and in Mexico, where payments via mobile phone are similarly often used as payments via internet, and South Africa, where payments via mobile phone is even more often used.

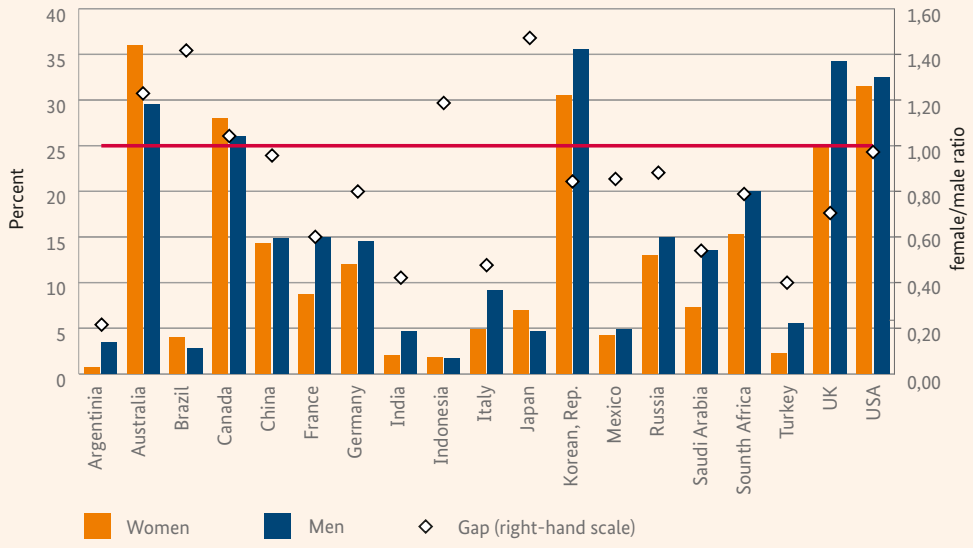
Figure 3.2: Gender gaps in the use of internet to pay bills or buy things



Percentage of respondents (age 15+) who report paying bills or making purchases online using the internet in the past 12 months.

Source: Global Findex Global Financial Inclusion Database, 2014; own calculations.

Figure 3.3: Gender gaps in the use of mobile phone to make money transactions from an account at a financial institution

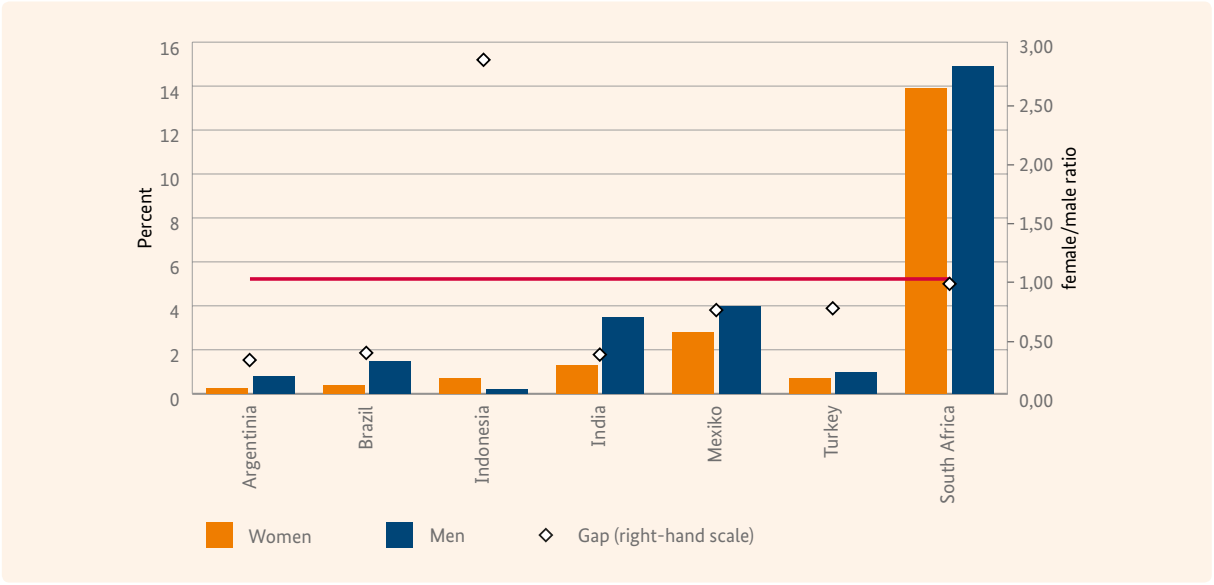


Percentage of respondents (age 15+) who report making a transaction with money from their account at a bank or another type of financial institution using a mobile phone in the past 12 months. This can include using a mobile phone to make payments, to make purchases, or to send or receive money

Source: Global Findex Global Financial Inclusion Database, 2014; own calculations.

Mobile money accounts may promote financial inclusion for unbanked persons, especially in the emerging economies among the G20 (Figure 3.4), as they provide convenient and affordable financial services for people who do not have access to a traditional bank account. The percentage of respondents who report paying bills or sending or receiving money via mobile money for the unbanked service is rather high in South Africa, where about 15 percent of population are using this service, followed by India and Mexico (about 2 percent and 4 percent, correspondingly). In all countries except Indonesia, men are more likely to own mobile money accounts. In South Africa the gap is the lowest (the female-to-male ratio is 0.92), while the gap in Argentina is the highest (female-to-male ratio is 0.27). In Indonesia, women are 2.8 times more likely than men to use the mobile money for the unbanked service, which is due to low levels of the use of such services, though.

Figure 3.4: Mobile money account ownership for the unbanked in selected G20 countries



Percentage of respondents who report personally using a mobile phone to pay bills or to send or receive money through a GSM Association (GSMA) Mobile Money for the Unbanked (MMU) service in the past 12 months; or receiving wages, government transfers, or payments for agricultural products through a mobile phone in the past 12 months

Source: Global Findex Global Financial Inclusion Database, 2014; own calculations.

4 GENDER GAPS IN ENTREPRENEURIAL ACTIVITIES

Entrepreneurship has often been regarded as a major driver of economic growth and individual well-being (Audretsch and Thurik 2000).

Technological changes, including the digitalization, will lead to the emergence of new entrepreneurial opportunities. However, there are still significant gender gaps in entrepreneurship participation rates. Women are significantly less likely to pursue a career as an entrepreneur. Women face different barriers on their way to entrepreneurship, including the lack of entrepreneurship-relevant skills, such as managerial skills, and of formal education in STEM (science, technology, engineering, mathematics) fields, which are particularly important for setting up a business in high-tech sectors. Women also have less developed social networks, fewer role models, and much stronger financial constraints.

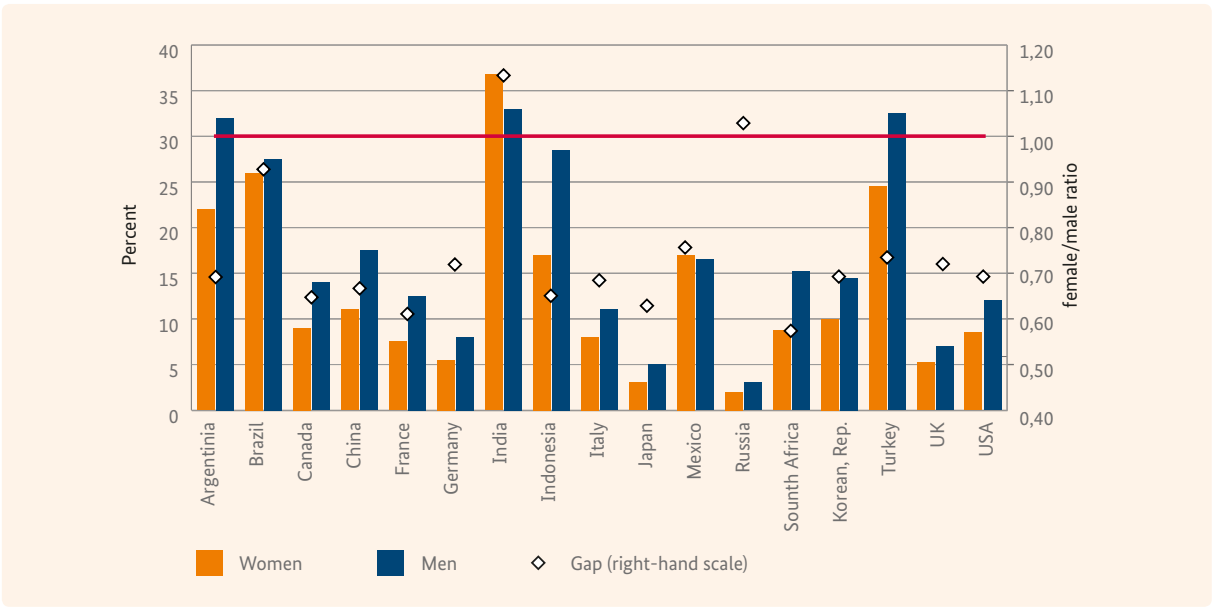
Access to financial capital is particularly important for start-ups in high-tech sectors that are often characterized by relatively high minimum efficient size.

In what follows, we reveal the gender gaps in the propensity to set up an own business in the G20 countries, the characteristics of female entrepreneurship, such as industry sector, and we investigate some of the gender-specific barriers to entrepreneurship, such as lack of entrepreneurial capabilities. The evidence on gender gaps in entrepreneurship presented in this Section is based on the data from the Global Entrepreneurship Monitor (GEM), the largest ongoing study on entrepreneurship and entrepreneurial dynamics in the world (Reynolds et al. 2005). Containing information on the levels of entrepreneurship and its characteristics in a broad set of countries, the GEM is an important data source for scientific research on entrepreneurship. GEM is unique because it studies the behavior of individuals as well as their perceptions, aspirations and intentions with respect to starting and managing a business. GEM is a particularly attractive data source for this study because it provides comparable information on entrepreneurial activities in the majority of G20 countries. For the present analysis we employ the most recent publicly available GEM data for the year 2013 (Amorós et al. 2014).

Entrepreneurial intentions reflect the ability to recognize entrepreneurial opportunities and the willingness to pursue them. In GEM, population with entrepreneurial intentions is defined as the adult population between 18 and 64 years who are not yet engaged in any stage of entrepreneurial activity but intend to start a business within the next three years.

Entrepreneurial intentions vary substantially across the G20 countries (Figure 4.1), with the highest levels being observed in India, Turkey, Argentina and Brazil, and the lowest in Russia and Japan. Remarkably, despite strong cross-country differences in the levels of entrepreneurial intentions, the gender gaps in entrepreneurial intentions, measured as female to male ratios, are rather similar at around 0.73 in most G20 countries. There are exceptions, however. In Brazil and Mexico women are similar to men in their willingness to pursue entrepreneurship. In India, the share of women intending to set up a business even exceeds the share of men.

Figure 4.1: Gender gaps in entrepreneurial intentions in G20 countries



Shares of the adult population between 18 and 64 years who are not yet engaged in any stage of entrepreneurial activity but intend to start a business within the next three years.

Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

A central indicator of GEM is the **Total Early-stage Entrepreneurship Activity (TEA) rate**, which measures the percentage of the adult population (18 to 64 years) being in the process of starting a business or having done so recently. This indicator measures individuals at two phases of the entrepreneurship process: nascent entrepreneurs who have not paid salaries or wages for more than three months, and new business owners who have moved beyond the nascent stage and paid salaries and wages for more than three but fewer than 42 months. The share of early-stage entrepreneurs is usually lower than the share of population with entrepreneurial intentions, because people may give up their idea to set up an own business when facing unexpected entry barriers.

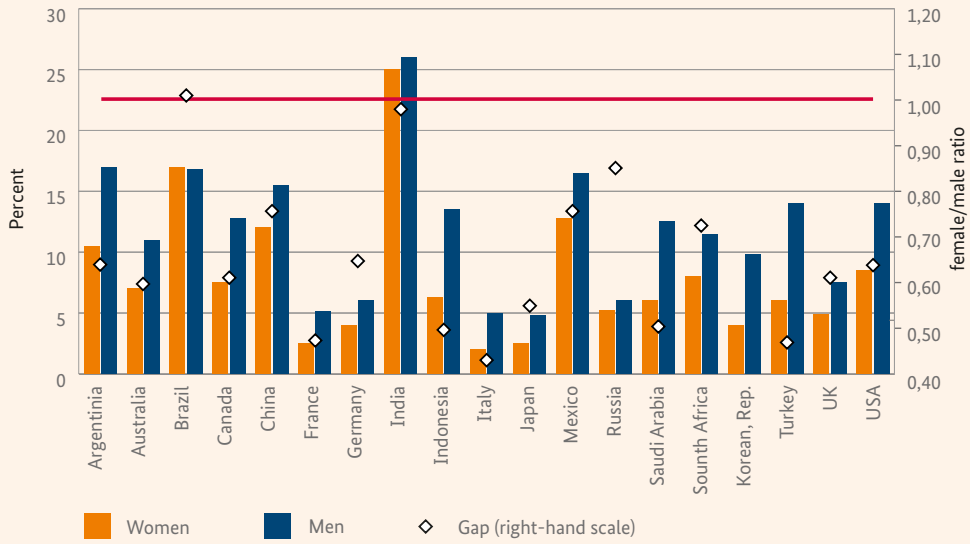
Almost all G20 countries display low gender parity for early-stage entrepreneurial activities (Figure 4.2). In France, Indonesia, Italy, Saudi Arabia and Turkey the female-to-male ratio of early-stage entrepreneurship is below 0.5. Only in Brazil and India women are not less likely than men to be involved in early-stage entrepreneurial activities. In both countries, the overall level of entrepreneurial activities is rather high, which may be due to the lack of alternative employment opportunities in those countries.

Remarkably, while gender gaps in entrepreneurial intentions are rather similar across the G20 countries (Figure 4.1), gender gaps in early-stage entrepreneurship vary a lot across the G20 countries (Figure 4.2).

For instance, in China, Russia and South Africa the gender gaps in early stage entrepreneurship are lower than the gender gaps in entrepreneurial intentions. In France, India, Indonesia, Italy, Mexico, Korea, Turkey and UK the gender gaps in entrepreneurial intentions are lower than the gender gaps in early-stage entrepreneurial activities. This indicates that women may face different barriers on their way to

entrepreneurship there, which hinder them to realize their entrepreneurial intentions. For instance, women tend to have on average lower levels of entrepreneurial capabilities ship-relevant human capital, such as managerial skills and general work experience. They also have lower access to financial resources (see Section 3 above), which is important especially at the beginning of the start-up process and for start-ups in knowledge-intensive sectors.

Figure 4.2: Total Early-Stage Entrepreneurial Activity rates by country and gender



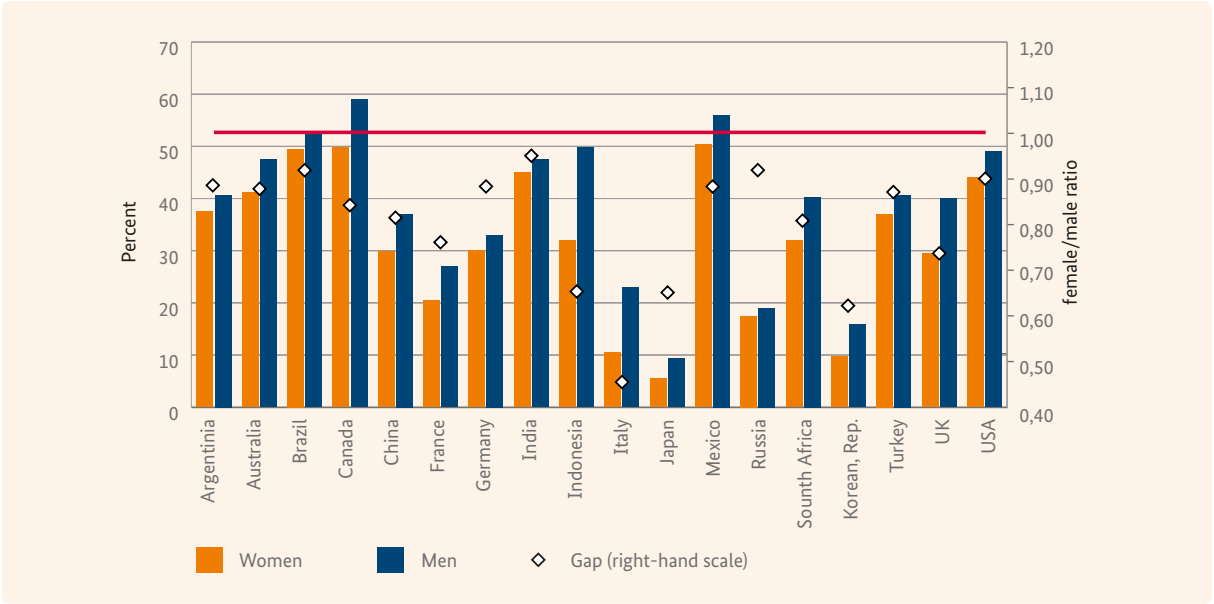
Shares of the adult population between 18 and 64 years who are in the process of starting a business or having done so recently (nascent entrepreneurs who have not paid salaries or wages for more than three months, and new business owners who paid salaries and wages for more than three but fewer than 42 months).

Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

Entrepreneurial capabilities are those skills and resources that enable an individual to recognize and to exploit an entrepreneurial opportunity. People with strong entrepreneurial capabilities are more likely to set up an own business, because they are more likely to have skills and knowledge necessary to identify profitable entrepreneurial opportunities.

According to GEM data, women in all G20 countries are less likely to perceive entrepreneurial opportunities (Figure 4.3). Remarkably, the overall share of population that report to perceive entrepreneurial opportunities is rather low in Japan, South Korea, and Italy. In Japan, less than 10 percent of population report to perceive entrepreneurial opportunities. In addition, the gender gaps with regard to individual perception of entrepreneurial opportunities in those countries are the highest. In turn, the perception of entrepreneurial opportunities is relatively high in several developed countries among G20, such as Canada and USA, but also in Mexico and in India. In India, this result may be driven by a relatively high level of necessity, though. Remarkably, countries with low levels of perception of entrepreneurial opportunities among their population also tend to reveal rather low shares of people who believe they have sufficient knowledge, skills and

Figure 4.3: Gender gaps in perception of entrepreneurial opportunities in the G20 countries

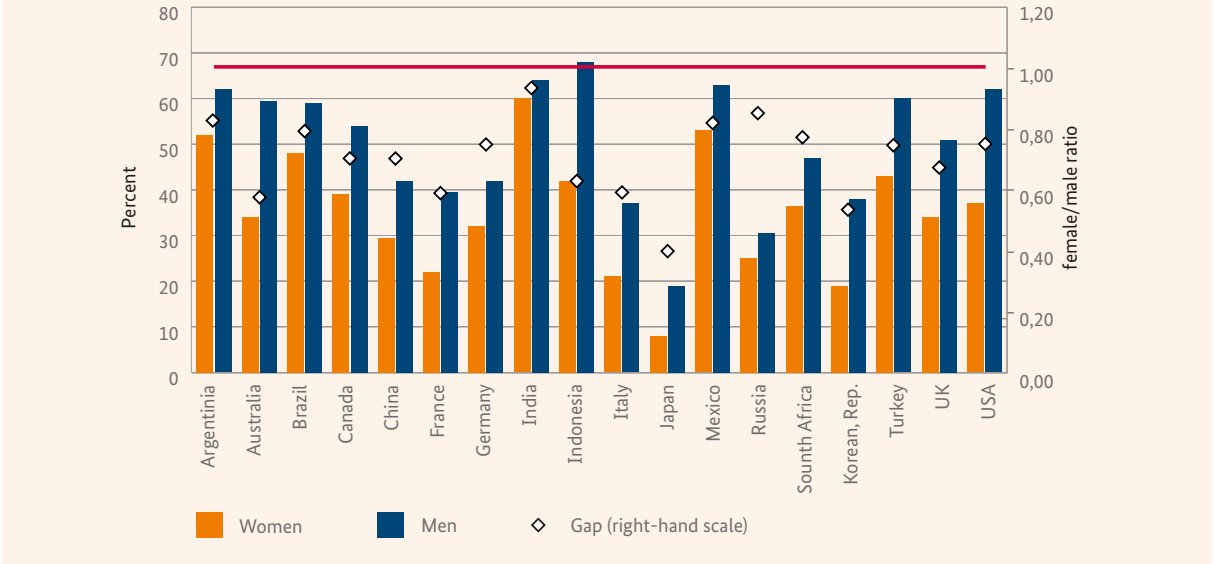


Shares of the adult population between 18 and 64 years who perceive opportunities to start a business.

Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

experience required to start a new business (Figure 4.4). In all G20 countries women less often report to have sufficient skills for starting an own business, and the gaps are especially strong in Japan and Korea (female-to-male ratio is below 0.5). In India, women and men have a similar level of confidence about their entrepreneurial skills.

Figure 4.4: Gender gaps in entrepreneurial capabilities

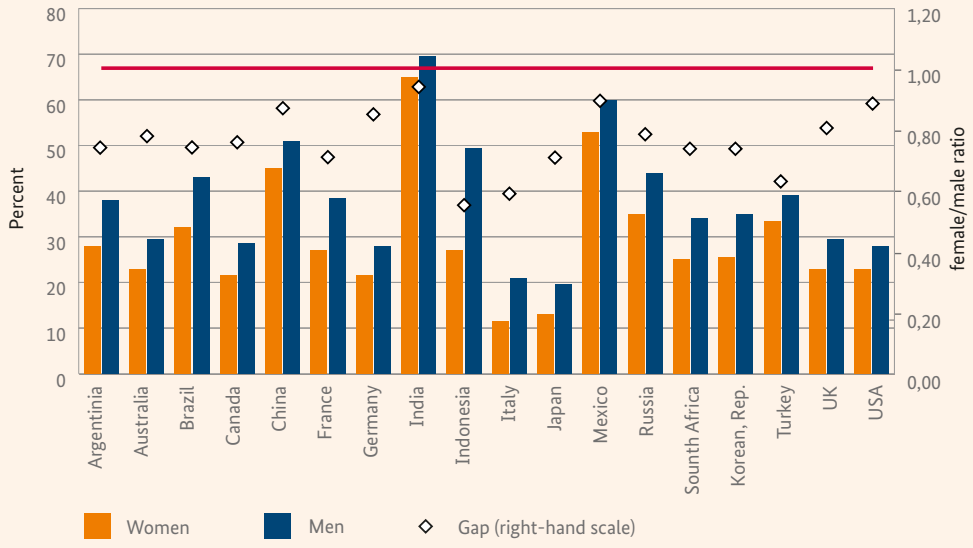


Shares of the adult population between 18 and 64 years who perceive they have sufficient capabities (knowledge, skills, and experience) to start a business.

Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

Role models of entrepreneurship can significantly improve one's entrepreneurial capabilities, as they play an important role in motivating people to set up an own business venture. Observing an entrepreneurial role model can increase one's own ability to recognize an entrepreneurial opportunity and the level of self-confidence about one's own entrepreneurial abilities. Entrepreneurs whom one knows personally can further serve as a source of important social and business networks. GEM measures the presence of entrepreneurial role models by asking whether a respondent personally knows an entrepreneur (Figure 4.5). In all G20 countries, women are less likely than men to personally know an entrepreneur. While on average about 38.6 percent of men personally know an entrepreneur, this is the case only for about 30 percent of women in G20 countries. The gender gap in entrepreneurial role models is particularly pronounced in Indonesia and Italy, where women are about half as likely as men to personally know an entrepreneur.

Figure 4.5: Gender gaps in entrepreneurial role models in G20 countries

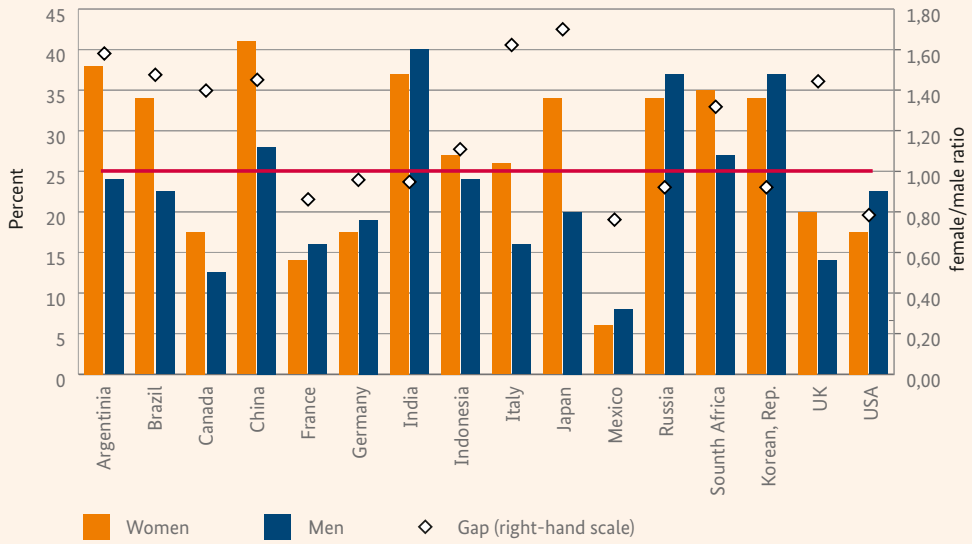


Shares of the adult population between 18 and 64 years who personally know an entrepreneur.

Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

Female entrepreneurs in many G20 countries are more likely than men to be necessity-driven entrepreneurs. This means that a higher share of women (27.1 percent on average) start businesses because they need a source of income or have no better alternatives for work, as compared to men (23.1 percent on average). The gender gaps are particularly pronounced in Argentina, Italy and Japan. However, in some countries, such as Mexico and USA, men are slightly more likely than women to pursue necessity-driven entrepreneurship (Figure 4.6). In those countries the overall level of necessity entrepreneurship tends to be relatively low. While necessity-driven entrepreneurship can be important in enabling people to generate income, opportunity-driven entrepreneurship may greatly contribute to economic growth through job creation and innovation.

Figure 4.6: Percentage of Entrepreneurs with Necessity Motive, by country and gender



Percentage of entrepreneurs involved in total early-stage entrepreneurial activity who are driven by the lack of alternative employment opportunities.

Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

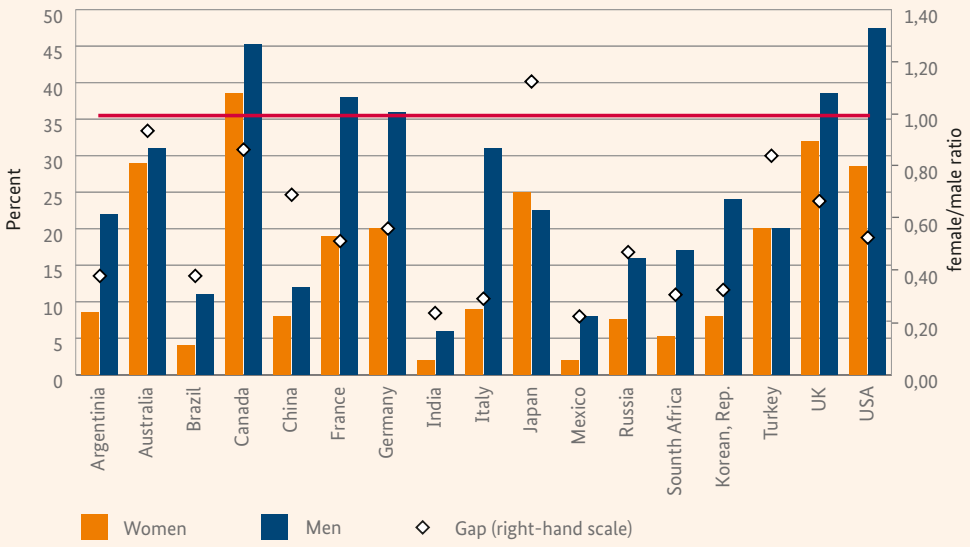
Entrepreneurial activities in knowledge-incentive sectors usually require high levels of human capital, such as formal education and industry-specific experience, e.g., in STEM fields. Moreover, entry barriers in knowledge-intensive sectors are often high, thus, requiring relatively high levels of financial capital necessary to set up a business. Given that women dispose of on average lower levels of relevant human capital (see section 2) and they often have less access to financial capital (see section 3), it is not surprising that they are significantly less likely than men to be involved in total early-stage entrepreneurial activities in knowledge-intensive sectors.

Gender gaps are pronounced in the business services sector that includes information and communication technologies, financial intermediate and real estate, professional services and administrative services (Figure 4.7). The share of this sector in the overall entrepreneurial activities is rather low in India, China, Brazil, and Mexico, and it is rather high in Canada, UK, and USA. Interestingly, in Japan women entrepreneurs are slightly more likely than men to set up a business venture in the business services sector. Also, a gender gap is not observed in Turkey. In the course of digitalization new entrepreneurial opportunities are likely to emerge in ICT-related sectors. Figure 4.8 demonstrates that the current level of total early-stage entrepreneurial activities in the ICT sector is rather low.[11] According to GEM data, the average share of entrepreneurship in this sector for all G20 countries is 5.5 percent for men and 3.1 percent for women, whereas entrepreneurs in developed countries are more likely to choose ICT sector. Still, the gender gaps are pronounced, particularly in developed countries such as Canada, France, Germany, UK

[11] It needs to be emphasized that the GEM data do not identify a sufficient number of entrepreneurs in the ICT sector in several countries. For other countries, the number of women in the ICT sector is very low to draw a comparison between men and women and, thus, they have not been included in the analysis. Hence, GEM data on entrepre-neurship in ICT sector should be interpreted cautiously.

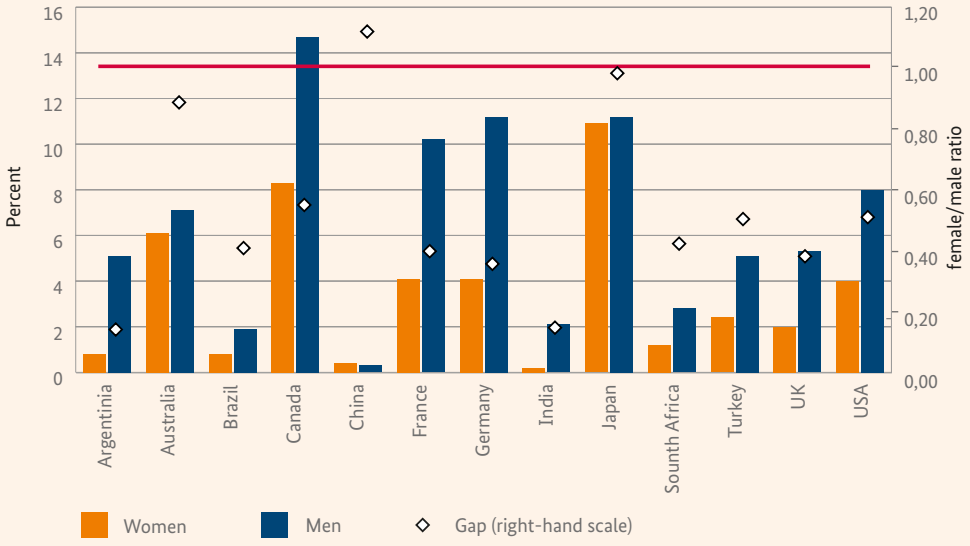
and USA. Although there are no pronounced gender gaps in digital literacy in those countries (see chapter 5), this evidence is indicative of women's lower levels of advanced ICT-relevant human capital. This seems to be related to the lower participation of women in STEM subjects, which is also observed in developed countries.

Figure 4.7: Gender gaps in total early-stage entrepreneurial activities in business services sector (including ICT)



Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

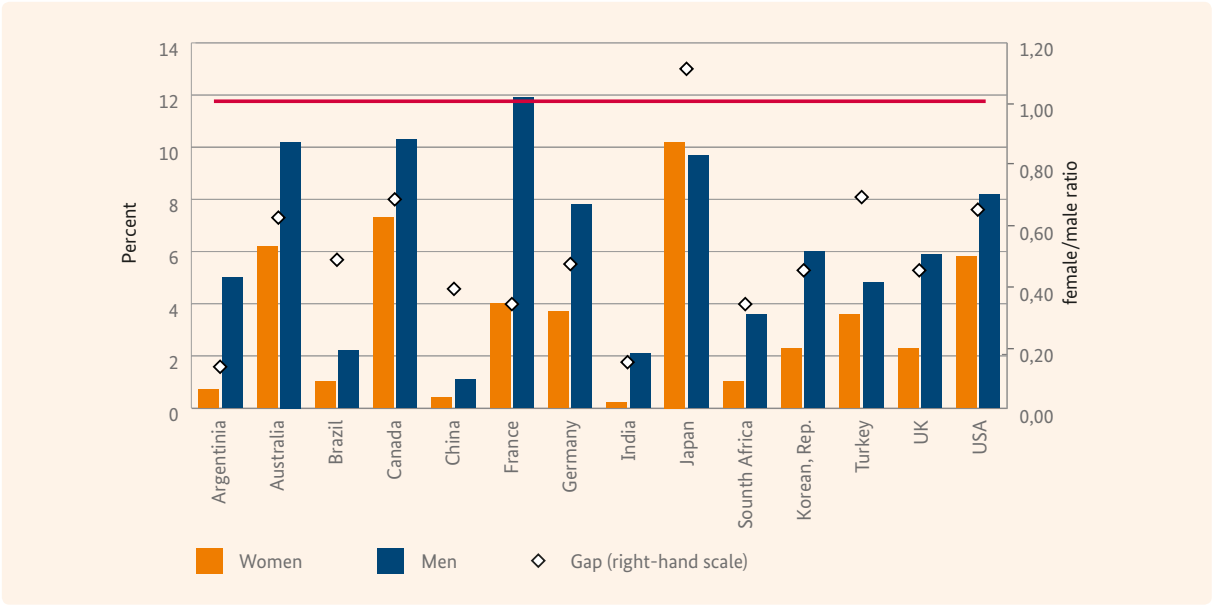
Figure 4.8: Gender gaps in total early-stage entrepreneurial activities in the ICT sector



Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

Similarly, women entrepreneurs are on average less likely to set up a business in high-tech sectors that include, for instance, scientific research and development and manufacture of pharmaceuticals, medicinal, chemical and botanical products, among others (Figure 4.9). Clearly, these sectors do not only require high levels of qualification, but also a solid start-up capital, which women often lack. It should be emphasized that the data in this section only addresses an early stage of the entrepreneurial process and, thus, reflect a more general attitude of women and men towards entrepreneurship in knowledge-intensive sectors. It remains unclear, however, based on the presented data, whether women's businesses in high-tech sectors are more or less successful, for instance, in terms of business survival or growth orientation, than businesses owned by men. Also in this respect, availability of financial capital is crucial.

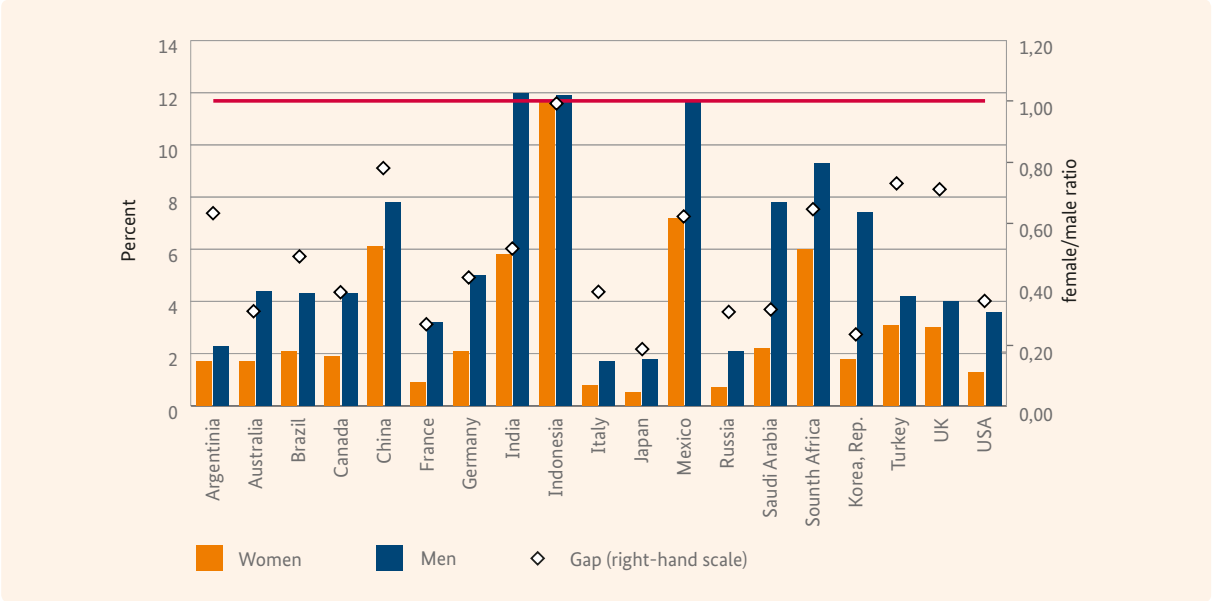
Figure 4.9: Total Early-Stage Entrepreneurial Activities in High-Tech sector, by country and gender



Source: Global Entrepreneurship Monitor (GEM) database, 2013; own calculations.

Another barrier for female entrepreneurship regards financial constraints that women face when setting up a business. The reasons for the funding gap in entrepreneurship are manifold and they include, for example, the gender wage gap that prevents women from accumulation sufficient amounts of financial capital, women's lower risk tolerance that makes them to invest smaller and sometimes insufficient amounts of financial capital into their business. Women may be less likely to get funds for their businesses, if male-dominated financial institutions are more likely to invest into men-led businesses (see a case study for the USA in section 7.3). The latest data from the Global Findex database for 2014 demonstrates that women in all G20 countries are less likely than men to borrow money to start, operate, or expand a farm or a business. This gender gap is especially pronounced in Japan, Korea, Russia, and France, and it is almost absent in Indonesia (Figure 4.10).

Figure 4.10: Borrowed money to start, operate, or expand a farm or business.



Percentage of respondents (age 15+) who report borrowing any money in the past 12 months to start, operate, or expand a farm or business.

Source: Global Findex, Global Financial Inclusion Database, 2014; own calculations.

5 DIGITAL INCLUSION

A major tool for empowering women to enable their inclusion in labour markets, in entrepreneurial and financial activities, particularly with a view on future challenges, is to strengthen their digital inclusion, i.e. their access to ICT and to the internet, and their digital literacy.

Digital inclusion allows women to overcome some of the specific restrictions that are imposed on them (e.g., UN Women2000 2005, Intel, Dalberg 2012, Accenture 2016, Nikpur 2015, BMZ 2017, and the literature cited there), particularly so in developing and emerging countries. Thus, ICT reduces the importance both of time and space restrictions where women often lack time due to double responsibilities both for gaining income and fulfilling family chores, and sometimes underlie conventions restricting their mobility in the public.

The anonymity of the internet benefits women by precluding all kinds of gender-specific restrictions to gaining information, spreading knowledge, inserting own content and expressing own opinions. Female peasants, for instance, may independently from men use information on weather, crops, and developments of market prices, to schedule their production and their sales and become more efficient.

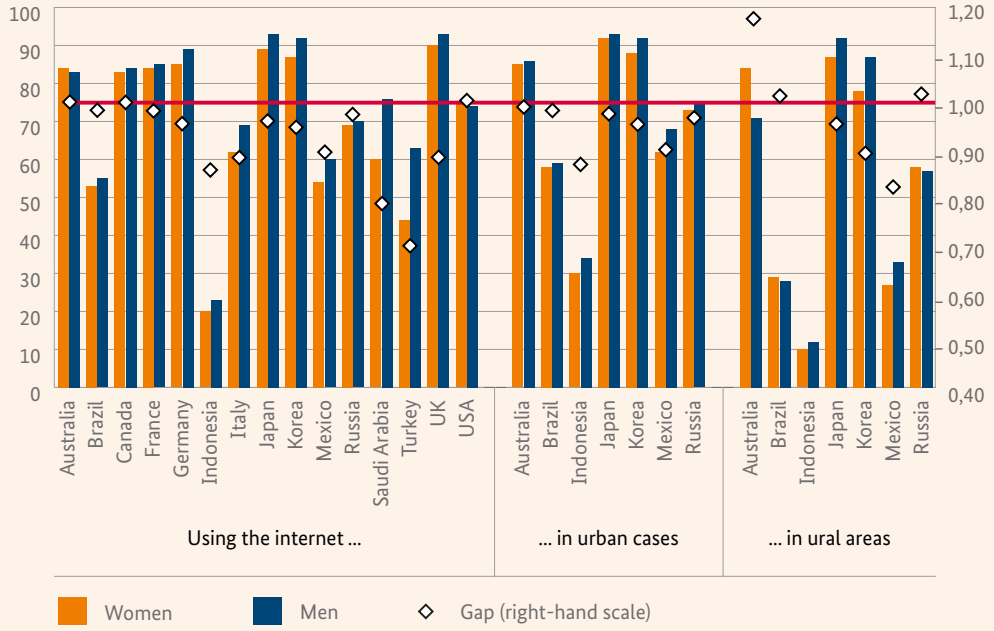
Distant learning offers new, gender-neutral chances for attaining education. E-commerce opens new avenues for retailing women's own productions directly to consumers, circumventing the traditional, often male-dominated market places. Similarly, e-banking allows for new easy ways of transferring money and accessing loans. More generally, teleworking offers new opportunities to women of gaining own income and becoming more independent from men. Campaigning via social media backs the fight against all kinds of violation against women. Last not least, communicating via internet helps women gain self-esteem and overall strength, and learn new role models.

Yet, there exist considerable gaps for women as compared to men regarding ICT utilization, at least in less developed countries and in rural areas (Figure 5.1). This gap is particularly pronounced for the emerging countries Turkey, Saudi Arabia, and–at an overall very low level of ICT utilization–Indonesia, moreover Mexico. It is remarkably high also for the developed country Italy. By contrast, the gap is small for most other developed countries as well as for Brazil and Korea. Not surprisingly, Internet utilization is generally lower in rural than in urban areas and the gap of women relative to men is usually considerably higher (except in Australia, Brazil and Russia). Some similar results apply to other indicators for ICT utilization such as using a computer, using internet banking and purchasing online. Moreover, women are less present in STEM careers at all levels, and they work even fewer in the ICT industry and in leading positions thereof. Less women than men are participating in ICT policy forums and respective governance bodies (ITU EQUALS 2016).

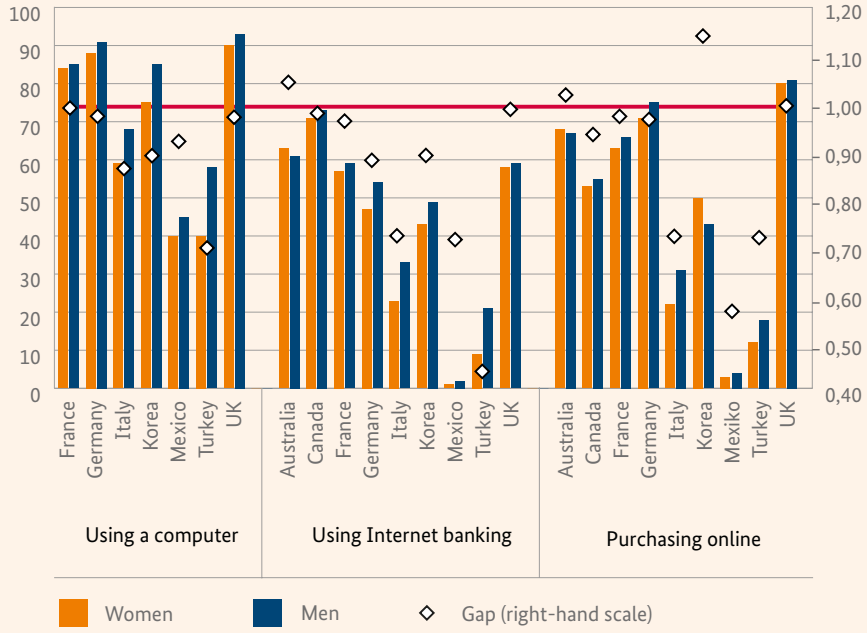
[12] This is not to trivialize new dangers that also originate from the internet, from virus-inflicting or spying-out of the computer, to deception, fraud, blackmailing, some of which owe a specific misogynous note such as sexual har-assment, cyber-stalking, or sexual exploitation and trafficking (Primo 2003).

Figure 5.1: ICT utilization by women as compared to men, in percent, 2014/2015[a,b]

Internet utilization



Other ICT utilization



[a] Provisions according to availability. – [b] Gap: Ratio female/male.

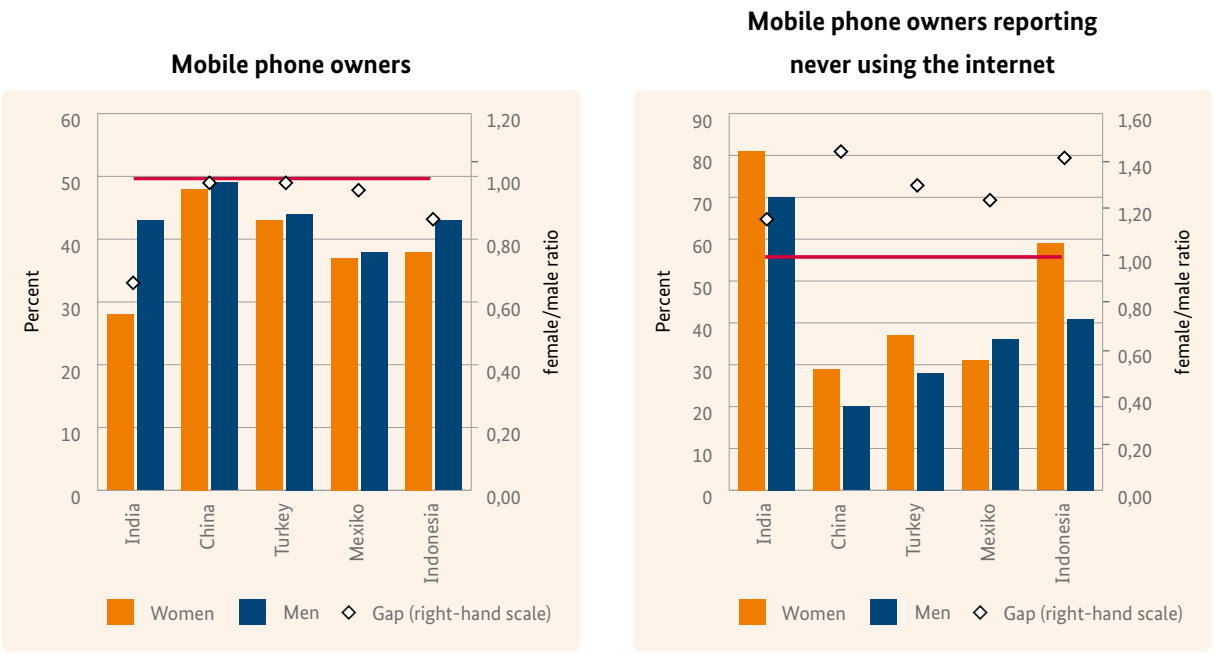
Source: ITU Gender Statistics; OECD Statistics database.

To characterize further the gender gap in digital inclusion and its causes, we look at some more detail at the specific example of mobile phone utilization. Mobile phones empower women in many ways. In a recent study on emerging (and developing) countries, many women reported that mobile phone ownership saves them money and time, and it makes them feel safer and more autonomous and independent (GSMA 2015).

However, women are less likely to own a mobile phone than men. With only 36% of population in India owning a mobile phone, the market is still largely unconnected (Figure 5.2, left-hand graph). The gender gap in ownership is high: an estimated 28% of women versus 43% of men own a mobile phone.

China is the world's largest mobile market in terms of unique subscribers to mobile phone accounts. The gender gap is very small, in comparison to other countries, as it is around 1 percent. In absolute terms, however, it means that there are about 3 million women less than men owning a mobile phone. Indonesia has one of the largest mobile markets in the world, and a unique subscriber penetration rate of 40%. The gender gap in mobile ownership is 10%, which translates into 5 million fewer women than men with a mobile phone. Mexico has a relatively low unique subscriber penetration rate of 37% and a small gender gap in mobile phone ownership. Turkey has a unique subscriber penetration rate of 44% and a small gender gap in mobile ownership (2%).

Figure 5.2: Mobile phone ownership and mobile internet utilization



Source: GSMA (2015).

Moreover, even if women do own a mobile phone, they report using mobile internet less than men do (Figure 5.2, right-hand graph). Differences in mobile internet use between women and men were apparent in the five G20 countries, for which the gender-specific data on using mobile internet were available. The data indicate that in all countries under analysis more women than men report never trying mobile internet. In India, about 80 percent of women report never using the internet on a mobile phone, as compared to about 70 percent of men. This is followed by Indonesia where about 60 percent of women have never used mobile internet.

As to the reasons for this gap, women more strongly than men perceive lack of technical literacy and confidence, and worries about security and harassment as barriers to owning and using a mobile phone (Table 5.1). The strongest barrier to both men and women is the handset cost, where a gender gap is almost absent. Lack of perceived value is one of the lowest barriers, thus, indicating that both women and men appreciate the value and opportunities offered by mobile phone. Women tend to experience certain barriers more acutely than men, such as technical literacy and confidence, but also security and harassment.

The 'security and harassment' barrier refers to security concerns related to owning and using mobile phones, harassment from strangers, or spam advertisements via mobile phone. Particularly in Mexico and China, security represents one of the most serious barriers to owning and using a mobile phone. Nevertheless, mobile services can help women perceive mobile phones as a tool for improving security.

In India, the app 'FightBack' enables users to instantly send an alert in an emergency. By pressing a simple button (and then confirming), SOS SMS and emails, GPS coordinates, and location maps are automatically sent to pre-selected contacts. The app has had more than 100,000 downloads and is now available in 22 Indian states and 81 countries worldwide (GSMA 2015).

Table 5.1: Perception of barriers to owning and using a mobile phone, in %

	Handset cost		SIM cost		Lack of perceived value		Security and harassment		Technical literacy and confidence		Network quality and coverage	
	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
India	50	45	29	25	15	17	34	33	35	26	35	26
China	50	49	32	36	36	39	63	64	48	46	40	43
Turkey	65	64	63	63	35	35	44	34	24	19	24	19
Mexico	66	65	36	41	47	53	69	68	42	46	47	45
Indonesia	40	37	19	16	16	17	32	30	28	21	50	47

Source: GSMA (2015).

Furthermore, barriers to mobile ownership and use vary by country. In India, Turkey and Indonesia, for instance, women perceive technical literacy and confidence as a much stronger barrier to owning and using a mobile phone, as compared to men. On contrary, in Mexico, men are more likely to see technical literacy as a major barrier to using a mobile phone.
Regarding developing countries (who are also of considerable policy concern for the G20 members), such gender gaps and the underlying barriers are reported to be even much stronger than in the emerging G20 countries (Intel, Dalberg 2012): In many of these countries, women lack awareness, ability, occasion and social backing for accessing and using ICT devices and the internet. That is, they are too illiterate to know what ICT is, why it is relevant to them, and how to use it, they are too poor to afford ICT devices and access, and they are too much stuck in stereotypes that question their right and the appropriateness of using ICT. In some countries, it is simply unthinkable or even dangerous for women to walk the street and enter an internet café.

Summarizing, we find a considerable gender gap in digital inclusion in the emerging countries among the G20 (reported moreover for developing countries), both regarding access to and actual use of digital devices. Looking for the reasons for this gender gap, one tends to find the same sort of restrictions at the root of lacking digital inclusion that digital inclusion is expected to overcome: Lacking economic and social inclusion of women entails lacking digital inclusion, which in turn entails lacking economic and social inclusion.

6 POLICIES FOR WOMEN'S ECONOMIC EMPOWERMENT

This section provides examples of selected policy programs aimed at reducing gender gaps regarding the successful inclusion of women in the current as well as in the future economy.

6.1 Digital inclusion

As stated before, women's economic take-off suffers from a vicious circle of mutually reinforcing gender restrictions, educational backwardness and gender stereotypes. Measures and initiatives to promote women's digital inclusion may be one way of breaking through this vicious circle and of empowering women towards their inclusion in labor markets, in entrepreneurial and financial activities, all with a view on future challenges.

To this end, governments and several NGOs have taken various and differing measures and initiatives in different countries to improve the digital inclusion of women. Some of these aim at opening access to infrastructure, i.e. at making available computers and mobile phones, and at providing a mobile phone network and broadband access to the internet. Other measures aim at training for specific skills, digital literacy and familiarity in utilizing computers. Still other measures aim at removing barriers such as written laws, unwritten rules and stereotypes. Such barriers whether being maintained by the society (where it may be considered inappropriate for women to use computers) or by the women themselves (who often internalize a feeling of unease and discomfort towards ICT technology, as part of a more general female reluctance regarding STEM activities) may impose direct or indirect restrictions to the successful digital inclusion of women.
Some measures and initiatives are directly aiming at reducing the gender digital divide. In the following monitoring of policies in G20 countries, we will focus in some detail on these specific measures and initiatives, distinguishing them according to their aims (following a similar classification in the ITU EQUALS project):

- Measures directly addressing the women themselves:
  - Capacity building denotes developing and retaining the skills and competencies required to successfully master ICT devices and an ICT environment
  - Training refers to obtaining and improving specific knowledge and practice in handling ICT devices and an ICT environment
  - Mentoring is a personal relationship where experienced persons provide guidance and advice to less experienced women or girls
  - Community building or networking stands for creating web-based women's communities to communicate among each other, and to advise and support one another
- Measures addressing society at large:
  - Infrastructure development involves the provision of affordable ICT devices and a reliable and secure broadband internet access to women
  - Advocacy activities aim at influencing political, economic, and social decisions towards the interests of women
  - Awareness raising means alerting the public to specific problems of women, it may, for instance, include running initiatives against unfavorable stereotypes

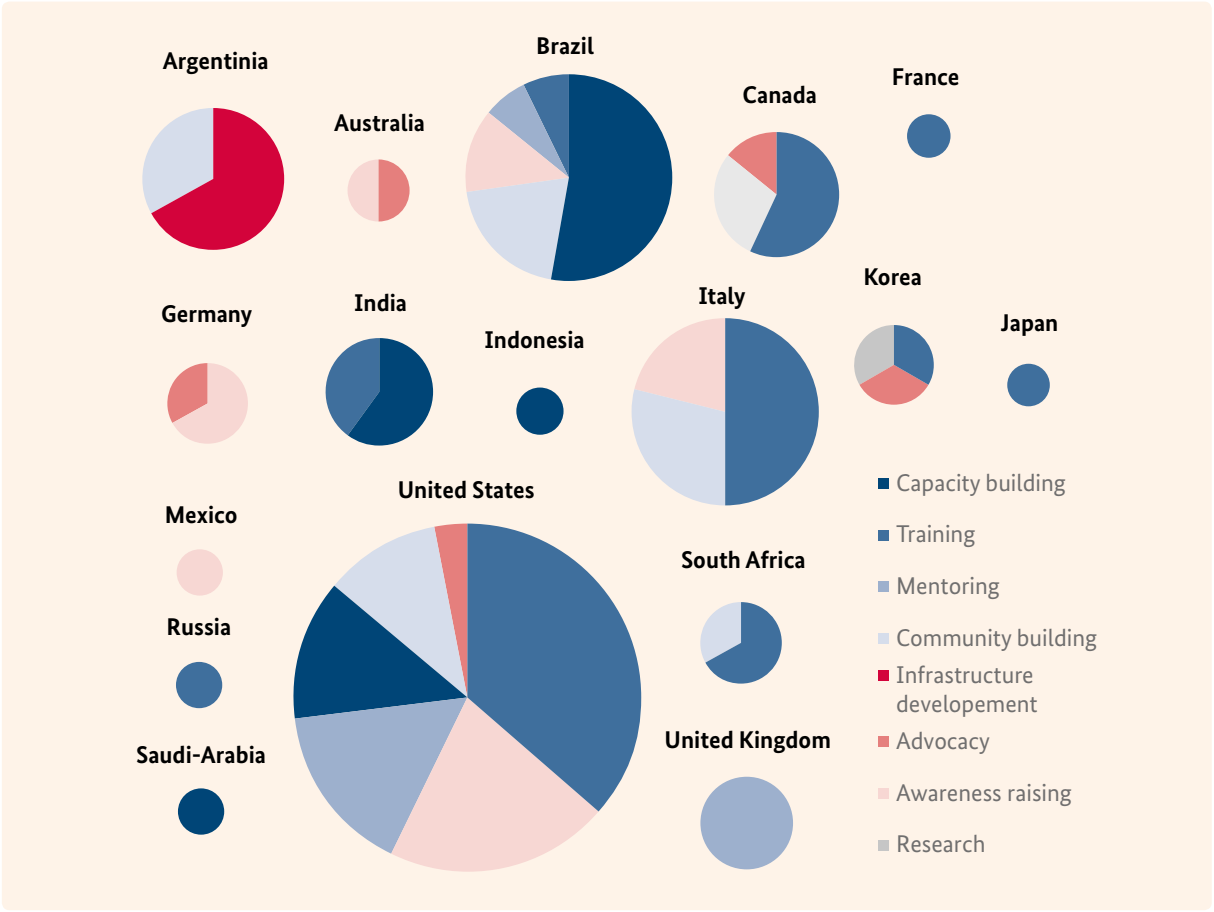
» Research refers to the funding of research on the relations between digitalization and gender gaps

» Multi-stakeholder partnerships aim at forming alliances for promoting policy measures towards women's digital inclusion

Information on such gender-specific initiatives for digital inclusion is derived from various sources: The EQUALS project of the UN's International Telecommunication Union (ITU) gathers such information in a special dataset. The work is ongoing; so far, more than 240 initiatives have been recorded. Another source is a list by the UN's Internet Governance Forum (IGF 2016). Some examples are also to be found in an UN study (UN Women2000 2005) and an Intel study (Intel, Dalberg 2012).

The records included in our overview (Figure 6.1.1, condensing the information from Table A6.1.1) are thus highly random and arbitrary; a high number of hits does not necessarily imply that the respective country really scores particularly high, and zero hits do not imply that there aren't any initiatives in that country; rather the records offer some indication.

Figure 6.1.1: Specific measures and initiatives reducing the gender digital divide – G20 countries



Blue colours for initiatives addressing women themselves, red colours for initiatives addressing society at large; size of circles referring to number of initiatives recorded. No information available on China and Turkey.

Source: ITU EQUALS Database; IGF (2016); Intel, Dalberg (2012); UN Women2000 (2005); Cf. Table A 5.1.1.

According to this information, we find considerable differences between various countries, regarding the intensity of the engagement, the focus towards individuals versus the society, and towards strong versus soft measures. As seen above, developed countries have little need in reducing a digital gender gap, and accordingly they show only few records of such measures (often just one or two records). A striking exception, however, is the United States with the highest number of records of all countries (38 records); moreover, Italy and Canada with also a considerable amount of records (14 and 7 records). This result may in part be due to a higher inclination in these countries of reporting such measures to a UN project like ITU EQUALS. It may also be due to a higher heterogeneity of the respective societies, where women of large disadvantaged minorities such as the black and Latina people face worse opportunities than those in the mainstream society. Otherwise, the emerging countries report higher numbers of measures than developed countries, consistent with their lower levels in ICT supply, cases in point being Brazil (15 records), Argentina (nine records), India (five records), Korea and South Africa (each three records). By contrast, we could not find any records for China and Turkey. Again, this does not necessarily imply that there are not any such measures and initiatives in these countries.

As to content, most of the measures and initiatives recorded address the individual women themselves (blue colors). Strong measures like capacity building and training are recorded more often than soft measures like mentoring and community building / networking. Measures aiming at the society at large are generally less widespread (red colors). They focus primarily on advocacy of women's rights and interests, moreover on awareness raising, targeting the reluctance of girls and women to engage in ICT or more broadly STEM activities, and to take up a profession in this field. Table 5.2.1 provides some particularly speaking examples. They aim at promoting digital education for women and girls; they provide platforms for digital e-learning and for networking for female entrepreneurs and investors, to increase women's self-confidence and entrepreneurial skills; they foster more flexible work arrangements, e.g. for a better work-family balance and for overcoming mobility and/or cultural barriers; they offer new internet-based loan programs allowing for alternative ways of assessing creditworthiness of women, without formal credit records. All these measures and initiatives are typically implemented not by governments, but by NGOs, sometimes in cooperation with governments, sometimes in cooperation with private enterprises (usually from the ICT sector; Table A6.1.1).

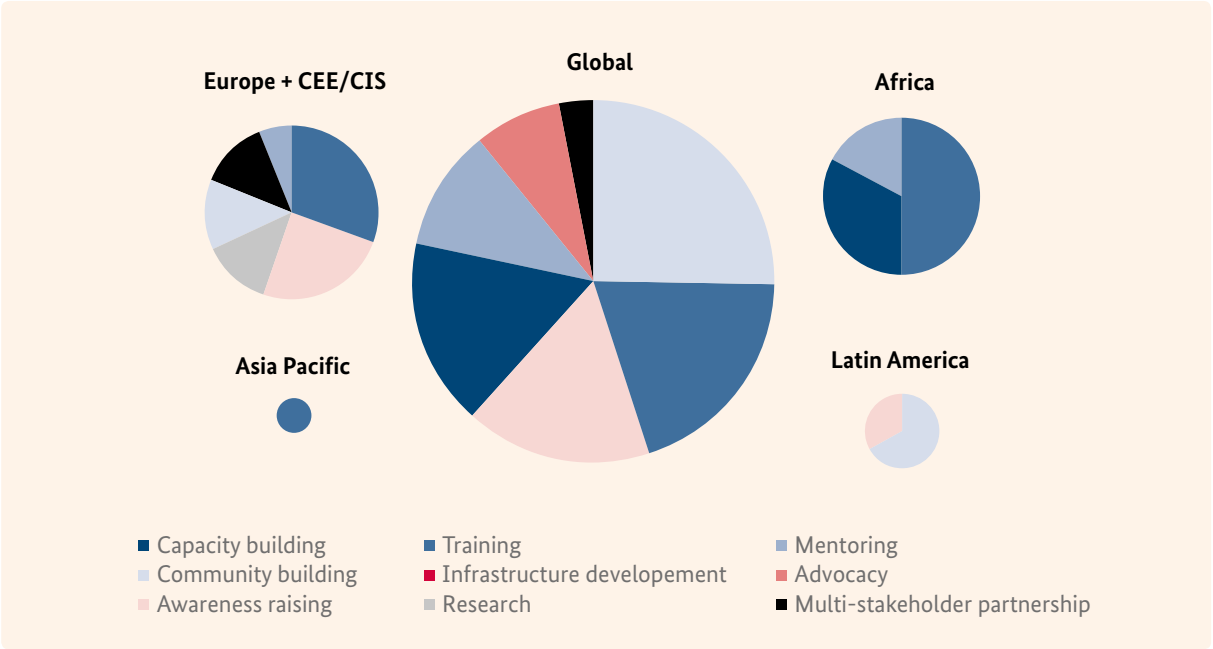
Given this NGO background, it is perhaps no surprise that most of the initiatives reducing the gender digital divide have a multi-country or even global scope (Figure 6.1.2); they are often funded from international organizations or organizations that are located in the more developed and richer countries. Some of these measures focus on certain regions of the world, i.e., Europe including CEEC and CIS (16 records altogether), Africa (12 records), Latin America (three records), Asia Pacific (one record), but most of them are global and do not involve any geographical restrictions (65 records). However, many, though not all, of these initiatives are selective in that they address developing countries.

Table 6.1.1: Examples of measures and initiatives reducing the gender digital divide

Initiative	Description
Capacity building	
"Cyberela Network", Brazil	Tries to advance information and communication on women's issues particularly in rural areas by using community-radio broadcasts and the internet.
"Project Sampark", India	Strives to bridge the gap in rural India, drive commercial revenue and create value for women.
"Women working from home", Saudi Arabia	Is a new staffing model by Glowork, a Saudi Arabian recruitment office.
"Upwork", United States	Digital staffing platform
"CHAYN", multi-country	Open-source project that leverages technology to empower women against violence and oppression.
	By Alibaba Group, internet-based loan programs allowing alternative ways to assess creditworthiness of women without formal credit records
"10,000 Women", multi-country	By Goldman Sachs, internet-based loan programs allowing alternative ways to assess creditworthiness of women without formal credit records
Training	
"Ladies Learning Code", Canada	Aims to inspire women to not only consume ICT but rather contribute to building the new ICT.
"Be the Video Game Developer", United States	Aims at motivating underserved girls, for engaging in ICT and code-learning.
"Black Girls Code", United States	Addresses black girls and women to become innovators in STEM technologies, leaders in their communities and builders of their own future based on computer technology.
"She Will Connect", African countries	By Intel, organizing digital literacy training and an online peer network.
"Technovation", multi-country	Initiative run by scientists and engineers, for helping girls 10-18 to identify and address problems, create a mobile app solution and translate it into fully launched business.
Community building	
"Girls in Tech", Argentina	Aims at developing women at the brink of accessing a high-tech industry and establishing a start-up.
"MariaLab", Brazil	Offers a feminist hackerspace for exchange of knowledge.
"Strong Her", multi-country	Initiative of employees of Alcatel-Lucent, to strengthen the position of women in the company.
"LinuxChix", multi-country	Community for women who like Linux and for anyone who wants to support women in computing.
Advocacy	
"Act on Fostering and Supporting Women in S&T", Korea	Law to increase number of female scientists and engineers: number of graduates as well as number of employees in public S&T institutions and private S&T enterprises
Awareness raising	
"Diversity Charter", Germany	Is an online CSR initiative, where enterprises can commit themselves to show respect and appreciation to all employees regardless of gender, nationality, ethnic origin, religion, disability, age, sexual orientation and identity. More than 100 companies (e.g. Deutsche Telekom, Deutsche Bank, Daimler BP Europe) have joined the initiative.
"EpicQueen", Mexico	Aims at growing the leadership of women and girls in technology, science and entrepreneurship.
"TECHNOLOchicas" , United States	Aims at sensitizing Latina girls and women about opportunities and careers in technology.
"#eSkills4Girls", multi-county	Initiative by the German government for promoting digital education for women and girls and also offering relevant job opportunities.

Source: ITU EQUALS Database; IGF (2016); Intel, Dalberg (2012); UN Women2000 (2005); Cf. Table A 6.1.1.

Figure 6.1.2: Specific measures and initiatives reducing the gender digital divide – Multi-country approach



Blue colours for initiatives addressing women themselves, red colours for initiatives addressing society at large; size of circles referring to number of initiatives recorded.

Source: ITU EQUALS Database; IGF (2016); Intel, Dalberg (2012); UN Women2000 (2005); Cf. Table A 5.1.1.

Similar to the measures at the national level, the majority of multi-country initiatives address women directly. However, in comparison, a little more of these initiatives address society at large (red colors), and a little more of them focus on soft measures (community building, awareness raising) rather than strong. Moreover, some initiatives aim at multi stakeholder partnership, which seems to be required at the international level only.

On a somewhat broader base, we will also give an upshot of such policies that deal more generally with improving digital inclusion, either by fighting digital backwardness of remote, usually rural areas and parts of the population left behind, or by pushing to get or stay at the frontier of digital progress. These more general policies may also contribute to overcoming the gender digital divide. Even though these policies are usually gender neutral, still, they may help laying the ground also for women's inclusion in the digital world. Policy fields concerned are:

- **Providing e-infrastructure:** Improving the required infrastructure consists primarily of providing and extending internet access and broadband networks. However, it also includes providing relative content in the digital media, and this means in particular providing content in native languages. Women, who in emerging and developing countries are often less educated than men, may benefit particularly from such content.

- **Developing e-skills:** Empowering citizens digitally by promoting their digital literacy, and also by providing important information for all, and by establishing participative platforms, may help strongest those that are farthest behind.

» **Promoting ICT industry:** Promoting and accompanying the structural change of the economy towards e-industry, e-commerce, and internet of things aims, of course, primarily on making the economy competitive and sustainable for the future as it is expected to evolve. Yet, as noted above, advancing digitalization quite generally, may help women to overcome some of the restrictions imposed on them.

» **Cybersecurity:** Providing and advancing cybersecurity, and even more providing and advancing privacy protection may reduce actual dangers related to increasing ICT use, particularly dangers of harassment that worry women a bit more than men.

» **Furthering e-government:** Offering more public services in a digitalized way, may facilitate complicated bureaucratic procedures, particularly for small and micro enterprises and self-employed, and may help women in countries where their mobility in the public is restricted or endangered.

» **ICT-related R&D:** Supporting ICT-related R&D infrastructure, research on ICT development and research on the convergence of various ICT devices may make ICT use more accessible and convenient, particularly for those that feel uneasy about it. Moreover, the gender digital divide may be one research topic in this field.

All these fields describe tasks that usually are at the responsibility of governments. To get some information on the activities of G20 governments in this field, we exploited OECD and WISAT policy monitoring reports, more precisely, the OECD Science, Technology and Innovation Outlook (including country chapters), and the WISAT series of National Assessments on Gender Equality in the Knowledge Society. Figure 6.1.3 displays which fields of ICT policies are covered by which countries, building on a more detailed policy overview in Table 6.4.1.

Figure 6.1.3: Policy measures and initiatives to improve digital inclusion in general

Field	ARG	AUS	BRA	CAN	CHN	FRA	GER	IND	IDN	ITA	JPN	KOR	MEX	RUS	SAF	TUR	UK	USA
1. Providing e-infrastructure	■		■				■		■	■				■				
2. Developing e-skills	■	■						■					■		■	■		
3. Promoting ICT industry			■		■	■	■	■			■	■	■		■		■	■
4. Cybersecurity		■					■							■				
5. E-government	■							■						■			■	
6. ICT-related R&D				■	■						■				■		■	■

Red marks indicate that the respective country was recently active in the specific policy field. No information available on Saudi Arabia.

Source: OECD (2016c), Science, Technology and Innovation Outlook; WISAT (2011, 2012, 2014); Cf. Table 6.4.1.

Out of these policy fields, almost all countries explicitly pursue an industry policy to promote the ICT industry; several of them put forward a specific Digital Agenda. They aim at maintaining their top positon in patenting/innovating for the internet of things, big data and wireless communication (China, Korea) – or in regaining such top position (Japan, also for cyber-space uses). Or they aim at supporting eco-mobility, the data economy, medicine of the future (France), entrepreneurship in the digital economy (Mexico), and ICT start-ups (Germany), or at reforming the patent system to improve intellectual property rights (United States).

Some countries, primarily the developed, also engage in ICT-related research, i.e., improving the research infrastructure, including cyber infrastructure (Canada, United States), improving the collaboration between research and commercialization (United Kingdom), or encouraging private sector investment (South Africa), and they engage in cybersecurity, i.e., by securing ICT infrastructure and by reinforcing the ICT security industry (Australia, Germany, also Russia).

Some countries, primarily the emerging, engage in providing e-infrastructure such as fixed and wireless broadband subscriptions (Brazil), particularly for government offices and specific public spaces (Indonesia), or ultra-broadband networks (Italy), and they engage in developing e-skills (India, Mexico South Africa, Turkey, also Australia), and in advancing e-government (Argentina, India, Russia, also United Kingdom).

Unfortunately, we do not have any clear-cut evidence on how successful and effective both the gender-specific initiatives and the more general policy measures are in reducing the gender digital divide and thereby in empowering women to participate in labor markets and in financial and entrepreneurial activities.

6.2 Labor market inclusion

As noted above, the relationships between the measures favoring the digital inclusion of women and the measures favoring the more general inclusion of women in the economy are mutually supportive. Of particular interest may be measures like abolishing constrictive legislation, improving the education of women, altering restrictive stereotypes, and strengthening women's self-esteem. Such measures may in turn also increase women's access to and use of ICT devices, which again in turn may further increase women's general inclusion in the future digital economy.

Regarding the issue of including women into labor markets, we distinguish the following policy fields, some of which directly address women, while others more generally address disadvantaged persons:

- Direct support to women in work and to women's careers: This may take the form of abolishing discrimination against women, e.g., legal restrictions against their taking up work. Another issue may be overcoming unfavorable stereotypes by positive discrimination, e.g., by providing quota for leader positions. Moreover, this policy field may include special training and coaching of women, to strengthen their fitness for labor markets and more generally their self-esteem.

- Labor market reforms: Such reforms may aim at bringing more people into regular work and at supporting and funding the unemployed and those at the margins of the labor market. Women may benefit in so far they are more affected by unemployment, irregular work and poverty than men are.

- Better work-life balance: Improvements may be achieved by all kinds of family support facilitat-

ing a redistribution of caregiving tasks between genders, e.g., rules on parental leave, provision of supportive child care systems. This may support women in relieving them from family chores.

» Better education: This concerns a higher overall school enrolment rate for both sexes; it may concern specific improvements regarding vocational training and digital literacy. This may help in particular those that are farthest behind, which may often be women, at least in emerging and developing countries.

» Better health care: Good health is a basic precondition for being at all able to work. Reliable health care systems – also for the poor –, and health support around pregnancy and motherhood may help bringing and retaining women first in education and later in employment, particularly in emerging and developing countries.

» Prevention of violence: Similarly, the containment of violence is a precondition for moving about freely in public space and for being able to get to work. Better provisions towards ending violence against women in the public and private space, is therefore also required to fit women for labor markets, again, particularly in the case of emerging and developing countries.

» Other measures may deal with country-specific challenges.

Information on respective policies pursued by the G20 countries may be drawn from various monitoring sources: the annual OECD "Science, Technology and Innovation" Outlook, the annual OECD "Economic Policy Reforms–Going for Growth" Reports, the regular OECD "Economic Surveys" on all OECD and several other countries, and the regular World Bank reports on "Women, Business and the Law". Under the UN Women's "Step it up for gender equality" initiative, countries committed themselves to ending discrimination against women by 2030 and announced concrete and measurable actions to this end. The results drawn from these monitoring reports are summarized in Table 6.4.1 and visualized in Figure 6.2.1. Accordingly, the G20 countries set different priorities with respect to measures that may contribute to including women into labor markets.

Figure 6.2.1: Policy measures and initiatives to improve women's labor market inclusion

Field	ARG	AUS	BRA	CAN	CHN	FRA	GER	IND	IDN	ITA	JPN	KOR	MEX	RUS	SAF	TUR	UK	USA
1. Support to women& their careers	■	■			■		■	■	■	■	■	■	■	■		■		■
2. Labor market reforms	■	■	■	■		■	■			■	■	■	■		■	■	■	■
3. Better work-life-balance		■	■			■	■			■		■	■			■	■	■
4. Better education	■			■		■			■	■	■	■			■	■	■	■
5. Better health care			■		■				■				■					
6. Prevention of violence	■		■		■		■			■			■					■
7. Other					■													

Yellow marks indicate that the respective country was recently active in the specific policy field. No information available on Saudi Arabia.

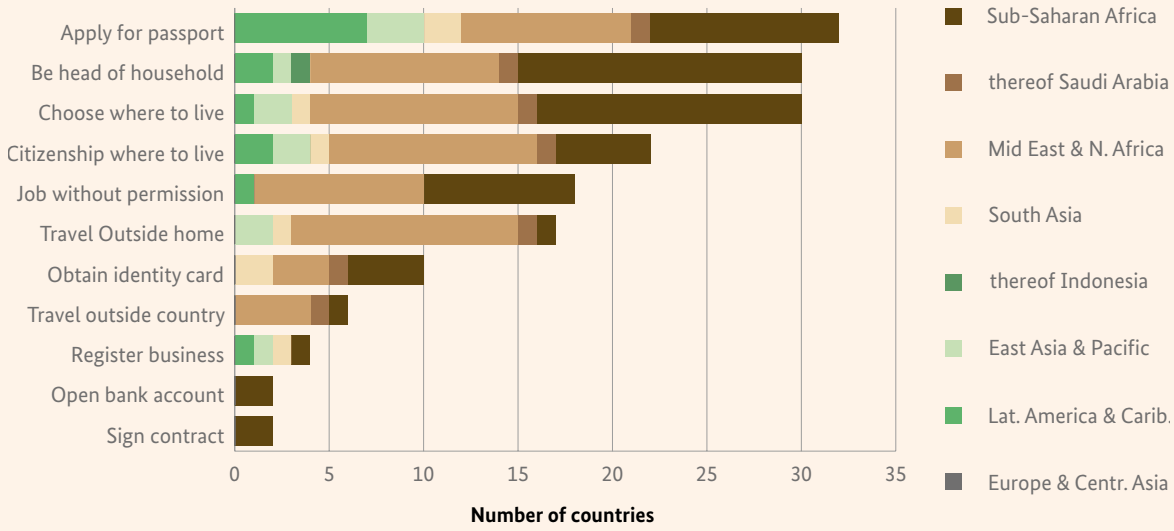
Source: UN Women, Step it up; OECD (2016a), Economic Policy Reforms–Going for Growth; OECD (2016c), Science, Technology and Innovation Outlook; OECD Economic Surveys; WISAT (2011, 2012, 2014); Cf. Table 6.4.1.

Concerning the **direct support to women in work**, ten out of seventeen G20 countries, for which information is available, pursue such measures some way or another (Figure 6.2.1). One issue under this heading is the abolishing of legal restrictions that are imposed specifically on women (World Bank 2015, OECD 2012 "Closing the Gender Gap"; Box 6.2.1). Overcoming this negative discrimination is a major precondition for any progress in gender equality and follows directly from human rights. To deal with such restrictions, twelve G20 countries signed the UN's Convention on the Elimination of All Forms of Discrimination against Women (CEDAW; Argentina, Australia, Brazil, Canada, France, Germany, Italy, Mexico, Russia, South Africa, Turkey, United Kingdom), which however, expresses largely an unbinding intent.

Box 6.2.1: Legal restrictions to women

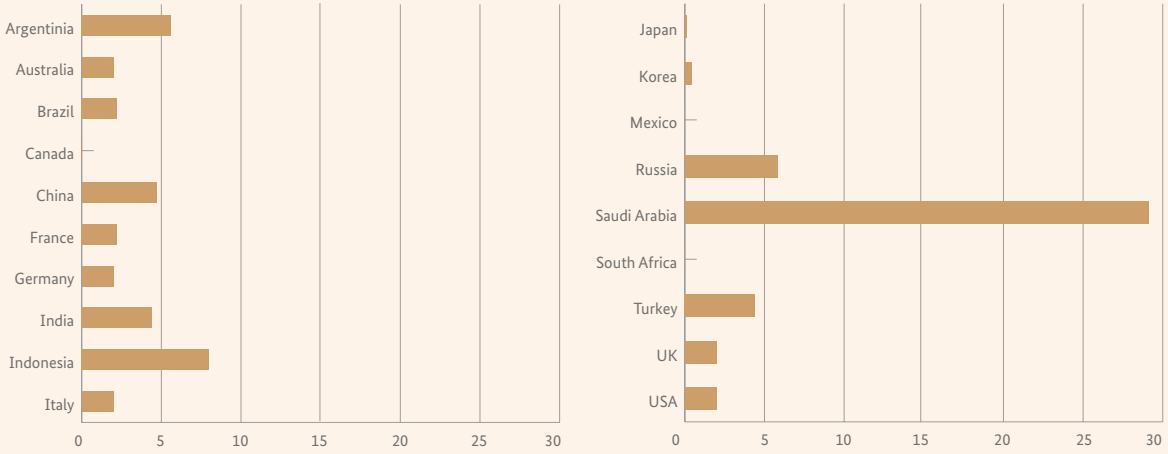
Some very fundamental restrictions concern, for instance, women not being allowed to choose where they live, to travel outside their home, to take up work without permission by their husband, to be head of their own household, or to confer their citizenship to their children. Actually, such fundamental restrictions are not very characteristic for G20 countries, with the exception of Saudi Arabia and Indonesia (Figure 6.2.2), yet they need to be considered when thinking about programs to empower women in developing and emerging countries, particularly from the Middle East and Africa. Still this is not to say that there are not any legal restrictions to women in G20 countries. Figure 6.2.3 shows that in most G20 countries at least some differences in the treatment of women and men by law remain. These may concern inheritance rights over property (including husband's property), rules on working at night hours, at doing the same jobs, or at statutory retirement age, and treatment with regard to taxation and allowances. Saudi Arabia exhibits the highest number of legal differences, followed by Indonesia, Russia, Argentina, China, India and Turkey. In the other countries, such differences are less prevalent; Canada, Mexico and South Africa even exhibit none at all (World Bank 2015). Some more subtle legal impediments, such as tax-wedge induced work disincentives for second-earners – which usually happen to be women – are not even included in this index (e.g., Germany).

Figure 6.2.2: Countries with basic legal restrictions to women (worldwide)



Source: World Bank (2015).

Figure 6.2.3: Extent of legal gender differences in G20 countries



Source: World Bank (2015).

Some G20 countries introduced a sort of cross rule, a review mechanism on gender equality, requiring all other policy fields to take into account women's rights and interests and to increase women's participation and representation (Argentina, China, India, Indonesia, Mexico, Japan). In Korea, such rule is enforced by a preference in public procurement to firms with a higher share of women in management, and by public naming of companies that fall short. Another huge issue are unwritten rules in the form of stereotypes discriminating against women, again particularly in developing countries. Where it is felt inappropriate for women to touch a computer, to visit a public internet café (which may be the only available access to the internet), let alone to go for a STEM profession, there women forego both the chances of digital inclusion and of inclusion into sustainable and well-paid employment (UN Women2000 2005, Intel, Dalberg 2012). Even in G20 countries, considerable stereotypes persist, expressed, e.g., in the choice of women for "feminine" professions instead of well-paid STEM professions, and even in a general supposition that such female work do not deserve better payment.[15]

The gender gap in payment may to some degree be regarded an indication of the persistent continuation of such stereotypes. Still in these countries, the issue often tends to boil down to the question of quota as a form of positive discrimination in favor of women, be it in public institutions (e.g., in parliaments or at least in candidate lists for parliaments) or on the boards of enterprises. And indeed, some measures of G20 countries aim at breaking through the "glass ceiling". Several countries adopted quota for leader positions, either quite general (Indonesia), or more specific in listed large enterprises or state-owned companies (Germany, Italy), or in public leadership positions or local self-government (Japan, India). Such quota regulations have not always proven to be successful; they are subject to controversial discussions and therefore require a particularly careful justification.

[15] Ausprung et al. (2017) give an impression on how deeply rooted the disregard for female work is both in men and in women. They show that both men and women consider it to be fair that female employees earn lower than male employees in a clearly comparable position.

With some effect, several G20 countries, particularly emerging countries, transformed their poverty alleviation programs into conditional cash transfer programs (CCP), and thereby used them to support women while at the same time improving the efficiency of these programs regarding their primary targets.[16] The basic idea is to pay transfers to beneficiary families conditional on children attending school and being vaccinated, sometimes granting higher benefits for girls' than for boys' school enrolment. By paying these benefits directly to the mothers, women's position in their families is strengthened, and misspending is reduced by strategically activating the women's higher sense of responsibility for their families' wellbeing. Moreover in some countries, by paying the benefits through bank cards rather than cash, beneficiary women are forced to open an own bank account, which enhances their financial inclusion. Also enhancing their digital inclusion would require paying benefits through mobile money accounts or by using online communication, reporting or monitoring tools, which is currently under discussion (Aker et al. 2016, High Level Panel on Humanitarian Cash Transfers 2015). In addition, women are in some countries assigned active roles in the local program administration of the CCPs, strengthening their participations in local communities. CCPs have been implemented in more than 50 countries (e.g., Mexico's "Prospera" and Brazil's "Bolsa Família" program, Indonesia, Russia and Turkey).

Still other measures in this policy field deal with training and motivating women for STEM jobs (Canada) or more generally for better-paying jobs (United States).

Almost all G20 countries (fourteen out of seventeen) pursue labor market reforms (Figure 6.2.1). A general trend is to combine more flexibility with better active labor market policies. Such reforms are assumed to be the best way of lowering unemployment and empowering people at the margin of the labor market. This strategy, following the successful Scandinavian type of welfare systems (Hemerijck 2013, Friedl et al. 2015), has been proposed by the OECD Restated Jobs Strategy, and forms the base to the OECD's reform recommendations to its member countries. The underlying idea is to combine lowly regulated wage setting and light job security legislation with a strong policy of supporting and activating those that drop out of employment ("flexicurity"). In some countries, such policy is even expected explicitly to outpace irregular – and often unfair – employment (Argentina, Brazil, France, Indonesia, Italy, South Africa, and Turkey). By contrast, other countries introduced new restrictions in order to contain irregular work, e.g., on temporary agency work and on fixed-term contracts (Germany, Japan, Korea).

Several countries lay particular stress on programs supporting specific problem groups of the labor market, such as indigenous, disabled, long-term unemployed, low-skilled or young persons (Canada, France, Germany, Japan, South Africa), sometimes organized in the specific form of public-private partnerships (United States). Again, this may help women insofar they suffer even stronger respective drawbacks than men do.

In the policy field of work-life balance, ten out of seventeen G20 countries have taken action (Figure 6.2.1). This field again is framed by stereotypes influencing the distribution of family chores and income provision between spouses (Box 6.2.2). Reducing family chores is thus likely among the most effective measures for improving the employment participation of women. Supporting measures start with laws on (paid)

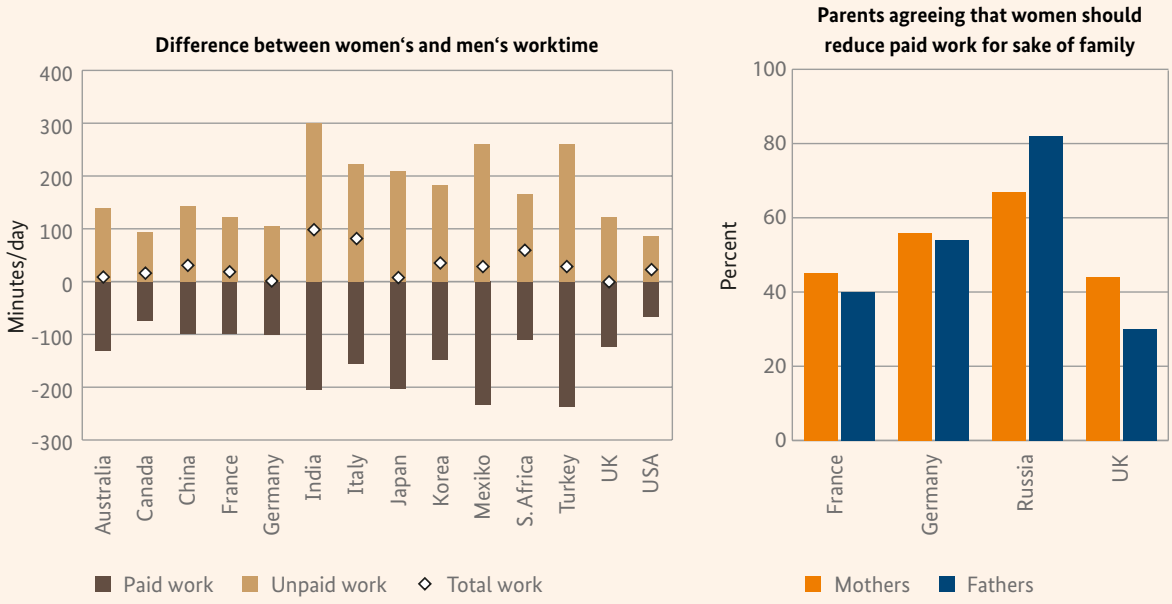
[15] See, among others, Fizbein and Schady (2009), Fultz and Francis (2013) or Gil-Garcia (2016). Cecchini and Madra-ga (2011:144-145) and Fultz and Francis (2013:29-30) discuss the effects of CCP on women's empowerment con-troversially.

maternal leave, moreover on paternal leave (Brazil, Germany, Italy, Korea, Mexico, United States – in a few cities or counties). Support continues with the provision of supportive child care systems in the form of high-quality kindergartens and full-time schools (Australia, Brazil, France, Germany, Italy, Japan, Korea, Mexico, Turkey, United Kingdom and United States – reluctantly and for low and moderate income families only).

Box 6.2.2: Family role models in G20 countries

Women bear much larger loads of unpaid work for family chores (positive yellow columns in Figure 6.2.4, left graph), and hence tend to reduce their amount of paid work (negative brown columns). In total, women work even more than men do (rhombs). The imbalance between genders regarding paid and unpaid work is strongest (among the countries observed) in the cases of India, Mexico and Turkey, followed by Japan and Italy. This distribution is rooted in the perception of traditional role models, according to which mothers should stay at home with their children. This perception seems to be particularly widespread among Russian fathers. In other countries, a stark minority of parents admits to this perception, mothers lying ahead of fathers.

Figure 6.2.4: Distribution of family chores between women and men



Right-hand graph: Answers on a respective question in an OECD survey, available only for selected countries.

Source: OECD (2012) Closing the Gender Gap.

A further issue is to support part-time work (Korea), since this represents an option for women to reconcile employment and family chores, with the danger of leading women's career development and payment perspectives to a dead end. A similar merit and caveat applies to actions favoring teleworking for women (Mexico, Saudi Arabia).

There is little doubt on the important role of **better education** for the empowerment of women, and eleven out seventeen countries started recent initiatives in this field. Some measures concern improving school enrolment rates and quality of education, including secondary and tertiary (Brazil, Canada, France, Indonesia, South Africa), often with a particular stress on STEM activities and on a positive attitude towards entrepreneurship (Argentina, Italy, Japan, Korea, Turkey, United States).

Some countries also lay emphasis on an appropriate match of skills demand and supply. This may require, inter alia, arranging for a just amount of vocational education (China – it even reconverted provincial universities to vocational colleges, France, Italy, Korea, United Kingdom).

Provision of health care and **prevention of violence**, from the view of G20 countries, may look like being of minor concern for empowering women. Yet again, for developing and some emerging countries, these are necessary though not sufficient conditions for women's successful inclusion into the economy, including their digital inclusion. Health care deficiencies in the extreme may imply girls being aborted before even been born, or girls being less well fed than boys throughout childhood, with lasting consequences for their lifetime. In G20 countries, the focus is on provision of contraceptives, measures to reduce maternal mortality and prevent teenage pregnancies (Brazil, China, Indonesia, Mexico). Violence actually "thwarts women's economic empowerment by limiting their ability to exercise agency and make choices" and violence "both reflects and reinforces inequalities between women and men" (Sakhonchik et al. 2016). Actions in these fields, e.g., sanctions against sexual harassment, trafficking, sexual exploitation, also domestic violence, have been organized recently in seven G20 countries (Argentina, Brazil, China, Germany, Italy, Mexico, United States).

Another measure is, in China, to offer migrant workers (from inside the country) and their families equal access to basic public services in cities, including education, community hospitals and public housing, something they lacked so far.

While all these measures have a potential of supporting women's integration into labor markets, it is by far not clear whether they are actually implemented as they are announced and whether they are successful to these ends. The efficacy of the policies announced is likely to vary between the different G20 countries. For the future, it will be necessary to monitor carefully the progress achieved, e.g., that women meanwhile reach higher levels of education and receive higher grades than men, or that the vertical occupational segregation between women and men has diminished at least slightly. Similarly, the remaining challenges are to be observed closely, e.g., that the distribution of caregiving tasks and the disproportionate concentration of women in traditional disadvantageous work roles persist as do gender stereotypes in the media, and that the gender pay gap and the horizontal segregation have remained largely unchanged. Systematic evaluations of the progress of programs and actions underway are required but lacking so far, as are the sufficient gender-disaggregated data enabling such evaluations.

6.3 Financial and entrepreneurial inclusion

Turning to the issue of financial inclusion of women and of their participation in entrepreneurship, we distinguish the following kinds of measures:

- **Direct support to women to becoming entrepreneur**, e.g., by specific funds available for women entrepreneurs; measures for improving the financial literacy of women, e.g., by specific training.
- **General support to becoming entrepreneur**, e.g., by funds for start-ups and grass-root investment, by shaping education at schools and universities in a way conducive to entrepreneurship, more¬over, by training and coaching. Starting small-scale businesses may be particularly relevant to women, even more than for men.
- **Less regulations and less red tape**, particularly on SMEs, micro enterprises, start-ups and self-employed, to create a positive climate for starting business, e.g., by providing a one-stop shop for governmental compliance and support.
- **Well-developed financial markets**, with ample opportunities for enabling money transactions (interesting in this context may be the non-cash movement) and of finding credits and loans particularly for SMEs, micro enterprises, start-ups and self-employed (points in case may be seed funding, incubators, microcredits, crowd-funding, venture capital, angel networks).
- **Modernisation of land acquisition rules**, in order to provide a reliable basis to female peasant entrepreneurs in rural areas, as well as providing the required rural infrastructure.

As in the case of labor market inclusion, we find very different approaches towards financial and entrepreneurial inclusion as well (Figure 6.3.1). Strikingly, some of the countries with low efforts concerning labor market inclusion offer all the more measures and initiatives regarding the participation in entrepreneurship – the most obvious case being India. The other way round, countries with many activities in the field of labor market inclusion are less engaged regarding the participation in entrepreneurship – case being Brazil.

Figure 6.3.1: Policy measures and initiatives to improve women's financial and entrepreneurial inclusion

Field	ARG	AUS	BRA	CAN	CHN	FRA	GER	IND	IDN	ITA	JPN	KOR	MEX	RUS	SAF	TUR	UK	USA
1. Support to women	■	■			■					■			■					
2. Support all entrepreneurs		■				■	■	■	■	■	■	■	■	■	■	■	■	■
3. Less regulations& red tape								■				■		■	■			
4. Well-developed finan. markets								■	■	■		■			■			■
5. Reliable land acquisition								■										

Blue marks indicate that the respective country was recently active in the specific policy field.

Source: UN Women, Step it up; OECD (2016a), Economic Policy Reforms–Going for Growth; OECD (2016c), Science, Technology and Innovation Outlook; OECD Economic Surveys; WISAT (2011, 2012, 2014); Cf. Table 6.4.1.

Five out of eighteen countries, for which information is available, **support directly women's financial and entrepreneurial abilities**, e.g., by providing training in financial literacy (Australia, Mexico: for beneficiaries of social programs) or by helping them starting a business (Argentina, China, Italy).

Most countries claim to **support entrepreneurs in general**, and some do this in a quite general way via competitive grants with few priorities (United Kingdom, United States). Some countries issue specific funds for start-ups, grass-root investment and seed-funding (Italy, Indonesia, Korea – which also explicitly reduces support for SMEs after five years), in some cases with a specific stress on social inclusion, on the "bottom 500 million" and poor farmers (Argentina, India), on small and micro enterprises (Italy), or on hi-tech sectors (France, Mexico, South Africa). Some initiatives aim at enhancing a dialogue between the science and technology sector, policy and the public on upcoming societal challenges (Germany), or on creating an ecosystem that is particularly conducive to entrepreneurship (India), in some cases by re-orienting education towards more entrepreneurial spirit (Indonesia, Japan, Turkey).

Four countries intend to **reduce regulations and red tape**, in some cases quite generally (Russia, South Africa). Examples that are more specific are a large start-up initiative, which includes cutting red tape, compliance costs and market exit constraints (India), or the establishment of special economic zones with a one-stop shop (South Africa). One country, in order to cap the regulatory burden to firms, pursues so-called "cost-in, cost-out", "regulatory guillotine" and "thorn under the nails" systems (Korea).

The **development of financial markets** is an issue to five countries, e.g., by a national movement towards a non-cash economy (Indonesia), or by providing financial access to larger segments of the population (Mexico), or by amending schemes for venture capital companies (South Africa). Moreover, changes in financial markets have allowed for a growing number of angel networks, some of which are explicitly focusing on women entrepreneurs as an under-recognized and under-served segment of the market (Brush et al. 2014). In the United States, examples of such women-focused angel investor networks include Astia Angels, Golden Seeds, 37 Angels, and Pipeline Angels, all of whom provide training for women angel investors (Coleman and Robb 2016a). In addition to these established programs, the Rising Tide U.S. Angel Training Program has been launched in 2015 as a further step toward closing the gender gap in angel investing (see a case study in Section 7.3).

Just one country explicitly promises **reliable land acquisition rules** and a rural modernization program for computerization of all information and data relevant to peasant entrepreneurs (India).

6.4 Summary of gender gaps and policies by countries

Summarizing the preceding chapters, Table 6.4.1 tabulates, separately for each G20 country, the current gender gaps, identified in Sections 2 – 5, against the national policies that currently aim at addressing these gaps.[17] This table informs about current deficits in gender-oriented policies in the individual countries. It indicates, on the one hand, the need for additional policy action where gender gaps are high but policies to fight these gaps are absent. It also indicates, on the other hand, redundancies where active policies aim at fighting gender gaps that actually do not exist.

The informational content of the Table 6.4.1 is limited by several shortcomings, however. First, the set of policies reported in the table is likely incomplete and focuses on recent policies. Identifying all policy measures that address gender equality directly or indirectly is beyond the scope of the present study. We try to reduce this uncertainty to some extent by reporting not only those policies we are aware of that address gender gaps directly (printed in bold letters in Table 6.4.1) but also those policies that have no explicit gender perspective but may address gender gaps indirectly (non-bolded). For example, several G20 countries have enacted programs to increase labor market participation, reduce labor market duality, foster children's education, support start-ups or improve ICT skills of all participants. While many of these programs treat women and men alike, they may benefit women or girls more than men or boys. Second, little information is available about the actual utilization and effectiveness of the individual programs. Some programs have been evaluated extensively in the literature. However, evaluating the effectiveness of all these policies with respect to their effects on reducing gender gaps is far beyond the scope of the present study. And third, the matching of individual policies with specific gender gaps, respectively the available indicators for these gaps, is difficult in some cases. For example, several governments, including those of Argentina, Brazil, Indonesia, Italy and the United States, have launched initiatives to reduce violence against women and girls. These initiatives may contribute to reducing gender gaps in several categories, including labor force participation, education and self-employment. We nonetheless reference these initiatives in only one category in Table 6.4.1, namely, labor market participation. By contrast, we reference some of the conditional cash transfer programs multiple times in the table. For example, Mexico's "Prospera" program directly aims at fostering mothers' labor force participation, mothers' and daughters' education, and mothers' financial inclusion. We report it in each of these categories. In spite of these shortcomings and ambiguities, Table 6.4.1 provides a concise summary of the information collected in the course of the present study. We hope it will inspire future work to improve its informational content by successively completing, updating and substantiating the existing gender gaps and gender policies.

Table 6.4.1 indicates that the four "Anglo-American" countries among the G20, **Australia**, **Canada**, the **United States** and the **United Kingdom**, feature the greatest achievements in terms of gender equality among the G20 countries. The gender gaps in labor force participation, education, financial literacy and digital literacy are either closed or already comparatively small. The remaining gender gaps, primarily in labor market participation and wages, are targeted by at least some policy measures in these countries. Australia, the United States and the United Kingdom aim at stimulating female labor force participation by programs that improve childcare and provide train-

[17] We discretize the magnitudes of the gender gaps in the various categories, all of which are measured as fe-male/male ratios (see Section 2.1), into five groups for expositional clarity: "None" (1.00 or higher), "Small" (below 1 – >0.9), "Moderate" (0.9 – >0.8), "Large" (0.8 – >0.66), and "Very large" (<0.66).

ing, for example. We have no information about similar programs in Canada, though. In addition to this, minimum wages that may restrict gender wage gaps are mandatory in all four countries. Gender gaps are, however, still wide among highly qualified workers, notably among STEM graduates and managers and well as in entrepreneurship. At least Australia and the United States have launched initiatives to bring more women into STEM professions and entrepreneurship. However, we have no information about effective policies in any of the four countries to help female managers break the so-called "glass ceiling" that prevents them from being appointed to leadership positions.

The three continental European G20 countries, **France**, **Germany** and **Italy**, lag only slightly behind the Anglo-American countries in terms of gender equality. They feature, on aggregate, similarly low or moderate gender gaps in labor market participation and education, and aim at addressing the remaining gaps in these areas by at least some policy measures. Italy lags further behind in terms of labor force participation, though. The three continental European G20 countries also share the wide gender gaps among highly qualified workers, notably among STEM graduates and managers and well as in entrepreneurship with the four Anglo-American countries. Their policy foci appear to differ somewhat from those of the four Anglo-American countries, though. The governments appear to put more emphasis on breaking the "glass ceiling" for female managers through mandatory quota for women in supervisory boards of large companies but somewhat less emphasis on attracting more women or girls into STEM occupations or entrepreneurship. National initiatives in these countries are complemented by EU-wide initiatives by the EU Commission like the "Small Business Act" or the "European Network of Female Entrepreneurship Ambassadors" or the "European Centre for Women and Technology", though. The gender gaps are somewhat larger in the continental European than the Anglo-American countries in digital inclusion. This is especially true for Italy, where digital technologies are generally still less commonly used than in other highly developed countries. Like in other highly developed countries, these gaps are primarily addressed by private initiatives but rarely by governmental programs.

Unlike most of the other highly developed G20 countries, **Japan** and **Korea** have still to overcome cultural barriers to increase female labor force participation, grant women equal access to higher education and highly qualified jobs, especially in STEM and management occupations, and guarantee women equal pay. The Japanese government appears to be quite active in contributing to reducing these gaps, trying, for example, to get more women into research and leadership positions. The Korean government appears to be somewhat less active, by contrast.

China and **Russia** exhibit rather small gender gaps in labor market participation, compared to the other emerging economies among the G20. This strong integration of women in the labor market is partly an inheritance from the countries' former socialist eras. Gaps in financial and digital literacy are also mostly small. Unlike Russia, China exhibits still wide gaps in higher education, however, which have, to our knowledge, not yet been addressed effectively by policy. Wide gender gaps still prevail among highly qualified managers and self-employed, like in most other G20 countries. Except for a program to foster female entrepreneurship in the digital economy in China, we have no information about any governmental programs to reduce these wide gaps.

The three Latin American G20 countries, **Argentina**, **Brazil** and **Mexico** feature comparatively wide gender gaps in labor market participation and unemployment, which their governments seek to address

directly or indirectly by a variety of program, including conditional cash transfer programs for the poor. Gender gaps are also wide among highly qualified managers, entrepreneurs and—in Mexico—professionals. We have no information about programs that address these gaps effectively, however. Gender gaps in education as well as in access to finance appear to be low in all three countries, by contrast, except those among STEM graduates. Still, especially Argentina and Mexico provides specifically foster girls' school attendance. Finally, Argentina and Mexico show sizable deficits in women's digital inclusion, which their governments or civil societies address with a few measures.

The Gender gaps in **South Africa** are in several respects comparable to those in the three Latin American G20 countries. It features comparatively wide gender gaps in labor market participation, which its government addresses a conditional cash transfer programs for the poor, among others. While the gender gap in unemployment is somewhat lower, that in wages is somewhat higher, though. It also features similarly wide gender gaps among highly qualified manages and entrepreneurs, which are also not addressed effectively by the government to our knowledge. And it features also no gender gaps in access to finance and—similar to Mexico—only moderately wide gender gaps in the access to and the use of digital technologies. South Africa features a wider gap in higher education than the Latin American countries, though. We have no information about governmental programs that directly address this deficit.

India, **Indonesia**, **Saudi Arabia** and **Turkey**, finally, still lag significantly behind in terms of gender equality. They arguably still need to overcome significant cultural and religious barriers to reduce the large gender gaps in labor force participation and education, among others. While India, Indonesia and Turkey have enacted a variety of programs that appear to foster women's labor market participation, education and entrepreneurship, Saudi Arabia has, to the best of our knowledge, done very little to empower women.

The only initiative we are aware of is "Glowork", a privately initiated online platform that aims at assisting skilled women in finding a job. Its website (www.glowork.net) does not appear to see much action, however. Deficits in women's financial and digital inclusion are also still fairly large in all of these countries. There are some programs that address these deficits directly or indirectly in all four countries but we know little about their scope and effectiveness.

Table 6.4.1: Summary of gender gaps and policy measures in all G20 countries

Category	Sizes of gender gaps	Policy measures
	Argentina	
Labor market inclusion	LFP rates: Large Unemployment: Large Wages: Small	**Steps towards increasing women's political participation and breaking cultural barriers, incl. significant extension of preschool capacity** Asignación por hijo para protección social (Child allowance for social protection) provides conditional cash transfers to poor households, including benefits for children's health and education; no focus on women as recipients of the benefits **Gender quota in trade unions** **Actions to end violence against women**
Advancement	Managers: Very large Professionals: None	
Education	Literacy: None Secondary ed.: n/a Higher ed.: None STEM graduates: Very large	**National Education Law with explicit gender perspective** Law on Technical and Vocational Education
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Very large Start-up barriers: Large Financial inclusion: None	FONARSEC fund supports inter alia innovation initiatives that foster social inclusion
Digital inclusion	Very large	**Initiatives for providing women with digital infrastructure, advocacy or training and community building** Extension of internet access. Efforts to advance e-government
	Australia	
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: Moderate	Measures to encourage employment, deepen skills and address inequality by incentivizing unemployed youth and adopting welfare-to-work policies "Jobs for Families" child care package **Initiatives to end violence against women**
Advancement	Managers: Very large Professionals: None	**Government programs for fostering participation of girls and women in STEM education and careers, e.g. "Women in STEM and Entrepreneurship" program**
Education	Literacy: None Secondary ed.: Small Higher ed.: None STEM graduates: Very large	**"Women in STEM and Entrepreneurship" program (see above)** Several governmental sub-initiatives of the "National Innovation and Science Agenda" (NISA) to ICT dissemination: ICT teachers to schools; expansion of Massive Open Online Course (MOOC)
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Moderate Start-up barriers: Large Financial inclusion: None	**Financial literacy projects for women** **"Women in STEM and Entrepreneurship" program** (see above) Small business reforms to create new opportunities for women Entrepreneurs' Infrastructure Program (EIP); Government plans to ramp up infrastructure investment
Digital inclusion	None	**Initiatives for providing women with digital infrastructure and advocacy; e.g., Advocacy initiative by the Australian Computer Society** NISA includes support of ICT dissemination, focus on cyber security

Category	Sizes of gender gaps	Policy measures
	Brazil	
Labor market inclusion	LFP rates: Large Unemployment: Very large Wages: Moderate	**"Bolsa Familia" program provides conditional cash transfers to poor households, including benefits in health, education, nutrition; the benefits are paid to the woman responsible for household and childcare** **Longer maternity leave for military personnel** Lower social contributions and simplified social security procedures for SMEs and self-employed to increase labor participation in the format sector through lower hiring costs More childcare centers and extended enrolment in early childhood education **Actions for ending violence against women**
Advancement	Managers: Very large Professionals: None	
Education	Literacy: None Secondary ed.: None Higher ed.: None STEM graduates: Very large	**Support of women's development at all educational levels** Progress in general access to vocational education
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Very large Start-up barriers: Moderate Financial inclusion: Small	"Individual Microentrepreneur" program provides micro-entrepreneurs with social security and low-interest loans **"Bolsa Familia"** (see above): **payments via bank cards**
Digital inclusion	Small	**Very active civil society, providing various initiatives to reduce gender digital divide (part. capacity building)** Foster dissemination of fixed and wireless broadband. Tax incentives and non-reimbursable funds for private R&D investments in ICT. Coordinated industrial policy towards S&T
	Canada	
Labor market inclusion	LFP rates: Small Unemployment: None Wages: Moderate	"Youth Employment Strategy" (YES) includes program for indigenous and disabled youth, for gaining workplace skills, abilities and job experience
Advancement	Managers: Very large Professionals: None	
Education	Literacy: None Secondary ed.: None Higher ed.: Small STEM graduates: Very large	Efforts to improve numeracy or literacy skills and access to tertiary education for socially disadvantaged students Apprenticeship program to harmonize training and certification requirements across provinces
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Large Start-up barriers: Large Financial inclusion: None	
Digital inclusion	None	**Initiatives for digital training and capacity-building of women** Federal government support for digital research infrastructure

Table 6.4.1 continued

Category	Sizes of gender gaps	Policy measures
	China	
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: n/a	**Legislation on women's rights: review mechanisms on gender equality in regulations and policies in some provinces, regions or municipalities** **Improvements to rural women's health care** Better work-life balance opportunities for migrant workers
Advancement	Managers: Very large Professionals: None	
Education	Literacy: Small Secondary ed.: Large Higher ed.: Large STEM graduates: n/a	Greater emphasis on applied skills versus academic education for better matches on labor markets; includes reconverting many universities at the province level to vocational colleges
Entrepreneurship, financial inclusion	Self-employed: n/a KI start-ups: Large Start-up barriers: Large Financial inclusion: Small	**"Women Entrepreneurship and Innovation Action" helps women start businesses in the digital economy, includes, e.g., small-sum loans**
Digital inclusion	None	
	France	
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: Moderate	Steps towards more labor market flexibility to address labor market duality More posts in early childhood education, more teachers, more individualized support More professional training for low-skilled workers and unemployed, including personal training accounts and orientation services. Subsidized non-work-study contracts for 16 to 25 year-olds with low educational attainment
Advancement	Managers: Very large Professionals: None	**40% quota for female supervisory board members in CAC 40 companies**
Education	Literacy: None Secondary ed.: Small Higher ed.: None STEM graduates: Very large	
Entrepreneurship, financial inclusion	Self-employed: Very large KI start-ups: Very large Start-up barriers: Very large Financial inclusion: Small	Financial support for start-ups, venture capital, ICT, biotechnology; innovation grants **EU's "Small Business Act" includes a mentoring network to promote, support and encourage female entrepreneurship** **EU's "European Network of Female Entrepreneurship Ambassadors" aims at inspiring women entrepreneurship** EU's "Competitiveness and Innovation Framework Programme" aims at facilitating venture capital investments and provide credit guarantees for SMEs
Digital inclusion	Moderate	**Training initiative for women's digital inclusion** Industrial policy for eco-mobility, data economy, smart objects, medicine of the future, sustainable cities, digital trust, new resources, transport of tomorrow, smart food production; including public funding for ICT firms and start-ups

Category	Sizes of gender gaps	Policy measures
	Germany	
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: Moderate	**Transparency regulations to enforce the ban on gender pay discrimination.** Various programs address labor market duality Legal entitlement for parents to childcare places. Widened scope to combine part-time work and parental leave, cash-for-care subsidy for not using childcare
Advancement	Managers: Very large Professionals: None	**30% quota for female supervisory board members in DAX companies**
Education	Literacy: None Secondary ed.: Moderate Higher ed.: Small STEM graduates: Very large	Early tracking in the school system reduced or postponed in several States **"Nationaler Pakt für Frauen in MINT-Berufen" aims at encouraging more girls and women into STEM subjects**
Entrepreneurship, financial inclusion	Self-employed: Very large KI start-ups: Very large Start-up barriers: Large Financial inclusion: None	Actions to enhance dialogue between S&T, policy and the public Support for ICT start-ups, mainly consultancy **EU's "Small Business Act" includes a mentoring network to promote, support and encourage female entrepreneurship** **EU's "European Network of Female Entrepreneurship Ambassadors" aims at inspiring women entrepreneurship** EU's "Competitiveness and Innovation Framework Programme" aims at facilitating venture capital investments and provide credit guarantees for SMEs
Digital inclusion	Moderate	**Initiatives for advocacy and awareness raising for women's digital inclusion, e.g., "Diversity Charter" initiated by several companies** Efforts towards more even fixed and mobile broadband infrastructure. Focus on secured ICT infrastructures and reinforced IT security industry. Support for ICT start-ups, mainly consultancy

Table 6.4.1 continued

Category	Sizes of gender gaps	Policy measures
	India	
Labor market inclusion	LFP rates: Very large Unemployment: Moderate Wages: Large	**"Indira Gandhi Matritva Sahyog Yojana" provides conditional wage compensation to women during childbirth and childcare** **"National Policy for the Empowerment of Women"; "National Mission for the Empowerment of Women"** **Quota for women in local self-governments** "National Rural Employment Guarantee" (NREGA) program creates paid employment for 48 million households in rural areas (about ¼ of all rural households); **⅓ is reserved for women**
Advancement	Managers: n/a Professionals: n/a	
Education	Literacy: Large Secondary ed.: n/a Higher ed.: Moderate STEM graduates: n/a	**"Beti Bachao Beti Padhao" initiative to reduce gender biased sex selection and educate girls**
Entrepreneurship, financial inclusion	Self-employed: n/a KI start-ups: Very large Start-up barriers: Small Financial inclusion: Large	**"Trade Related Entrepreneurship Assistance and Development" Scheme supports female entrepreneurs by low-interest loans and credit guarantees, among others** **"Self-Employed Women's Association" provides women with micro credits and complimentary services** Funds for "bottom 500 million" and grassroots innovators "Start-up India" reduces regulations and red tape Land reforms to reduce disputes and litigation, and to modernize/digitalize farm management
Digital inclusion	Very large	**Capacity building and training of women in digital terms,** Develops e-skills of all citizens, promotes ICT industries and e-government
	Indonesia	
Labor market inclusion	LFP rates: Very large Unemployment: Large Wages: Large	**"Keluarga Harapan" program provides conditional cash transfers to poor households with pregnant women or mothers, conditional on specific health- and education-related obligations; benefits are paid (through post offices) to the woman responsible for household and childcare** **Governmental equal employment opportunities guidelines, including the principle of equal pay for work of equal value** **Action against violence against women and girls**
Advancement	Managers: Very large Professionals: None	**Quota for shares of women in national and regional parliaments and senior leadership positions**
Education	Literacy: None Secondary ed.: Large Higher ed.: Large STEM graduates: Very large	Several programs to increase access to and quality of education
Entrepreneurship, financial inclusion	Self-employed: None KI start-ups: None Start-up barriers: Very large Financial inclusion: None	Education curricula inspiring students with entrepreneurial spirit. Training program on entrepreneurship Non-Cash National Movement (GNNT): transformation from cash society to less/non-cash society via use of safe electronic money credit and debit cards; program to offer financial access to unbanked and underbanked people in remote areas
Digital inclusion	Moderate	**Initiative for women's digital capacity building** Indonesia Broadband Plan for all government offices, hotels, hospitals, schools and public spaces. Local industries provide investment in data centers and cloud computing technologies

Category	Sizes of gender gaps	Policy measures
	Italy	
Labor market inclusion	LFP rates: Large Unemployment: Moderate Wages: Small	More labor market flexibility plus improved ALMP Support to maternity protection and paternal care, including compulsory paternity leave; incentives for parental telework. Maternity-support for low income families Territorial system of early childhood care **Action Plan against gender-based violence**
Advancement	Managers: Very large Professionals: Moderate	**33% quota for female supervisory board members in state-owned companies**
Education	Literacy: None Secondary ed.: Small Higher ed.: None STEM graduates: Very large	"Buona Scuola" reform to strengthen digital competences. Work-based learning with compulsory working hours in second level schooling
Entrepreneurship, financial inclusion	Self-employed: Very large KI start-ups: Very large Start-up barriers: Very large Financial inclusion: Small	Measures to foster female entrepreneurship. Funds to facilitate access of women-owned businesses to the banking system Fund for start-ups und SMEs in biotech, green technologies, health, ICT, the Internet and mechatronics. Support to small and micro enterprises for accessing bank credit, equity financing, and venture capital **EU's "Small Business Act" includes a mentoring network to promote, support and encourage female entrepreneurship** **EU's "European Network of Female Entrepreneurship Ambassadors" aims at inspiring women entrepreneurship** EU's "Competitiveness and Innovation Framework Programme" aims at facilitating venture capital investments and provide credit guarantees for SMEs
Digital inclusion	Large	**Active civil society, providing various initiatives to reduce gender digital divide** National strategy for fostering digital culture and economy, and for improving overall ICT investment

Table 6.4.1 continued

Category	Sizes of gender gaps	Policy measures
	Japan	
Labor market inclusion	LFP rates: Large Unemployment: None Wages: Large	**Strategies and action plans to increase women's participation and advancement in the workplace** Measures against labor market duality: Ban on unreasonable working conditions, subsidies for regular work. Employment Insurance with training support for young non-regular workers Men and women are both to share responsibility for work, household chores, child rearing. Childcare leave benefits, number of childcare places and after-school childcare centers increased
Advancement	Managers: Very large Professionals: Very large	**30 per cent quota for women in public leadership positions** **"Program to Support the Female Researchers" and "Initiative for Realizing Diversity in the Research Environment" support women's appointment to leading positions**
Education	Literacy: None Secondary ed.: Small Higher ed.: Very large STEM graduates: Very large	**"Program to Support the Female Researchers" and "Initiative for Realizing Diversity in the Research Environment" (see above) improve research skills of female researchers** Vocational qualifications expanded nationwide
Entrepreneurship, financial inclusion	Self-employed: Moderate KI start-ups: None Start-up barriers: Very large Financial inclusion: None	Initiatives at all education levels to broaden entrepreneurial spirit and improve social acceptance of start-ups, venture businesses
Digital inclusion	Small	**Training initiative for women's digital inclusion** Efforts to develop ICT infrastructure, especially cyber-space uses and Internet of Things, sensor and robotics technologies, multilingual speech translation systems, e-government and open data
	Korea	
Labor market inclusion	LFP rates: Large Unemployment: None Wages: Very large	**Measures to increase female labor force participation. Preferential public procurement for firms with higher share of women** Measures against duality of labor markets, including expansion of regular employment in public sector, extension of unemployment insurance to self-employed, strengthening social safety net. Tripartite Agreement for expanding youth employment. More Meister vocational schools Improved paid maternity leave; promotion of parental leave; higher childcare subsidies for children up to 5 with a preference for parents who are both employed or have more than one child; more high-quality part-time jobs in the public sector
Advancement	Managers: Very large Professionals: Small	**Quota for women in parliaments**
Education	Literacy: Moderate, Secondary ed.: Moderate, Higher ed.: Moderate, STEM graduates: n/a	
Entrepreneurship, financial inclusion	Self-employed: Moderate KI start-ups: Very large Start-up barriers: Very large Financial inclusion: Small	Efforts to nurture creativity and entrepreneurial education at secondary level. Scholarships, general and specific for women, for science and engineering Support for startups and innovative SMEs. Funds for promoting creativity in various ways. Economic regulation reduced by initiatives to cap regulatory burden on firms
Digital inclusion	Small	**Initiatives for women's digital inclusion (training, advocacy, research)** Highest priority to advancing S&T and ICT sectors and innovative application of technology. Accelerated and fostered growth of ICT industries

Category	Sizes of gender gaps	Policy measures
	Mexico	
Labor market inclusion	LFP rates: Very large Unemployment: Small Wages: Moderate	**"Prospera" program provides conditional cash transfers to poor households, obligations for health, nutrition and education (children and mothers); benefits usually paid to the woman responsible for household and childcare; elected women are involved in local program administration** **"Seguro Popular" program provides free healthcare to poor people, including free access to care for pregnant women ("Healthy Pregnancy Strategy")** "Regulation on Labor Equality and Non-Discrimination" to promote maternity protection, paternity leave, flexible schedules and remote working arrangements Implementation of full-time schools and child care facilities Teleworking recognized legally **Improved health care and prevention of sexual harassment**
Advancement	Managers: Very large Professionals: Large	
Education	Literacy: Small Secondary ed.: Small Higher ed.: None STEM graduates: Very large	**"Prospera" (see above) pays larger school attendance scholarships for girls than for boys; also fosters job placement, and grants priority access to production, training and job programs;**
Entrepreneurship, financial inclusion	Self-employed: None KI start-ups: Very large Start-up barriers: Moderate Financial inclusion: None	Support of strategic areas related to IT, to business innovation, to SMEs and entrepreneurship, and business development **"Prospera" (see above) fosters financial education and financial inclusion**
Digital inclusion	Moderate	Initiative for awareness raising for digital inclusion of women Focus on innovation and entrepreneurship in the digital economy, inter alia, improving the quality of education through ICT
	Russia	
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: n/a	**Conditional cash transfer program for the poor.**
Advancement	Managers: Very large Professionals: None	
Education	Literacy: None Secondary ed.: Small Higher ed.: None STEM graduates: n/a	
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Very large Start-up barriers: Moderate Financial inclusion: None	Interest-free loans for business innovation activities Reduction of restrictions and red tape
Digital inclusion	Small	Governmental program to improve e-government, overcome digital divides and develop new communications technologies. Governmental cybersecurity strategy

Table 6.4.1 continued

Category	Sizes of gender gaps	Policy measures
	Saudi Arabia	
Labor market inclusion	LFP rates: Very large Unemployment: Very large Wages: n/a	**"Glowork" initiative to mediate the recruitment of women who work from home**
Advancement	Managers: Very large Professionals: Very large	
Education	Literacy: Small Secondary ed.: Moderate Higher ed.: Large STEM graduates: Very large	
Entrepreneurship, financial inclusion	Self-employed: Very large KI startups: n/a Start-up barriers: Very large Financial inclusion: Moderate	
Digital inclusion	Large	**"Glowork" initiative** (see above)
	South Africa	
Labor market inclusion	LFP rates: Large Unemployment: Moderate Wages: Large	**"Child Support Grant" paid to the woman who provides childcare, conditional on the child's school attendance** Active labor market policies, including the "Employment Tax Incentive", which incentives employment of young workers.
Advancement	Managers: Very large Professionals: None	
Education	Literacy: Small Secondary ed.: Small Higher ed.: Very large STEM graduates: Very large	"Child Support Grant" (see above) is conditioned on child's school attendance Improved access to science and mathematics education. "Thuthuka" program: financial support for education of women or the black community
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Very large Start-up barriers: Large Financial inclusion: None	Reduction of municipal red tape Established Ministry for Small Business Development Special Economic Zones with "One Stop Shop" are scheduled Support of local enterprises for developing competitive technologies, including "Technology Localization Programme" and the "Competitive Supplier Development Programme" "Youth Enterprise Development Strategy" to increase youth entrepreneurship "Youth Fund" to fund youth-owned businesses Venture capital company scheme has been amended
Digital inclusion	Moderate	**Training and community building initiatives for women's digital inclusion** "ICT Industry Innovations Partnership Programme" to encourage private-sector investment in ICT-related R&D and innovation and foster human capital formation "Operation Phakisa" extended to include ICT teaching and learning

Category	Sizes of gender gaps	Policy measures
		Turkey
Labor market inclusion	LFP rates: Very large Unemployment: Moderate Wages: Moderate	**"Conditional Education and Health Assistance Program" provides conditional cash transfers to poor households, obligations for health care and children's education; benefits are paid to mothers or expecting women** "National Employment Strategy" aims at introducing "flexicurity" in labor markets adapted to Turkish circumstances, with increased budget for ALMP and on-the-job training programs Improved child care opportunities
Advancement	Managers: Very large Professionals: Very large	Strategy to strengthen investment in technological infrastructures and to train teachers in leadership and entrepreneurship
Education	Literacy: Small Secondary ed.: Large Higher ed.: Large STEM graduates: Very large	**"Conditional Education and Health Assistance Program" (see above): larger school attendance scholarships for girls than for boys** Activation of teachers, education researchers and policy makers towards STEM
Entrepreneurship, financial inclusion	Self-employed: None KI start-ups: Large Start-up barriers: Large Financial inclusion: Very large	"Vocational and Technical Education" (VET) Strategy to strengthen investment in technological infrastructure and to train teachers in leadership and entrepreneurship **"Conditional Education and Health Assistance Program"** (see above): **benefits paid through mother's bank account**
Digital inclusion	Very large	Plan to expand broadband infrastructure, deliver more effective public services, improve diffusion of ICT, support e-commerce Training programs to develop and extend ICT competencies and skills
		United Kingdom
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: Moderate	Increased social security benefits for childcare, extended capacities of childcare
Advancement	Managers: Very large Professionals: Small	
Education	Literacy: None Secondary ed.: Small Higher ed.: None STEM graduates: Very large	Measures to promote apprenticeship **Non-governmental initiatives like "Mind the GAP" aim at encouraging more girls into STEM subjects**
Entrepreneurship, financial inclusion	Self-employed: Very large KI start-ups: Very large Start-up barriers: Large Financial inclusion: Small	Shift from competitive grants to businesses towards credit loans, guarantees, risk-sharing mechanisms, R&D tax credits and patent boxes
Digital inclusion	Small	**Initiatives for mentoring women in digital matters** "UK Research and Innovation" (UKRI) focuses on cross-cutting issues and research-business collaboration Improved Open Data Institute (ODI) fosters evolution of Big Data utilization Extended E-government

Table 6.4.1 continued

Category	Sizes of gender gaps	Policy measures
	United States	
Labor market inclusion	LFP rates: Moderate Unemployment: None Wages: Moderate	**Job training and apprenticeships to help women gain better-paying jobs.** Several States, cities and counties raised minimum wages above federal level. Some paid leave programs by the States. Preschool-for-All initiative particularly for low and moderate income families Several programs to get unemployed and underemployed back to work, including the "Trade Adjustment Assistance Community College and Career Training" grants program (partnerships between colleges and businesses) and the "Ready to Work" public-private partnerships **Resources to address violence against women and girls**
Advancement	Managers: Large Professionals: None	
Education	Literacy: None Secondary ed.: None Higher ed.: None STEM graduates: Very large	Commitment to improving STEM education at all levels, **particularly for girls and other groups underrepresented in STEM** **Non-governmental initiatives like "Million Women Mentors" aim at encouraging more girls and women into STEM subjects** Support for college-businesses partnerships to (re)train unemployed and underemployed
Entrepreneurship, financial inclusion	Self-employed: Large KI start-ups: Very large Start-up barriers: Large Financial inclusion: None	Grants for US R&D investments with priority for small businesses and small business-led consortia Programs for technology consulting services and technology extension services "White House Demo Day" with showcase stories of entrepreneurial success
Digital inclusion	Small	**Very active civil society, providing various initiatives to reduce gender digital divide, particularly through training or mentoring** "Strategy for American Innovation towards Sustainable Growth and Quality Jobs

Notes: Size classes of the gender gaps (female/male ratios): None (1.00 or higher), Small (below 1 – >0.90), Moderate (0.90 – >0.80), Large (0.80 – >0.66), Very large (<0.66). Gender gap in higher education is the average of the gender gaps among Master and PhD students. Gender gaps in start-ups in knowledge-intensive sectors ("KI startups") is the average of the gender gaps in TEA Business Services, TEA ICT and TEA high-tech. Gender gaps in start-up barriers is the average of the gender gaps in TEA, Entrepreneurial Opportunity Perceptions, Entrepreneurial Sufficient Skills and Entrepreneurial Knowing an entrepreneur. Gender gap in financial inclusion is measured as the gender gap among bank account holders. Gender gap in digital inclusion is the average of the gender gaps in "internet use", "Computer use", "Used the Internet pay or buy", "Used mobile phone bank money transactions" and "Mobile money account of the unbanked". Policy measures in bold target specifically women, those in non-bold target men and women alike.

Source: UN Women, Step it up; OECD (2016a), Economic Policy Reforms – Going for Growth; OECD (2016c), Science, Technology and Innovation Outlook; OECD Economic Surveys; WISAT (2011, 2012, 2014).

7 CASE STUDIES

7.1 Empowering women in a digital age in India
(by Urvashi Aneja and Vidisha Mishra)

New information and communication technologies along with the expansion of the digital economy is creating new opportunities for trade, innovation, and inclusive economic growth. Policy narratives assert that the digital economy has the potential to challenge traditional societal relationships and transform the world of work. Conversely, there are serious concerns that the existing ‚digital divide' within and across nations will simply exacerbate existing social and economic inequities, including gender hierarchies. It is estimated that the chances of women benefitting from opportunities accrued by the information society will be one third less than for men (WorldWideWeb Foundation 2015). A gender-based digital divide in access and usage is particularly pronounced in developing countries where 16 percent fewer women than men use the internet (Broadband Commission Working Group on Broadband and Gender 2013).

This paper explores the challenges and opportunities for women's empowerment in India in a digital age, with a particular focus on issues of access, labor market participation, and financial inclusion. Section I titled Digital Exclusions unpacks the factors underpinning India's digital gender divide; Section II on Digital Inclusions indicates existing policy pathways and best practices; and Section III concludes with a set of policy recommendations.

7.1.1 Digital exclusions

In India, women are 27 % less likely than men to access the internet – only 8.4 % of women are online, compared to 11.6 % of Indian men (Intel 2013). With regards to mobile phone usage, only 28 % of Indian women own a mobile phone; conversely, 40 % of the male population own a mobile phone (Gurumurthy and Chami 2014). Further, women remain grossly underrepresented in Science, Technology, Engineering and Math (STEM) jobs (Wajcman 2000); the majority of women in the IT sector are confined to back-end, lower-level, employment (Abagi et al. 2009).

Access, Education, and Social Norms

Gender-based digital exclusion in India is a result of three main factors: access and affordability, education and digital skilling, and socio-cultural norms. The low uptake of ICTs by Indian women is due to the high cost of access to new technologies combined with low levels of female purchasing power (Broadband Commission Working Group on Broadband and Gender 2013:21). The Affordability Report 2014 (Alliance for Affordable Internet 2014) establishes that while the digitally excluded are not a homogenous group, women are globally predominant amongst the groups having least access to affordable internet.

Low levels of education further prevent women from meaningfully participating in the digital economy. Census data from 2011 indicates that 66 % of women are literate as compared to 82 % of men (Gurumurthy and Chami 2014). The gender gap in education contributes directly to the ICT gender gap as better education leads to better paid employment, and higher purchasing power. Further, since literacy, English language skills and basic technical know-how are deemed necessary for acquiring a usable skill-set in ICTs, the level of education and digital fluency are intrinsically linked (Macueve et al. 2009). Increasingly, different context-specific dimensions of the digital divide, such as involuntary or skills-based exclusion

-- where people are unable to engage, mobilise and participate in public life using ICTs -- are being recognized (Walton et al. 2013). The digital divide then, is not simply a social division between the 'haves' and 'have-nots', i.e. those who have information and those who do not; it can also be democratic in nature, i.e. those who are able to use it, and those who are not.

Lastly, gender biased belief and value systems are relevant and potent factors. It is estimated that 23% of girls drop out of school before they reach puberty due to a preference for male children, the disproportionate burden of housework, patriarchal restrictions to mobility, and the lack of proper toilet facilities in schools (Gurumurthy and Chami 2014: 35). Restrictions to mobility also result in women losing access to community internet centres, outside employment, and training facilities (Desai 2014).

Labor Market Participation

According to a recent ILO study, despite a period of stable economic growth, the female labor force participation rates (FLFP) in India declined from about 34 % in 1999-2000 to just over 27 % in 2011-12 (Polaski 2015). Although, the FLFP increased in urban areas during 2009-10, it continued to decline in rural areas (Ibid). The study suggests that these trends are driven by a combination of crucial factors: girls' educational enrolment and household incomes have increased. This could mean that women are staying out of the workforce to pursue an education instead, or simply because they do not need to work for money due to the increase in household income levels. At the same time, job-creation has stagnated, particularly in those industries that generate employment for women (Ibid). Poor working conditions, lower wages, implicit and explicit discrimination, poor legal protection – particularly in the informal sector where women are concentrated - combined with the challenge of balancing work and family commitments creates barriers for women to participate in the labor market (Ibid).

The recent boom in employment creation within the ICT sector has however benefited some women. Over the last twenty years, women's enrolment in technical institutions has increased from 5% to 45% and outsourcing of business activities has created new ICT jobs in service industries, some of which have been occupied by women (Huyer and Sikosa 2003:13).

Studies suggest that women are increasingly employed as computer and electronic assembly manufacturing workers (Marcelle 2002). Yet, recent studies suggest that women are concentrated in "routine" back office services that require basic skills; ‚specialized' jobs and managerial positions are dominated by men (Dash et al. 2005). In this context, the digital economy risks further entrenching a form of 'skill bias technical change' – i.e. a shift in the production technology that favors skilled over unskilled labor by increasing its relative productivity and, therefore, its relative demand (Violante 2008).

Recent studies suggested that automation will benefit women: As household work becomes automated, women will be relieved from the burden of unpaid domestic work (World Economic Forum WEF, 2016c). However, this may not hold true in India with approximately 4.2 million domestic workers, most of whom are women. According to National Sample Survey Office (NSSO) data, the number of women employed as domestic workers increased fourfold from 1999-2000 to 2009-2010 (Sampath 2013) – automation of housework, in the absence of alternative employment creation, will put their livelihoods at risk (Women in Informal Employment Globalizing and Organizing (WIEGO) 2008).

Financial Services

India is home to 21% of the world's unbanked population, with only 61 regional rural banks (Vidisha 2016). Only 26% of women in India have an account with a formal financial institution, as compared to 46 % of men (Roshika 2016). Recent initiatives by the government such as the the Pradhan Mantri Jan Dhan Yojana (PMJDY) programme , the promotion of mobile wallets, and the direct delivery of government subsidies to individual bank accounts are geared towards bringing citizens into the formal banking system.

India has seen an increase in the percentage of 'growth-oriented' women entrepreneurs (Lubna 2015) in the past decade, thought it still ranks at a low 70 among 77 countries covered in the 2015 Female Entrepreneurship Index; women comprise only 10 % of the total number of entrepreneurs in the country (The Global Entrepreneurship and Development Institute 2015). This is because of the lack of gender parity in labor force, and hurdles in accessing first-tier finance (The Global Entrepreneurship and Development Institute 2015). Less than 15 % of the country's women entrepreneurs have access to finance from a formal banking institution (Roshika 2016); recent reports suggest that formal banking sources are only able to cover a fraction of the financing required for India's three million women-owned enterprises in India, with an un-financed gap of $116 billion, or 73% of total demand (Saibal and Vindo 2017).

Financial inclusion in India is closely linked to broader issues of education and prevailing socio-cultural norms. Poor financial literacy prevents women from accessing banking and financial services (Roshika 2016). Financial illiteracy then, is a determining barrier to financial inclusion. Moreover, the socio-cultural context plays an exclusionary role. For instance, although the Government of India amended inheritance laws in 2005 to ensure equal rights to parental land inheritance among men and women, the amendment has been largely ineffectual in dismantling deep-rooted cultural biases and patriarchal traditions of son-preference. This has a far-reaching impact as one of the main reasons that women are considered 'un-bankable' is the lack of tangible asset ownership (Roshika 2016).

7.1.2 Digital inclusions

The Narendra Modi government, elected in 2015, has committed itself to 'Digital India' and ‚Skill India' programmes for transforming India into "a digitally empowered society and knowledge economy (Digital India 2016). It has also been reported that India has amongst the highest numbers of ICT for development initiatives (Gurumurthy and Chami 2014). This section looks at existing policy pathways and interventions, including best practices.

Education and Skilling

Indian education policy has maintained a steady focus on ICT education, with new initiatives to tackle the persistent gender digital divide. Thirty percent of all seats reserved in government and private Industrial Training Institute (ITIs) courses are for women and girls. Additionally, 5 Regional Vocational Training Institutes (RTVI) for women in skill development have been set up. As on October 31, 2016, these programmes have trained 1,55,236 women candidates across India, of which 54, 456 have been employed (MyGov 2016). The increasing use of digital technologies at work is raising the demand for new skills along three lines: ICT specialist skills to programme, develop applications and manage networks; ICT generic skills to use such technologies for professional purposes; and ICT complementary skills to perform new tasks associated to the use of ICTs at work, e.g.: information-processing, self-direction, problem-solving and communication (Urvashi et al. 2017). However, women-specific data on the level and skills imparted is unclear. The level of skills would determine the level at which the women are employed after the training

– data on job placement is also unclear. An example of a successful government intervention is Kerala's 'IT@ schools' which trained teachers across public schools in the state in integrating ICTs into their classroom teaching, and put teachers at the heart of managing the evolving IT infrastructure in schools. Since women constitute a majority of teachers in the state, the impact of the programme was two-fold: first it introduced teachers to digital technologies and helped overcome entrenched stereotypes, and second, it helped cultivate role models for female students to overcome the gender gap in STEM fields (Raji and Arun 2010). However, such interventions remain few and far between.

In addition to state-led measures, several small-scale pilot projects have been initiated by private sector and civil society actors. In many cases technology itself has become a digital skills provider. Google and TATA trusts for example launched an 'Internet Saathi' campaign in 2015, which aimed to bring 5 million rural women online over a period of 18 months by training them to use tablets and smartphones (Menon 2015). Unlike a number of other private sector initiatives which tend to be vendor-centric and technology-heavy, the Internet Saathi model differentiates itself by imparting training through local women in local languages, in this way focusing on teachers as well as recipients, and ensuring sustainability and scalability.

According to an estimate, the on-going programme impacted 60,000 villages across India where over a million women are now trained to use internet applications such as Youtube and PayTM. However, the programme continues to face obstacles such as parental reluctance, illiteracy, and crucially, the lack of high speed internet connectivity, particularly across rural areas (Durba 2017).

Older ICTs like mobile phones are still very relevant to the Indian context. For instance, Barefoot College, a school in the state of Rajasthan trains rural women in the use of mobile phones. The Barefoot College largely works with illiterate, older women and focuses on strategies that do not require formal education or literacy are as a prerequisite. In this way, local women entrepreneurs, who may not be textually literate, can also use it in the marketplace (Nagamani and Veni 2016). Evidence suggests that for large sections of the country, girls' school dropout rates increase as they grow older. In this context, it is important for policies to promote ICTs in informal education and in strategies for life-long learning like in the Barefoot Model (Gurumurthy and Chami 2014).

Labor Market Inclusion

While the lack of access exacerbates inequalities, digital access can also be an equaliser for women. A significant aspect of women and work in the new digital economy remains the flexibility to work from home. E-commerce has already eased the selling of products and services online; case studies demonstrate that by linking small-scale producers and traders directly to national, regional, and global markets, e-commerce allows them to pass intermediaries and rigid market structures. For instance, SEWA (Self-Employed Women's Association) Trade Facilitation Centre (STFC) works to build capacities for women artisans to access newer markets using ICTs and upgrade their skills for global competition. It helps in showcasing local products at the international level, facilitates business-to-consumer sales, and builds business-to-business links using ICTs (SEWA 2014). However, women do not directly facilitate these transactions, making SEWA another intermediary. Since the digital economy has the potential to replicate existing power structures, it is important to explore ways in which women e-traders can be skilled to retain their agency.

Women can also avail new employment opportunities in the platform and shared economy, permitting them to circumvent barriers of physical mobility and balancing work-home commitments. However, such

flexi-work can come create new forms of contractual employment, without access to the social benefits and work place protection that comes with formal employment (Ryder 2016). Structural discrimination against women makes them particularly vulnerable, and reinforces the need to develop alternative social protection mechanisms.

Financial Inclusion

According to a report by Inter Media's Financial Inclusion Insights (FII), the government's Pradhan Mantri Jan Dhan Yojana (PMJDY) has been successful in bringing an unparalleled number of citizens under the formal financial fold (Moin 2016). The level of financial inclusion among Indian adults is estimated to have increased by 20% between 2014 and 2015. Estimates also suggest that almost 86% of female PMJDY account holders have started using basic banking activities like withdrawals and deposits (Kretchun 2016).

In addition to government-led interventions like PMJDY, expansion of mobile networks, and push for digital transactions, fintech start-ups are also expanding financial inclusion by leveraging technology (Choudhury and Sharma 2017). According to a TechSci report, "the mobile wallet market in India will touch $6.6 billion by 2020, backed by crucial factors like the increasing usage of smartphones, a rapidly expanding mobile internet user base, government focus, and favorable demographics – 50% of Indian smartphone users are aged between 18 and 30 years" (Ibid).

Mobile wallet operator, PayTM, is a recent example of success in this context. By making its platform interoperable with Immediate Payment Service (IMPS), PayTM enabled peer to peer transfers via mobile apps. This can help female home-based retailers as it enables them to carry out transactions without having to set up a license or banking facilities (Khosla 2015). The PayTM experience is encouraging, but caveats apply before it can truly empower women. Even today, many women in India, especially in rural areas, are discouraged or disallowed to use mobile phones as it is considered "indecent and shameful" (New York Times 2016). Further, the amount of control 'banked' women exude on their monetary resources is directly related to their decision-making powers within the household.

7.1.3 Future policy pathways

i. In the digital age, ‚online' and ‚offline' are becoming increasingly intermeshed. Policy measures aimed at women's empowerment, and those aimed at technological innovation must not operate within silos. At present, ICT policy development tends to be fragmented. To be effective, it must be inter-linked with broader policy interventions for economic and financial inclusion, broadband and other infrastructure, rural development, education, health, governance, social welfare and social protection (Gurumurthy and Chami 2014).

ii. The paper reaffirms that for technology to be a tool for empowerment, policies to overcome prevailing socio-cultural norms must be prioritised. The gender gap in education, burden of housework, lack of decision-making powers and restrictions to mobility, hinder women's digital, financial and labor market inclusion. Women must already be empowered with basic education, freedom of movement, and rights to be able to access and engage productively with technology.

iii. For India, affordable access to ICTs remains crucial. Further, it is important that ICT policies are not gender-blind. They must consider gendered perspectives and gender-disaggregated data while devising strategies and measuring progress towards them.

iv. Digital inclusion does not end at access. Digital literacy for meaningful engagement is paramount. However, the rapid speed of technological innovation makes adequate digital skilling a 'moving target'. Therefore, in addition to measures for digital literacy, fluency, and mastery, the policy focus should move towards inculcating 'learnability' that will allow women and girls to lead in the digital age (World Economic Forum 2016c).

v. Digital Skills training policies and programmes must be context- and need-specific. What works in one state may not work in another state. The paper demonstrates that successful pilot projects led by the state, or private and civil society actors have been small-scale and scattered. Measures must be taken to conduct rigorous evaluations of best practices and integrate them into existing state-sponsored programmes.

vi. Evidence suggests that for large sections of the country, girls' school dropout rates increase as they grow older. In this context, it is important for policies to promote ICTs in informal education and in strategies for lifelong learning for women who may not be textually literate (Gurumurthy and Chami 2014).

vii. Today, technology itself has the potential to a digital skills provider, however, it is important to avoid vendor-centric programmes that tend to be more focused on the vendor or technology itself rather than the end goal of effective capacity-building.

viii. High speed internet connectivity is needed for several such skills-building programmes. In the absence of such infrastructure, particularly across rural India, older ICTs like mobile phones may be more useful in some contexts.

ix. While the focus on bridging the gender gap in digital skills is crucial, it must be recognised that ICT skills training by itself is likely to be ineffectual in dramatically impacting labor market and financial inclusion prospects until the implicit and explicit exclusionary barriers are addressed.

x. In the future, automation of housework and emergence of the 'gig' economy can further marginalise women workers in the domestic work sector. In the absence of alternative employment, the issue of basic social protection in the digital economy needs to be addressed.

xi. Most of the evidence on the empowerment of women in a digital age in India is anecdotal. There is an urgent need for long-form empirical research that captures the nature of challenges and opportunities across demographics and regions in India.

7.2 Empowering women in a digital age in South Africa
(by Vidisha Mishra and Urvashi Aneja)

South Africa continues to grapple with wide income inequalities. It possesses characteristics of both an advanced and a developing economy. While it has sophisticated institutions, progressive policies, and a strong private sector, it lags on indicators for access to information and communication technologies (ICT) and digital participation.

A study by the National Assessments and Benchmarking of Gender, Science, Technology and Innovation Centre ranked women in South Africa high in agency, social status, science, technology and innovation participation, and knowledge society decision-making. This was attributed to the existence of a strong education system, a policy focus on STI (Science Technology and Innovation), and importantly, existence of a quota system implemented in various identified sectors for the promotion of a gender- and race- inclusive workforce. At the same time, the country was ranked lower in access to resources and lowest in health due to its slow progress against HIV (Elan 2012).

Today, the concept of 'digital divide' extends beyond the simple division between the information 'haves' and 'have-nots'. The focus is now moving from material access to the skills and opportunities that are prerequisite for the effective use of ICTs and financial products for overall empowerment. In this context, the paper explores the challenges and opportunities for women's empowerment in South Africa in a digital age, with a focus on issues of access, labor market participation, and financial inclusion. Section I titled Poverty, Prejudice, and Infrastructure unpacks the factors underpinning South Africa's digital gender divide, the extent of women's labor market participation, and financial inclusion; Section II highlights examples of best practices across sectors; and Section III concludes with a set of policy recommendations.

7.2.1 Poverty, prejudice, and infrastructure

Digital Inclusion

What is colloquially referred to as the 'digital gender divide' is less pronounced in South Africa, in comparison to other emerging economies. According to recent figures by the Internet World Stats, out of a population of 54,978,907, South Africa had 28,580,290 internet users in 2016. The figures suggest that internet penetration in the country increased from 5.5% in 2000 to 52% in 2016 (Internet World Stats 2017). Further, as per the 2014 Effective Measure Demographic Report, South African internet users were typically aged between 20 and 50, with an almost even number of male and female users. According to the report, 51% of Internet users in the country were female (mybroadband 2014). At the same time, despite progressive steps by the government, women – particularly women of colour -- are often left behind in higher education and advanced skills indicators.

Recent data from the Organisation for Economic Co-operation and Development (OECD) revealed that only 50.9% of the female population aged 25 – 54 is employed in South Africa. This is extremely low compared to the OECD average of 67.4% (BusinessTech 2016).

Poverty is the main impediment to digital inclusion and participation in South Africa. While race has historically been a driver of economic disparities, traditional socio-cultural prejudice has been a barrier to women's labor market, financial, and digital inclusion. According to an OECD estimate, the incidence of poverty is extremely high for African women at 52% (OECD 2012). This in-turn impacts access to higher education and financial services. Within the multi-ethnic and multi-lingual context of South Africa, four main

barriers restricting women's digital access and inclusion in STEM (Science, technology, engineering and math) sectors have been identified: gender stereotyping and societal attitudes; family responsibilities; working time constraints; and a lack of confidence in completing tasks (Li and Wilson 2001). A study by Moletsane and Reddy (2008) reveals that careers within the STEM sector are still perceived to be masculine, and women in these male-dominated fields are typically treated as 'intruders' and face implicit and explicit discrimination (Moletsane and Reddy 2008). Given South Africa's unemployment rate and skills-shortage, this is counter-productive from both, an economic as well as a rights perspective.

The National Research Foundation (NRF) in South Africa revealed that in 2015, women of colour represented only about 18% of the research and institutional workforce, despite them being the largest demographic group in South Africa (Wild 2015). While there is a long way to go for women's equal representation in academic leadership, some efforts have yielded positive results. To change the existing trajectory of women's underrepresentation in STEM research, NRF – which is the main research funding body in South Africa – has made deliberate efforts to financially support female postgraduate students in science. Their numbers reveal that since 2002, more than 18,000 women have obtained their postgraduate degrees in STI through NRF funding with the support of South Africa's Department of Science and Technology (Wild 2015).

In an interview, NRF's Dr Thandi Mgwebi identified female academics' lack of awareness of promotion policies, less external visibility, and less lifelong support for continuing their careers as the reason behind the dearth of female academics (Ibid). Polices for life-long skills-development, maternity benefits, and support in re-entering the workforce are necessary to remedy the situation. In addition, the country's Science and Technology Minister Naledi Pandor, advocated affirmative action for course correction -- establishing that 71% of the students funded in 2016-2017 would be coloured and 55% would be female (Wild 2015).

At present, Accenture's 'Getting to Equal' survey on digital fluency, ranked South Africa at a low 21 out of 31 countries (Accenture 2017). However, since both women and men have extremely low digital fluency rates, only a small gender gap in digital fluency exists. The study establishes the premise that digital skills accelerate women's advancement in the workplace. In this context, South African women's employment and education outcomes are also rated extremely low in the study due to the lack of advanced digital skills (Accenture 2017).

At the same time, a study on gender differences in technology acceptance in selected South African companies revealed surprising results – as opposed to reporting 'techno-phobia', women from the sample used in the study were more enthusiastic and accepting of the use of new technology based devices in comparison to their male counterparts (Accenture 2017). This underlines the potential of e-learning opportunities as a tool for skilling given sustained support and mentorship. With a relatively well-established ICT infrastructure, e-learning is gradually being accepted in skills-training programmes in South Africa, however, it remains under-utilised due to factors such as organization and individual rigidity to technology and ad hoc short-term strategies.

Labor Market Inclusion

Since its independence, South Africa has made notable progress towards gender and racial equality. The World Economic Forum's Global Gender Gap Index 2016 ranked South Africa 15th out of 144 countries (World Economic Forum 2016b). Yet, as mentioned above, a high rate of women's unemployment persists. The main factors behind this have been identified as economic stagnation during the apartheid years, persistent gender- and race- based discrimination, patriarchal norms restricting women to care-work, as well as the global financial crisis of 2008 (Hills 2015). As per an OECD estimate, the unemployment rates are higher for women than for men at all ages, but are particularly alarming for the ages between 15-24 years (OECD 2012). According to a 2011 report on the status of women in South Africa, the perception that women should be responsible for the care-economy and supporting roles such as fetching water, is still prevalent in the country (International Women's Forum 2011). Consequently, a disproportionate percentage of women is restricted within the domestic and farming sectors.

According to ONE's 2015 report on the status of women and girls in Africa, on average, women in the country earn 42% less than men (ONE 2015). Further, the report reveals that while women are, "responsible for up to 80% of food production, 60% of the harvesting, 80% of food storage and transport from fields to villages, 100% of the processing of basic foodstuffs, and 60% of marketing activities across the country" – less than 1% possess land (ONE 2015). Consequently, women face an automatic disadvantage in securing credit due to lack of collaterals, and limited experience in banking procedures (Ibid). Of the agricultural extension services and credit offered to small-scale farmers, women receive only 7% and 10% respectively (ONE 2015). In terms of policies, South Africa already has many gender-sensitive policies on paper. For instance, for programmes such as the Land Redistribution Programme, the Land Tenure Programme, and the Land Restitution Programme, there is no data on the monitoring and evaluation of these programmes which makes it hard to assess concrete outcomes (ONE 2015).

Globally, the slow progress towards women's economic empowerment is often attributed to the lack of funding and dearth of gender disaggregated data. Although South Africa has one of the most transparent budgets in the world – there is no deliberate gender responsive budgeting procedure. Further, it is unclear whether the budget allocated to the Department of women is based on evaluation of past programmes and gender disaggregated data (South African Government 2015). In addition, while South Africa's spending on education is significantly higher than that of other emerging economies, the budget again, is gender-neutral and does not set special targets for women's and girls' education and skilling.

Financial Inclusion

According to a study based on South Africa's Finscope Surveys, there was an overall increase in the number of bank account holders from below 50% in 1994 to approximately 80% by 2013 (Nanziri 2016). Notably, unlike in many other countries, women in South Africa were found to be not disproportionately excluded from formal financial services. According to a 2016 paper by the Finmark Trust, South Africa is the only country in the Southern African Development Community (SADC) in which women are more financially included than men (Finmark Trust 2016a). The paper suggests that with a positive gender gap of 6%, more South African women than men are financially included. The reason behind this is most likely that more women are social grant recipients than men – 42% of women over the age of 18 compared to just 13% of men receive grants.

At the same time, men have the edge in bank account usage as 30% men use their accounts at least 3 times a month for withdrawals or deposits as compared to women, where only 26% of women use their accounts with the same frequency. This demonstrates that more women have dormant accounts. Additionally, despite having access to more accounts, women still have less access to bank credit than men. Data however revealed that more women access credit through informal institutions (Ibid).

Another visible gender gap exists in access to savings. The study found that more women than men are excluded from the saving market, even upon considering informal saving channels as well (Ibid). The lack of digital literacy is a contributing factor for women's limited engagement with financial products, and particularly, savings products. World Bank's World Business Enterprise Survey revealed that in 2007, only 240 women owned enterprises in South Africa, compared to 805 male entrepreneurs (Nanziri 2016). Further, the Finscope Business Survey of 2010 indicated that women tended to be restricted in micro-enterprises and their primary source of capital was personal savings or support from friends and family (Ibid).

Self-employment and entrepreneurship have the potential to rectify the existing gender gaps in labor market inclusion, particularly for rural women and marginalized; however, for women enterprises to thrive – financial literacy is a pre-requisite. The data proves that financial inclusion, much like digital inclusion, should not be perceived solely in terms of access or simply as a matter of being 'banked' or 'un-banked'. As the study shows, despite more women being owners of bank accounts, external factors restrict usage and savings patterns.

Finally, the role of mobile money in the country merits further examination. Research on mobile money in the SADC region highlights that since there is just a 2% gender gap in mobile money account ownership in South Africa, the mobile money revolution has the potential to close the gender gaps in usage and savings. At the same time, the study re-affirms that due to limited mobile phone penetration and lower financial literacy amongst women, low income groups and rural population, the mobile money revolution may face a serious setback and could further widen the gap between those financially included and those excluded (Finmark Trust 2016b).

7.2.2 Best practices

South Africa is witnessing a wave of women-led, non-government- and private-sector initiatives that aim to close the gender gap in tech. For instance, Code4CT is an organization that runs 18 month programmes to introduce high school girls to coding, design and the tech industry (Strydom 2016). Similarly, GirlHype, another organization, offers free 7-week programs for 10th-12th-grade girls to learn coding and get exposure to tech jobs (GirlHype 2017). In addition, GirlCode is a non-profit organization aiming to fix the skewed gender ratio in the tech industry by organizing hackathons and facilitating women's skills advancement (GirlCode 2017). However, despite sharing a common mandate and inspired vision, the geographical scale of these interventions has remained relatively small and separate from each other.

In addition to equipping women with coding skills, websites like 'Tech Girl', are working to fill the information gap by creating an online space for South African women to ask questions and get comfortable with technology (Bradford 2014). In addition, a collaboration between UN Women and the Mozilla Foundation ran a programme in Cape Town to increase women's web literacy with the aim to improve employment opportunities by familiarizing them with hardware and functions of the internet. While the pilot project yielded success stories, it is unclear whether it is being scaled up (BBC News 2017).

Government funded research institutions and universities in South Africa are obligated to reserve a portion of student and faculty seats for women, and particularly for women of colour. This has resulted in relatively improved representation in the STEM academia in recent years. However, due to the lack of publicly available documentation, it is unclear whether women's participation has exceeded the stipulated quota in most cases (Wild 2015).

E-learning and mobile-learning are becoming popular in South Africa. In this case, if facilitated by trained teachers through a multilingual approach, technology itself becomes a tool for empowerment and digital skills-building. The country's experience with mobile learning and teaching demonstrates that teachers, context, culture and language are crucial to the development (content creation and disseination) and use of technology as a tool in education (Jantjies and Joy 2016).

A successful example of promoting women's entrepreneurship is showcased by the Women's Enterprise Development Initiative (WEDI), a South African private cooperation that aims to drive development by investing in women entrepreneurs. Since 2008, WEDI has provided technical assistance and sizeable investments to develop new funding models that facilitate job creation (Women's Enterprise Development Initiative 2008).

Poor rural women in South Africa have been utilizing a range of traditional technologies in both productive and reproductive activities that are important to their livelihood. Research in South Africa's KwaZulu-Natal Province shows that the advent of externally-produced new technologies creates tensions with local indigenous technologies. However, this research is also groundbreaking as it can provide pathways to innovative models of technology that an integrate the local with the global (Bob 2004).

7.2.3 Future policy pathways

The digital economy will not be separate from the existing economy and the prevalent perceptions regarding women and work. Therefore, for women to be truly empowered in the digital age, policies must tackle socio-cultural attitudes, negative perceptions, as well as other determining factors such as inequality in access to health services, violence against women, and lack of political representation.

i. In the context of South Africa, digital and financial inclusion cannot be understood solely in terms of access. The digital skills-gap and financial illiteracy determine women's levels of engagement which in-turn impacts their education and employment opportunities as well as overall quality of life.

ii. Race, gender and income are the three are key factors in determining access -- in addition to age and location. Therefore, to combat gender gaps in labor market participation and education attainment, South Africa's historical discrimination problem must be addressed.

iii. Women do not make a homogenous group. As data reveals, special measures are required to safeguard the rights and improve the lives of women of colour and of rural women in particular.

iv. Policy discourse must refrain from 'technological determinism'. Technology by itself cannot be empowering. The digital economy will not be isolated from existing social-cultural perception of women and work as well as existing gaps. Violence against women and unequal access to healthcare remain major concerns, and could cancel out the benefits accrued by the digital economy. It is important that communities of gender advocates and technology advocates interact with each other for devising holistic measures.

v. Digital fluency will determine employment outcomes in the digital age. Digital-skills building programs must focus on young girls to start their integration in STEM early.

vi. In addition to existing affirmative action in universities and research institutions, polices for life-long skills-development, maternity benefits, and support for re-entering the workforce are necessary to improve women's representation in academia as well as other sectors. Further, quota mechanisms in institutions must be audited.

vii. South Africa has several progressive, gender sensitive policies in place. However, greater focus needs to be given to monitoring and evaluation to assess and amplify their impact.

viii. At present, there is a serious lack of gender-disaggregated data, which in turn impacts effective monitoring and evaluation. In addition, moving forward, it is important to adopt gender responsive budgeting to ensure maximum benefit from allocated funds.

ix. Bank account ownership alone is insufficient to measure financial inclusion. Data reveals that women are disadvantaged due to lower levels of financial literacy. There is a need for effective financial literacy programs, and to improve women's access to financial and savings products.

x. Successful private-sector led pilot-projects must be given the support to scale-up.

xi. Rural women have locally created indigenous skills that are interlinked with their livelihood strategies. The aim of new technologies can be to complement these to improve lives, as opposed to dismantling traditional socio-economic systems.

7.3 Advancing Women's Economic and Financial Inclusion in the United States: Strategies for Reducing the Gender Gap in Angel Investing (by Susan Coleman and Alicia Robb)

Growth-oriented entrepreneurship is a public policy priority in most developed economies including the United States. The benefits provided by high growth firms are many and varied. From an economic perspective, high growth firms provide a significant number of jobs, generate substantial personal and corporate tax revenues, and play an important role in the commercialization of innovative products and services (Audretsch 2007; Decker et al. 2014; Haltiwanger et al. 2013; Wennekers and Thurik 1999). From an educational perspective, growth-oriented firms are an important source of employee training and development as well as "knowledge spillovers" leading to the launch of additional entrepreneurial ventures (Acs et al. 2009). Finally, growth-oriented firms play an essential role in community development and well-being through corporate giving, volunteer activities, sponsorship, and the provision of leadership and know-how (McKeever et al. 2015; Zahra and Wright 2015).

In light of these many benefits, it is not surprising that many countries implement measures to encourage, support, and celebrate the creation of firms with significant growth potential. To date, however, the majority of growth-oriented firms, and certainly those that are most highly publicized, are firms that have been launched by men rather than by women (Robb et al. 2014; Thebaud 2010). In a report published by the Kauffman Foundation, author Lesa Mitchell called for greater visibility on the part of successful women entrepreneurs who can serve a role models for young women. She also stressed that:

> *With nearly half of the workforce and more than half of our college students now being women, their lag in building high-growth firms has become a major economic deficit. The nation has fewer jobs—and less strength in emerging industries—than it could if women's entrepreneurship were on a par with men's. Women capable of starting growth companies may well be our greatest under-utilized economic resource.*
>
> *(Mitchell 2011: 2).*

The structure of this article is as follows. Following this brief introduction, we will discuss the status of growth-oriented women's entrepreneurship in the United States. Section two will be followed by a third section highlighting the link between firm growth and financial capital as well as gender differences in amounts and sources of financial capital. Our fourth section focuses on the essential role played by angel capital within the context of the entrepreneurial ecosystem. This section also documents women's lower level of participation as both investors and as recipients of funding in the angel investing market. The fifth section goes on to detail our own public policy response to the gender gap in angel investing, the Rising Tide U.S. Angel Training Pilot Program. We follow this section with another that describes additional policy responses in the U.S. and abroad directed toward increasing the flow of angel capital to growth-oriented women entrepreneurs. Our final section provides conclusions and next steps.

The Status of Growth-Oriented Women's Entrepreneurship

In recent years, women in the United States have made gains in terms of educational attainment as well as advancement in the workplace. These gains, in turn, have translated into a greater number of women who have the skills, experience, and motivation to take the entrepreneurial plunge. Table 1 shows that there were nearly 10 million women-owned firms generating

$1.6 trillion in revenues in 2012. This represents an increase of 83 percent from 1997 to 2012, compared to an increase of 33 percent for all firms. Thanks to these impressive gains, by 2012 women-owned firms accounted for 36 percent of all firms in the United States, a dramatic increase from 26 percent in 1997. Nevertheless, as reflected in Table 7.3.1, women-owned firms continue to account for only a small percentage of total revenues (4.8%) and employment (7.8%). Thus, although firms launched by women are growing in numbers, they are not necessarily growing in size.

Recent data from the Global Entrepreneurship Monitor's 2015 Special Report on Women's Entrepreneurship (GEM 2015), based on data from 83 countries, suggest a similar pattern in other regions of the world. The authors of that report found that two-thirds of the firms founded by women are in highly competitive and often low-growth consumer-oriented sectors compared to 45 percent of firms established by men. The report also observed that, while women were just as likely to recognize opportunities, they were more likely to doubt their capabilities than men and had a greater fear of failure, both of which could weigh on their willingness to launch high growth ventures. The report states:

> *Environmental conditions and constraints weigh differently on the sexes. This continues to be the biggest challenge women face worldwide. Subtle biases exist in many societies that suggest women have lower ambitions or are less capable, or that running businesses is inappropriate for them. This can, for example, inhibit their ability to gain access to growth capital. These biases need to be identified and eliminated so women entrepreneurs have the same opportunities as men to grow their businesses*
>
> *(GEM 2015, p. 68).*

Table 7.3.1: Women-owned businesses (1997-2012)

Women	1997	2002	2007	2012
Firms (Number)	5,417,034	6,489,483	7,793,425	9,932,434
Receipts (Millions of dollars)	$818,669	$940,775	$1,192,781	$1,616,319
Employer Firms (number)	846,780	916,768	911,285	1,052,876
Receipts (millions of dollars)	$717,764	$804,097	$1,010,470	$1,383,150
Employees (number)	7,076,081	7,146,229	7,587,020	8,982,588
Annual payroll (millions of dollars)	$149,116	$173,709	$218,136	$290,473
All				
Firms (Number)	20,821,934	22,974,685	27,110,362	27,626,362
Receipts (Millions of dollars)	$18,553,243	$22,627,167	$30,181,461	$33,537,004
Employer Firms (number)	5,295,151	5,524,813	5,752,975	5,424,393
Receipts (millions of dollars)	$17,907,940	$21,859,758	$29,208,766	$32,478,441
Employees (number)	103,359,815	110,786,416	118,668,699	115,249,459
Annual payroll (millions of dollars)	$2,936,493	$3,813,488	$4,886,977	$5,236,468
Women as a Percentage of All				
Firms	26.0%	28.2%	28.7%	36.0%
Receipts	4.4%	4.2%	4.0%	4.8%
Employer Firms	16.0%	16.6%	15.8%	19.4%
Receipts of Employer Firms	4.0%	3.7%	3.5%	4.3%
Employees	6.8%	6.5%	6.4%	7.8%
Annual Payroll	5.1%	4.6%	4.5%	5.5%
	1997-2012		2002-2012	
Growth Rates	Women	All	Women	All
Firms	83.4%	32.7%	53.1%	20.2%
Employer Firms	24.3%	2.4%	14.8%	-1.8%
Receipts	97.4%	80.8%	71.8%	48.2%
Employment	26.9%	11.5%	25.7%	4.0%

Source: 1997, 2002, 2007, 2012 Survey Of Business Owners

In a somewhat earlier report on women's entrepreneurship in the countries included in the Organization for Economic Cooperation and Development (OECD), economist Mario Piacentini (Piancentini 2013) concluded that "important gender gaps in entrepreneurship exist" (p.4). He found that male entrepreneurs were three times more likely to own businesses with employees than women, and that women's earnings from self-employment were as much as 60 percent lower than those of men. Consistent with the GEM Report, Piacentini noted that women rarely own large businesses and highlighted the unrealized economic potential of women-owned firms. In his analysis of factors contributing to gender differences in entrepreneurship, Piacentini pointed to two types of factors in particular. The first is market failures that lead to lower endowments for women entrepreneurs in the key areas of human, social, and financial capital. The second, also consistent with the GEM Report, is attitudinal differences and stereotypes that discourage women from launching or growing their firms.

Growth-Oriented Women Entrepreneurs and Financial Capital

A considerable amount of research has focused on the financing strategies of women entrepreneurs and has consistently documented the fact that women, on average, raise smaller amounts of financial capital than men and are more reliant on internal rather than external sources (Coleman and Robb 2009; Coleman and Robb 2016a; Coleman and Robb 2016b). This is especially true in the case of the external equity financing as provided by venture capitalists and angel investors. Although internal sources of financing in the form of personal savings, funds from family and friends, and personal debt, often in the form of credit cards, may be sufficient for the launch of smaller, lifestyle firms, these sources cannot typically furnish sufficient financial capital for growth-oriented firms. Thus, entrepreneurs who aspire to growth have to seek out and acquire external sources of financing such as bank loans, angel investments, and venture capital.

Table 7.3.2 provides a breakdown of financing sources, by gender, for new firms launched in 2004. These data are drawn from the Kauffman Firm Survey, a data set of over 4,000 U.S firms launched in 2004 and tracked over an 8-year period. Table 7.3.2 shows that women in the US started their firms with dramatically smaller amounts of financial capital than men. This was true for all firms as well as for growth-oriented firms. Similarly, women-owned firms were less reliant on both external debt and external equity than men. It is noteworthy that the gender gap in external equity was particularly large for all firms (1.6% relative to 18%) as well as for growth-oriented firms (2.9 % relative to 19.8 %).

Table 7.3.2: Startup Capital by Gender in the USA

	All	Women-Owned	Men-Owned	High Growth Women-Owned	High Growth Men-Owned
Owner Equity	$32,615	$23,915	$36,397	$44,436	$75,538
Insider Equity	$2,100	$1,897	$2,013	$774	$5,038
Outsider Equity	$16,294	$1,202	$23,474	$3,902	$56,012
Owner Debt	$4,582	$3,684	$5,023	$4,858	$15,921
Insider Debt	$6,737	$6,001	$7,217	$12,705	$18,010
Outsider Debt	$49,384	$37,601	$55,549	$69,749	$112,356
Total Financial Capital	$111,712	$74,299	$129,673	$136,425	$282,874
Owner Equity	29.2%	32.2%	28.1%	32.6%	26.7%
Insider Equity	1.9%	2.6%	1.6%	0.6%	1.8%
Outsider Equity	14.6%	1.6%	18.1%	2.9%	19.8%
Owner Debt	4.1%	5.0%	3.9%	3.6%	5.6%
Insider Debt	6.0%	8.1%	5.6%	9.3%	6.4%
Outsider Debt	44.2%	50.6%	42.8%	51.1%	39.7%
Total Financial Capital	100.0%	100.0%	100.0%	100.0%	100.0%
Outside Debt Ratio	20.0%	19.0%	21.0%	22.6%	29.2%

Source: Kauffman Firm Survey, 2004.

What accounts for the funding gap between female and male entrepreneurs? Several theories have been put forth attesting to the effects of gender differences in earnings, risk-taking propensity, self-efficacy, and networks. From the standpoint of earnings, women earn less than men, are less likely to reach the most senior, highly compensated, ranks of corporations, and are more likely to experience career interruptions frequently associated with the birth and care of children (Blau and Kahn 2000; Blau and Kahn 2016). Thus, they have smaller amounts of personal capital that could be used to launch or grow a firm. Consistent with this, Table 7.3.2 reveals that although women are heavily reliant on owner-supplied financial capital to launch their firms (32.2%), they actually use less of it in actual dollar amounts. The gap between the amounts of personal financial capital provided by women versus men launching growth-oriented firms is even larger ($44,436 vs. $75,538).

A second theory is that women are more risk averse and have lower levels of "financial self-efficacy" than men (Amatucci and Crawley 2011). Self-efficacy refers to the belief that one has the ability and skills to perform certain tasks. This theory contends that, if women are less confident in their financial skills, they will raise less financial capital and be less effective in dealing with providers of financial capital (Coleman and Kariv 2013). To illustrate this point, recent research indicates that women entrepreneurs are just as likely to be approved for bank loans as men. Nevertheless, women are still less likely to apply for loans because they fear they will be denied, and when they do apply, they request smaller loan amounts (Coleman and Robb 2009). Interviews with women who sought angel or VC funding also suggest that women do not ask for enough money when they do pursue these funding sources (Amatucci and Sohl 2004; Amatucci and Swartz 2011; Coleman and Robb 2016a)

A third theory, grounded in research conducted by the original Diana Project researchers, contends that angel and venture capital (VC) networks are heavily male-dominated with few women in decision-making roles (Brush et al. 2004). Thus, it is more difficult for women entrepreneurs to penetrate these networks. Prior research also finds evidence of "homophily" or the tendency of likes to be attracted to likes (Becker-Blease and Sohl 2007; Franke et al. 2006; Harrison and Mason 2007). According to this theory, angels and VCs who are primarily male are less likely to give serious consideration to firms launched by women.

Recent research on angel investment in the United States confirms that the gender gap in those who provide and those who receive funds persists. A report produced by the University of New Hamp-shire's Center for Venture Research revealed that in 2015, women angels represented only 25.3 percent of the angel investor market, a decline from the previous year's 26.1 percent. Further, although women-owned firms represented 29.2 percent of firms seeking angel funding in 2015, only 14.4 percent of firms owned by women actually received funding.

> *It should be noted that the yield rate for women entrepreneurs has steadily declined over the last four years and this, combined with the relatively unchanged percentage of women angel investors, may indicate the need for more women investors in the angel ecosystem.*
>
> *(Sohl 2015, p.2)*

The Role of Angel Investing in the Entrepreneurial Ecosystem

Why should we be concerned with women's lower representation on both the supply and demand sides of angel investment? Recent studies point out that entrepreneurs do not operate in a vacuum, but rather operate within the context of a larger ecosystem (Isenberg 2010; Hechavarria and Ingram 2014; Mason and Brown 2013). That ecosystem is comprised of numerous components, each of which has the potential to either enhance or derail the entrepreneur. Public policy that advocates for and supports entrepreneurship is one such component, while capital sources that provide equity capital, mentorship, and contacts is another (Isenberg 2010: 44). Angel investment is one such "capital source" and is a major source of funding for growth-oriented entrepreneurs. In 2015, angel investment in the U.S. totaled $24.6 billion, and a total of 71,110 entrepreneurial ventures were funded during that year (Sohl 2015). In contrast, venture capital, which has traditionally attracted far more attention than angel investing, invested $59.1 billion in 2015 in a total of 3,709 companies (Haque 2016; NVCA Yearbook 2016). Within these totals, seed and early stage deals represented 51 percent of the total (1,892) and 36 percent of capital invested ($21.3 billion). Thus, angel investors raised levels of seed and early stage capital comparable to that raised by VCs and used it to fund far more companies. Taken together, these statistics suggest that angel funding plays a much larger role in the launch, survival, and growth of early stage firms than has been previously credited.

In addition to the large number of firms funded by angel capital, prior research points to some important distinctions between venture capital and angel investing that are particularly beneficial for early stage firms. Angels are willing to make smaller investments than VCs, thereby making it possible for them to fund a greater number of companies as illustrated above. Similarly, although VCs have shifted toward investing in later stage firms since the financial crisis, angels are still willing to invest in early stage companies (Mason and Harrison 2015; OECD 2011). In terms of geographic concentration, angel investors are more geographically dispersed than VCs and are both willing and able to invest in and monitor firms throughout the United States (HALO Report 2015). In contrast, VC funding is far more concentrated, with California receiving 57 percent of investment dollars in 2015 (Haque 2016). As in the case of geographic diversity, angel investments also reflect a higher degree of industry diversification than venture capital which tends to concentrated on firms in either software or life sciences (HALO Report 2015; NVCA 2016; OECD 2011; Sohl 2015). Although both angel and VC investors desire a financial return, prior research as well as some of our own research suggests that angels are less preoccupied with the size and timing of that return than VC investors are. In a recent article, Harrison et al. (2016) found that:

> *...the majority of angels are patient investors in terms of investment intentions, engagement, and exit behavior, largely by default rather than intent. Most do not consider the exit at the investment appraisal stage nor the need for patience.*
>
> *(Harrison et al. 2016, p. 669).*

Similarly, our own interviews with a cohort of novice women angel investors revealed that, although financial returns were important, they were not at the top of the list in terms of either motivations or priorities (Coleman and Robb, forthcoming).

Prior research suggests that a fairly high percentage of angel investors have been entrepreneurs themselves and are thus in a position to share valuable resources in the form of knowledge, experience, financial capital, and key contacts with the entrepreneurs they invest in and mentor (Mason and Botelho 2014; OECD

2011). In this sense, their focus is on the success of the entrepreneur rather than the level of returns generated.

The types of resources that angel investors can provide are also highly beneficial to women entrepreneurs who typically start their firms with less financial capital and are often excluded from male-dominated networks that could provide them with not only financial capital but with valuable information and contacts as well. Similarly, the emergence of angel investor networks capable of making larger investments and providing follow-on funding offers growth-oriented entrepreneurs a promising alternative to VC funding (Mason and Harrison 2015; OECD 2011). These angel networks provide a number of advantages of both investors and entrepreneurs who seek funding. The first of these is that a network of investors is in a better position to secure, process, and communicate key information about target companies. This helps address the problem of informational asymmetry, which is inherent in new, privately-held firms.

A second major advantage is that, by pooling the financial resources of multiple investors, an angel network is able to attract and invest in larger deals. Thus, the network approach gets angel investors onto the radar screen of entrepreneurs who are launching firms in growth-oriented industries with attractive options for harvesting value. This brings us to the third advantage which is that a network has the potential to generate a better deal flow. A big part of entrepreneurial finance is having the right connections and contacts. Angel investors who are a part of an angel network, will probably see bigger and potentially better deals than they would see on their own.

From the standpoint of financing women-owned firms, a growing number of angel networks are focusing on women entrepreneurs in recognition of the fact that they represent an under-recognized and under-served segment of the market (Brush et al. 2014). In the U.S., examples of such women-focused angel investor networks include Astia Angels, Golden Seeds, 37 Angels, and Pipeline Angels, all of whom provide training for women angel investors (Coleman and Robb 2016a). In addition to these established programs, one of our authors (Alicia Robb) launched the Rising Tide U.S. Angel Training Program in 2015 as a further step toward closing the gender gap in angel investing. What follows is a brief description of the program, which has completed its first pilot programs in the U.S. and Europe, and is currently launching new programs in the U.S., Europe, and Africa.

Responding to a Public Policy Priority: The Rising Tide U.S. Angel Training Pilot Program

As noted above, growth-oriented entrepreneurship has become a public policy priority for the United States as well as for a number of other developed economies. This has been particularly true as nations continue to recover from the lingering effects of the "Great Recession". Although the majority of women entrepreneurs have traditionally launched smaller firms than men, there is a growing awareness that an important subset of women entrepreneurs have both the desire and the potential to launch firms that will achieve significant size and scale. A key resource input for such growth-oriented firms is financial capital in the form of external equity, the bulk of which is currently directed toward firms launched by men. In response to this funding gap, in our recent book, The Next Wave:

Financing Women's Growth-Oriented Firms (Coleman and Robb 2016a), we stressed the importance of increasing the number of women investors capable of investing in growth-oriented women-owned firms, noting that over 40 percent to the top wealth-holders in the United States are women. Our challenge is to harness not only their potential for growth-oriented entrepreneurship, but their economic and investing

potential as well. We chose to address this challenge through launching two pilot angel training programs, which employed a digital platform to deliver angel investor training while also connecting national networks of experienced and novice women investors.

We will focus specifically on the U.S. training program, which was launched in the fall of 2015 with the goal of increasing the number of women angel investors capable of investing in growth-oriented women-owned firms. The training program was designed to run for approximately 12 months. During that time, nine experienced women angel investors were recruited to serve as the investment committee of a learn-by-doing fund and as guides and mentors for a cohort of 90 novice women investors. Novice investors included women who had both the financial means and the desire to learn about angel investing, and all investors met the criteria for being an "accredited investor" as defined by the Securities and Exchange Commission.[19]

As a part of the program, each participant contributed a $10,000 to a pilot fund to be used for investment in portfolio companies over the course of the training period. Training activities included a combination of in-person sessions, online instructional materials and webinars, interaction with the nine experienced investors, and opportunities to participate in various phases of the evaluation and selection process for portfolio firms. Prior research has shown that women have lower levels of "financial self-efficacy" (Amatucci and Crawley 2011; Barber and Odean 2001) and that they are more likely to fall outside established angel investing networks (Harrison and Mason 2007). In light of that, training activities were selected to a) increase angel investing knowledge and skills, b) provide an investing network with expertise in a broad range of industries and skills, and c) build self-confidence and a willingness to "take the plunge" into angel investing. Over the course of the year, the funds were invested into a total of 10 firms, nine of which had women on the founding team, while six had female CEOs. The program concluded with a women's investor summit held in San Diego in October 2016 to discuss program highlights and next steps. The preliminary results for this first pilot have emerged:

1. The importance of an approach that combines both education and experience in engaging women as angel investors. Our findings revealed that participants who engaged in both training and networking activities achieved greater gains in their knowledge and skills to evaluate investment opportunities than those who engaged in networking activities only.

2. The power of the investing network created through a cohort of 99 investors with different backgrounds, skill sets, and contacts. Pre-test survey results revealed that two of the primary motivations for Rising Tide participants were to develop an investing network (83.8%) and gain access to a deal flow of high potential growth-oriented firms (55.9%). Similarly, post-test surveys and interviews revealed that major strengths of the program included access to experienced angel investors with knowledge and skills in a diverse array of industries and the ability to diversify risk by investing in multiple firms through the fund.

3. The learning by doing experience as a means of increasing self-efficacy and willingness to invest in current and future high growth ventures launched by women entrepreneurs. By the end of training, 17.9 percent of participants responded that they had invested in at least one entrepre-

[19] The SEC defines an "accredited investor" as an individual with at least $1 million in assets not counting her home or an income of at least $200,000 annually.

neurial firm (not including investments made by the fund) since the start of training while 52.2 percent responded that they had invested in more than one firm during that timeframe. Another 16.4 percent responded that they had not invested yet but planned to do so within the next 12 months.

4. The digital platform is an effective means for delivering training content and creating a network of women investors from different geographic regions and time zones. Traditionally angel investing has been a local phenomenon. With the development of angel networks, however, investors are able to source and invest in deals from across the United States. Given that the bulk of venture capital dollars has gone to either Silicon Valley, Boston, or New York (NVCA 2016) where deals are often over-valued, this is an advantage for both entrepreneurs and investors.

5. The Rising Tide U.S. Angel Training Program can serve as a prototype for addressing other gaps in the entrepreneurial ecosystem including those affecting women's growth-oriented entrepreneurship but also social entrepreneurship and entrepreneurship in developing economies. To test this hypothesis, we are launching the Next Wave Impact Fund in April 2017. This fund will combine and improve upon both the pilot fund and the training and networking components developed for the Rising Tide pilot program to train a new cohort of women equipped to invest in growth-oriented women-owned firms that provide both economic and social returns.

Additional Policy Responses to Increase the Flow of Angel Capital to Growth-Oriented Women Entrepreneurs

In the U.S., public policy is often implemented by a combination of both private and public individuals and groups acting individually or in concert. Policy can be operationalized through various means including legislation, funding, tax policy, mandates, or the creation of new structures and groups. The Rising Tide U.S. Angel Training Program is one such group specifically designed to address the gender gap in angel financing by increasing the number of women angel investors. In contrast, some policy responses such as

tax incentives, co-investment funds, and crowdfunding are more general in the sense that they provide benefits to all angel investors or all entrepreneurs rather than just women. Depending on how these policy responses are structured, they have the potential to benefit women entrepreneurs disproportionately or to perpetuate the attitudinal and structural barriers than deny women access to funding.

Tax incentives are used to encourage individuals to make angel investments and to invest larger amounts of financial capital in doing so. Typically the incentives allow the investor to write off a portion of either capital gains or losses. In the United States, tax incentives for angel investors are not provided at the federal level but are provided at in over half of the states. Similarly, Canada provides angel investor tax incentives at the regional and local levels. In contrast, other countries including the UK, Ireland, France, Portugal, Israel, and Japan offer incentives at the national level (OECD 2016b). While tax incentives can have a positive effect in terms of increasing the number of angel investors as well as the amount of angel capital invested, it is often difficult to tie their existence to actual gains in economic growth and employment (Hendon et al. 2012; OECD 2016b; Tuomi and Boxer 2015).

A second supply side strategy for increasing the level of external equity capital, co-investment funds, are funds where public and private financial capital is pooled. This approach is less commonly used in the United States, but is employed in other countries, most notably Scotland and New Zealand. The Scot-

tish Co-Investment Fund (SCF) which provides both angel and VC funding has been in existence since 2003 and has served as a model for co-investment funds in other countries. The SCF which is partially funded by the European Regional Development Fund invests alongside business angel syndicates and VC funds thereby increasing the amount of financial capital available to entrepreneurial firms. As in the case of tax incentives, however, the links between co-investment fund investments and economic development are poorly documented in many instances, often making it difficult to justify the use of taxpayer funds for this purpose (Lerner 2009; OECD 2011; Owen and Mason 2017).

Crowdfunding is a strategy than leverages the power of small and often overlooked investors through the use of digital platforms. Crowdfunding investors are in essence "mini-angels", sometimes investing as little as $25 in a company or cause that appeals to them. Although crowdfunding for donations and loans has been around for some time, crowdfunding for equity is a new development in the U.S., authorized by passage of the Jumpstart Our Business Startups or (JOBS Act) in April 2012. This act provides a means for startups and small firms to raise equity capital through securities offerings using the Internet, thereby lowering costs. Currently, equity crowdfunding platforms are restricted to accredited investors (those individuals with more than $1 million dollars in assets aside from their home, or $200,000 of income annually).

The initial entrant in the U.S. equity crowdfunding space was AngelList, launched with the goal of bringing entrepreneurs and angel investors together through an electronic marketplace. As of March 2017, AngelList's website reported that 1,275 companies featured on its site raised a total of $515 million in initial financing and $4.6 billion in follow-on financing (https://angel.co/done-deals). Significantly, from the standpoint of women entrepreneurs, early research using data from the crowdfunding platform Kickstarter shows that women actually do better on achieving their crowdfunding goals than men (Marom et al. 2016). Should these findings persist as equity crowdfunding continues to gain traction, it could suggest that crowdfunding is an effective means for helping to narrow the gender gap in equity investing (Mollick and Robb 2016).

In contrast to supply side measures which focus on increasing the level of angel funding, demand side measures often focus on preparing the entrepreneur and connecting her with key resource providers. Like crowdfunding, accelerators are a relatively recent phenomenon. The first accelerator in the U.S. was Y Combinator established in Northern California in 2005. The accelerator model consists of a short term and highly intensive program typically lasting for 60 to 90 days designed to help entrepreneurs bring their product to market and connect with potential funding sources. Entrepreneurs are provided with a rigorous program of training, mentoring, and technical assistance to help them grow their firms rapidly (Dempwolf et al. 2014). Participants move through the accelerator program as a part of a cohort, thereby establishing lasting relationships with members of their group. The selection process is highly selective with a focus on those firms most likely to succeed and grow.

For women entrepreneurs, this role is increasingly filled by a growing number of women-focused accelerator programs. As an example, programs such as Springboard Enterprises, Astia, and MergeLane work with women entrepreneurs to refine their business models, gain access to markets, and develop their entrepreneurial teams. They also help the entrepreneur develop her "pitch" and provide opportunities for her to deliver it by connecting her with angel and VC investors. In this sense, accelerators provide both expertise and access to investor capital.

As evidence of the efficacy of this type of approach, a report published on the Astia website states that 60 percent of Astia companies achieve funding or an exit within one year of presenting at Astia (Nelson and Vosmek 2014). Similarly, Springboard Enterprise's website states that 642 companies have participated in its forums since 1999, successfully raising over $7 billion. Equally important, over 80 percent of the Springboard firms are still in existence and have generated billions of dollars in revenues and tens of thousands of jobs (www.sb.co/about/). These statistics make a powerful argument for the effectiveness of women-focused accelerator programs as a means for developing human and social capital while also breaking down barriers to financial capital in the form of external equity. Although we may not necessarily think of the formation of an industry association as either a policy response or a strategy, the creation of a national or regional angel association also plays an important role in increasing the number of angel investors. Using the United States as an example, the Angel Capital Association (ACA) was established in 2004, supported by funding from the Kauffman Foundation. As of March 2017, the ACA had over 13,000 individual members and 240 angel groups and accredited platforms (https://www.angelcapitalassociation.org/). Each year the ACA hosts a 3-day summit featuring educational and training sessions, nationally known speakers, and multiple networking opportunities. In addition, the ACA conducts a series of regional meetings and provides a broad range of training opportunities through online webinars. These types of activities and functions have raised the visibility of angel investing and in doing so have attracted additional members and stimulated the creation of additional angel investing groups.

In recent years, the ACA has also focused very specifically on increasing the number of women angel investors by incorporating women-focused events and networking opportunities at its national and regional meetings. Consistent with this, the 2016 ACA Summit featured prominent women angels as speakers and panel participants as well as opportunities for women-focused angel groups liking Rising Tide to meet. The Summit also included a number of firms founded or co-founded by women as a part of it Innovation Showcase. To provide additional visibility for the role of women angel investors, the ACA conducted a "Celebrating Women Angels Meeting" in Boston in September of 2016 which brought together leading women investors as well as women who are relatively new to angel investing.

These various initiatives represent just a few of the more impactful public policy responses to the priority of increasing the number of women angel investors and the flow of angel investor capital to growth-oriented women entrepreneurs. Even this short list, however, illustrates the diversity of possible approaches as well as the fact that both public and private sectors can play a role in reducing the gender gap in equity finance. Diverse strategies for achieving this goal represent both an opportunity and a challenge, however, in that several researchers have noted that we are not doing a particularly good job of evaluating policy responses to ensure that they achieve their goals and do so in a cost effective fashion (Hendon et al. 2012; OECD 2011; Tuomi and Boxer 2015). In light of that, part of our challenge going forward is to identify "best practices" that address both the supply and the demand side of angel investing in women-owned firms including those practices that may work in some economies but not in others as well as those that can be shared and replicated across countries.

Conclusions and Next Steps

This article highlights the important role played by angel investing in the launch and development of growth-oriented firms. As we have observed, angel capital serves as a critical source of early stage financing, and angel investors provide funding to far more

companies than venture capitalists. In addition to the financial capital they provide, angel investors are valuable source of both human and social capital.

As we have shown, the majority of angel investors are entrepreneurs themselves or have some other association with an entrepreneurial firm, so they have industry as well as hands-on experience with the entrepreneurial process. They also have well developed networks and contacts who can provide access to customers, suppliers, employees, and other resources that can help the entrepreneur achieve her goals. In this sense, their value to the entrepreneur goes far beyond financial capital.

Prior research documents the challenges faced by women entrepreneurs in their attempts to secure financial capital. This is particularly true in terms of securing the types of financial capital required by growth-oriented firms in the form angel and venture capital funding. In this article we have focused on the gender gap in angel financing and the ways in which that gap affects women entrepreneurs who want to grow their firms. Research points to a supply side challenge in that there are far fewer women angel investors as a key factor. In this article we have described one response to that challenge, the Rising Tide U.S. Angel Training Pilot Program which targeted the educational and networking needs of a cohort of novice women angel investors.

As a part of the Rising Tide program, nine experienced and 90 novice angel investors from across the United States were linked through a digital platform that housed training modules, facilitated networking activities, and made it possible for novice investors to participate directly in various stages of the angel investing process. In terms of outcomes, over the course of the 12-month training period, participants invested in a total of 10 entrepreneurial firms, nine of which had women on the founding team and six of which had female CEOs. We are currently in the process of evaluating pre- and post-test data, but preliminary results suggest that participants made gains in skill areas related to the angel investing process. Our findings also suggest that those who participated in both training and networking activities achieved greater gains than those who participated in networking activities alone. For us, next steps include evaluating this first cohort of Rising Tide angel investors more thoroughly and incorporating our findings into training and networking activities that are being designed for the new cohorts that will launch in 2017.

In addition to the Rising Tide U.S. Angel Training Pilot Program, we have used this article as an opportunity to discuss some of the other initiatives that are responding to a call for increasing the flow of angel capital to growth-oriented women entrepreneurs. Although many of these initiatives have demonstrated some success in terms of attracting additional angel investors and helping women entrepreneurs connect with funding sources, more formal measures of how they contribute to job growth and economic development are often lacking. In light of that, next steps include better documentation of economic and employment impacts as well as cross-state and cross-country studies to identify “best practices” that can be shared. An important consideration from the standpoint of women’s entrepreneurship will be to ensure that new initiatives do not incorporate structural and attitudinal biases that may have sidelined women entrepreneurs and women angel investors in the past. As we have tried to point out in this article, we are just in the beginning stages of of closing the gender gap in angel investing in ways that will yield benefits and opportunities for women entrepreneurs and women investors in the United States and beyond. It is our belief and hope that the best is yet to come.

8 POLICY RECOMMENDATIONS

This study has shown that digitalization will offer women new opportunities to overcome current impediments and explore new careers. It will also challenge many jobs, however. The study gives rise to recommendations to the G20 that aim at helping women in exploiting the opportunities and facing the challenges that come with digitalization. Some of these recommendations have already been emphasized prominently in earlier studies while others add novel aspects to the discussion. The recommendations shared with the earlier studies include:

- To provide universal, affordable and open broadband internet access particularly for rural areas of developing and emerging economies;
- To foster women's digital literacy
- To improve cybersecurity, inter alia against sexual harassment;
- To develop and share web content relevant to women;
- To encourage more women to go into tertiary education and STEM occupations;
- To support dispersion of e-finance, e-commerce and e-government to facilitate female entrepreneurship; and
- To empower women financially through innovative digital finance tools and e-government.

In addition to these recommendations, the G20 should consider taking action in five areas. The first area addresses potential future challenges for women's jobs in all countries, the second and third the specific relevance of women's superior skills in lower- and higher income countries, and the fourth and fifth the role of new web-based tools for educating and financing female entrepreneurs in all countries.

1. **Keep track of gender-specific effects of digitalization on jobs.** While this study finds that women's jobs will be less susceptible to digitalization than men's jobs in the foreseeable future, at least in developed countries, some uncertainty remains. On the one hand, very little is as yet known about the susceptibility of women's jobs in emerging and developing countries. On the other hand, future technological progress may evolve into directions unforeseeable today. This is why G20 should initiate more high-profile research on the consequences of digitalization on women's employment prospects especially in emerging and developing countries, and continuously monitor women's employment prospects in all countries to establish an early warning system that may spark timely policy responses if necessary.

2. **Redesign existing government programs to foster women's economic and digital inclusion.** Many existing government programs especially in developing and emerging economies lend themselves to pursuing women's economic and digital inclusion in addition to their primary objectives. They may enhance women's economic inclusion by targeting women as beneficiaries of financial transfers to their families or communities, or entrusting them with program design, management or monitoring. In addition to enhancing women's economic inclusion, these modifications will even enhance program effectiveness, if they purposefully activate women's superior skills, notably their social skills, to the advantage of the program's primary objectives. Women's superior social skills manifest themselves in higher responsibility for the wellbeing of families or communities, greater empathy, higher communication competencies, or higher flexibility in adapting to changing circumstances, among others. The

programs may additionally both enhance women's digital inclusion and further reduce program costs by using digital technologies more extensively for payment, management or monitoring.

Conditional cash transfer programs like Mexico's "Prospera" or Brazil's "Bolsa Familia" programs (see section 6.2) provide good examples for these complementarities between women's economic inclusion and program effectiveness. There is scope for using digital technologies more extensively in most of these programs to enhance the women's digital inclusion, though.

3. **Help women complement their social skills with higher education and advanced digital skills in all G20 countries.** This study finds that gender gaps still exist in both university education and digital skills in several G20 countries. These gender gaps indicate important bottlenecks for women's access to those jobs that will most likely thrive best in the digital age. Keeping women from earning university degrees will prevent them from fully exploiting the opportunities of the digital age. Some women may even benefit more than men from the digitalization, if they complement their superior social skills with higher education and advanced digital skills. Advanced digital skills include high proficiencies in managing vast amounts of digital information, in data security issues and in coding. Studies like Deming (2015) suggest that wages have been increasing disproportionately for those who have high proficiencies in both social and cognitive skills. High proficiencies in cognitive skills, i.e., in problem solving, analytical and quantitative skills, are typically acquired at university. The G20 should ensure that women's talents are not wasted. It should grant women better chances to earn university degrees to better qualify them for high-profile jobs in management or STEM occupations, or for entrepreneurship.

Japan is one of the few countries that actively foster women's participation in higher education and research. It offers them favorable research environments and helps them improve their research skills, balance work and life, and access leading positions in research institutions or private companies.

4. **Support high-quality online platforms to foster women's entrepreneurial skills.** This study shows that women in virtually all G20 countries are still less likely to pursue an entrepreneurial career, particularly in ICT and knowledge-intensive sectors. This wide gender gap results primarily from women's less developed entrepreneurship-relevant human capital, such as lower managerial skills or less experience in STEM fields, as well as from a lack of female role models. This gap will constrain women even more in the digital age than in the past because digitalization will come with a greater variety of new, profitable entrepreneurial opportunities. Lacking sufficient entrepreneurial skills and role models, women will not be able to the same extent as men to recognize and pursue these new opportunities. Internet platforms are a promising new tool for disseminating entrepreneurial skills among women and providing them with more role models. In addition to improving female entrepreneurial skills in traditional ways, the G20 should support high-quality online platforms that train novice female entrepreneurs and facilitate their knowledge exchange with incumbent female entrepreneurs.

5. **Popularize innovative web-based instruments to access financial capital among female entrepreneurs.**

Female entrepreneurs face particular difficulties to access start-up capital necessary to set up and grow their businesses. One reason for these difficulties is that angel and venture capital networks, which are still male-dominated, preferably fund male-led businesses. Another reason is that many women lack collaterals required by traditional financial institutions to prove their creditworthiness. The G20 should promote innovative web-based instruments for women-led businesses to raise capital. It should popularize high-quality digital platforms for angel investors, venture capital investors or equity crowdfunding that bring together, train and mentor female entrepreneurs and female investors. It should also promote innovative ways of risk assessment that rely more on transaction histories and other information from the web than on traditional forms of securities.

The Next Wave Program in the United States is a promising digital platform for angel investors that enables women to invest in growth-oriented women-owned firms. It provides angel training programs and connects national networks of experienced and novice female investors. Goldman Sachs' 10,000 Women internet-based program provides women entrepreneurs in China with loans to grow their businesses by evaluating women's creditworthiness based on alternative information, such as transaction histories, rather than on collaterals.

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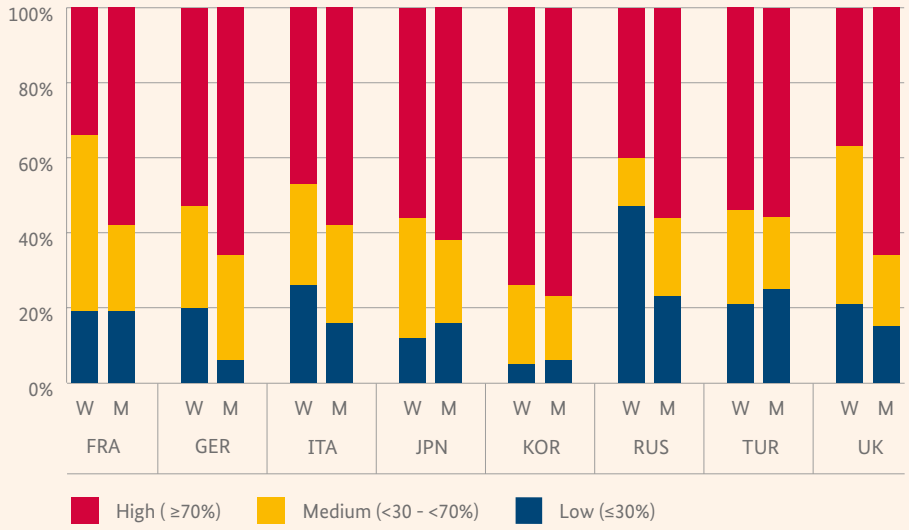
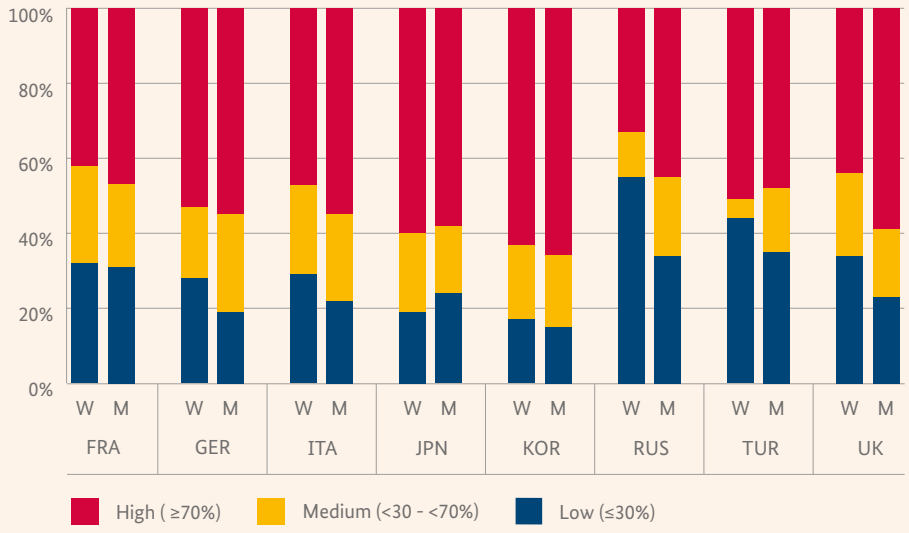
APPENDIX

Figure A2.2.1: Susceptibility to digitalization among female and male workers in selected G20 countries, by proficiency in literacy skills

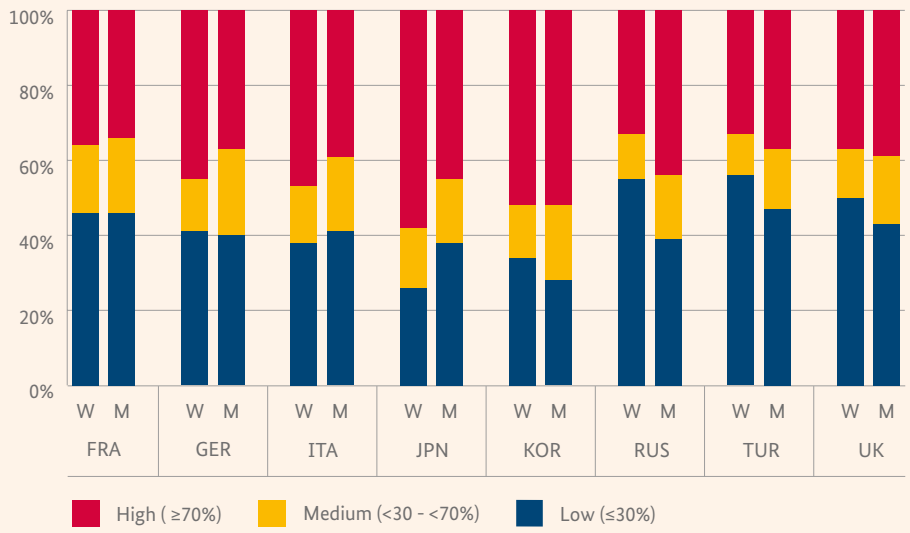
Digitalization probability: Low proficiency in literacy skills



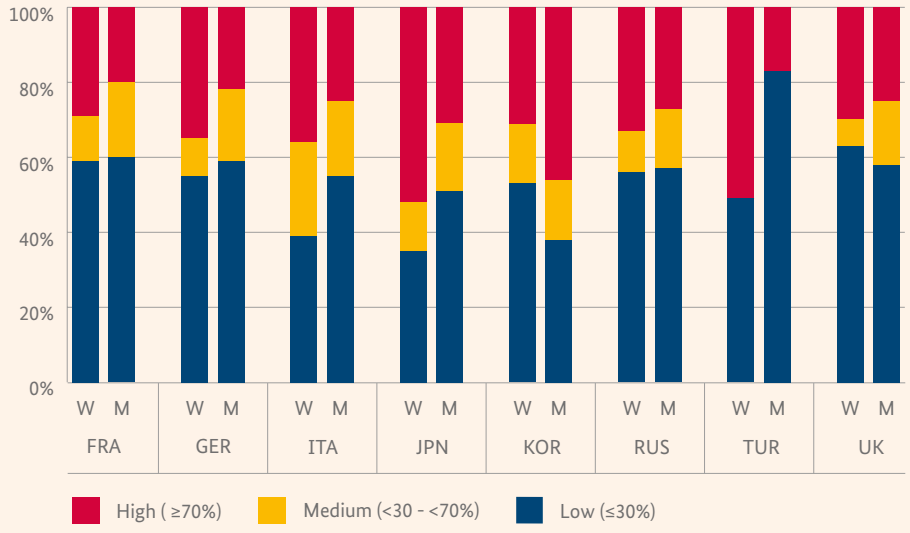
Digitalization probability: Medium-low proficiency in literacy skills



Digitalization probability: Medium-high proficiency in literacy skills



Digitalization probability: High proficiency in literacy skills

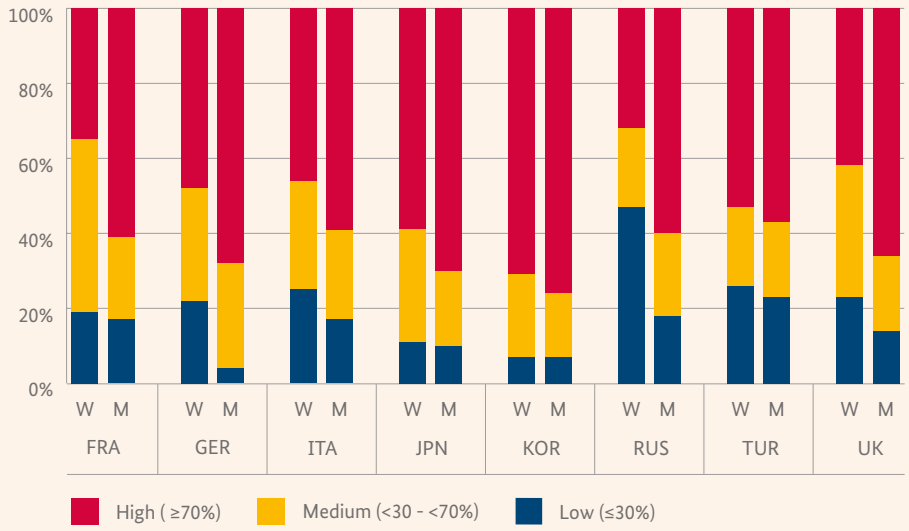


Notes: Average digitalization probabilities of the occupations currently (2012) held by women, resp. men aged 26-65 with the respective proficiency levels. Proficiency levels (PIAAC literacy scores, see OECD 2016: Table 2.1): Low (<226), Medium-low (226-275), Medium-high (276-325), High (>325). FRA: France, GER: Germany, ITA: Italy, JPN: Japan, KOR: Korea, RUS: Russian Federation, TUR: Turkey, UK: United Kingdom; W: Women, M: Men.

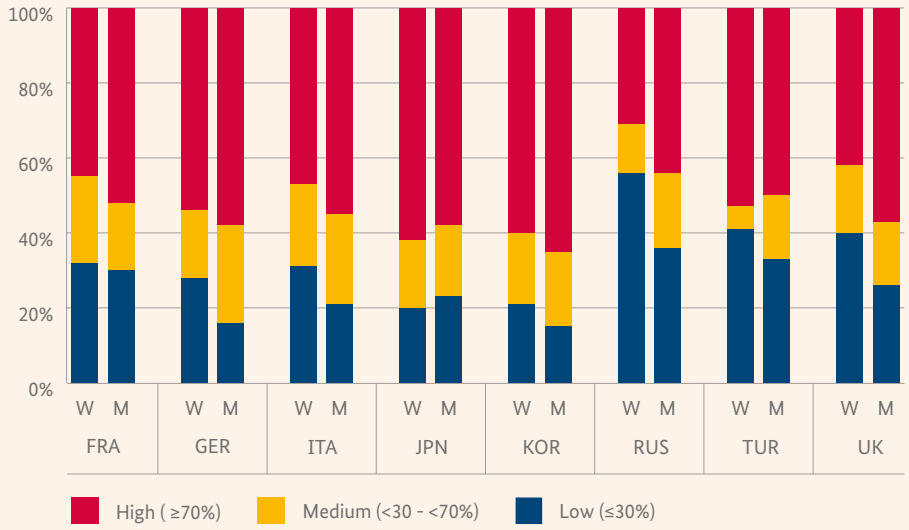
Sources: OECD (2016d), PIAAC; Frey and Osborne (2017); own calculations.

Figure A2.2.2: Susceptibility to digitalization among female and male workers in selected G20 countries, by proficiency in numeracy skills

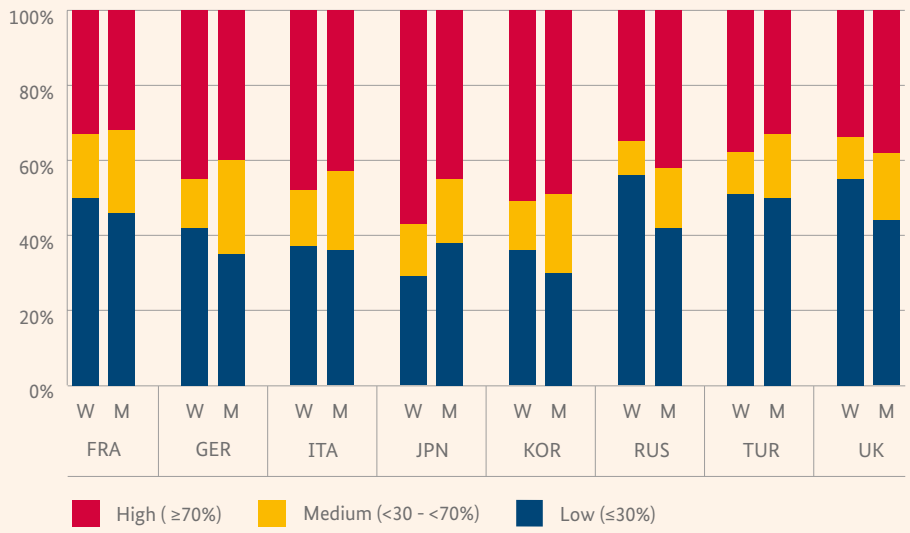
Digitalization probability: Low proficiency in numeracy skills



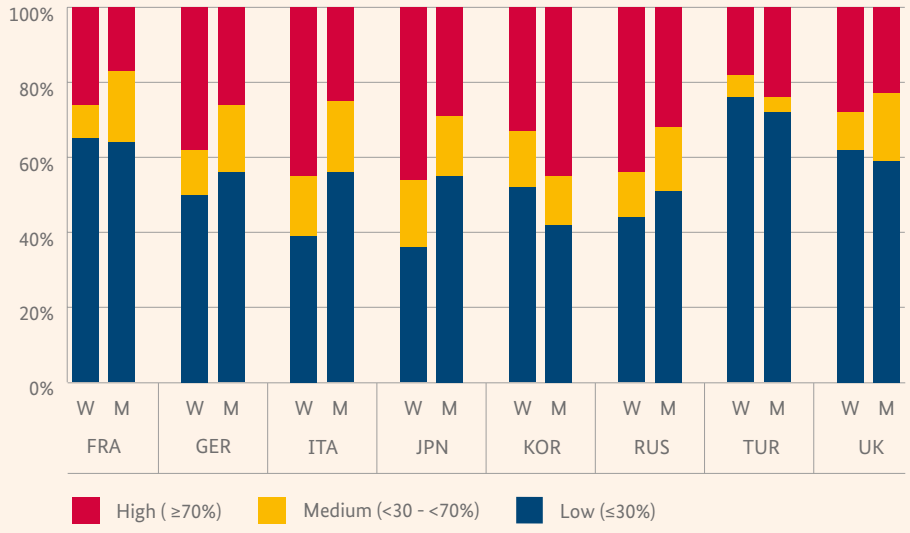
Digitalization probability: Medium-low proficiency in numeracy skills



Digitalization probability: Medium-high proficiency in numeracy skills



Digitalization probability: High proficiency in numeracy skills

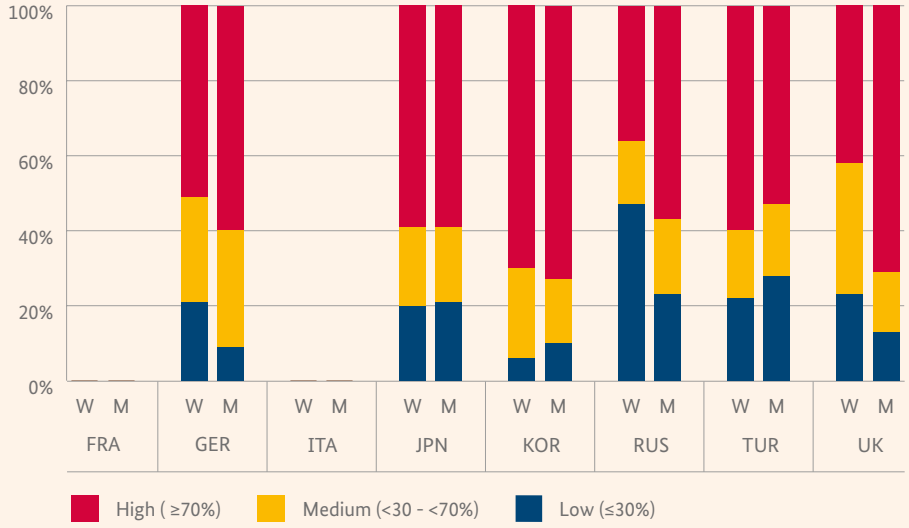


Notes: Average digitalization probabilities of the occupations currently (2012) held by women, resp. men aged 26-65 with the respective proficiency levels. Proficiency levels (PIAAC numeracy scores, see OECD 2016: Table 2.2): Low (<226), Medium-low (226-275), Medium-high (276-325), High (>325). FRA: France, GER: Germany, ITA: Italy, JPN: Japan, KOR: Korea, RUS: Russian Federation, TUR: Turkey, UK: United Kingdom; W: Women, M: Men.

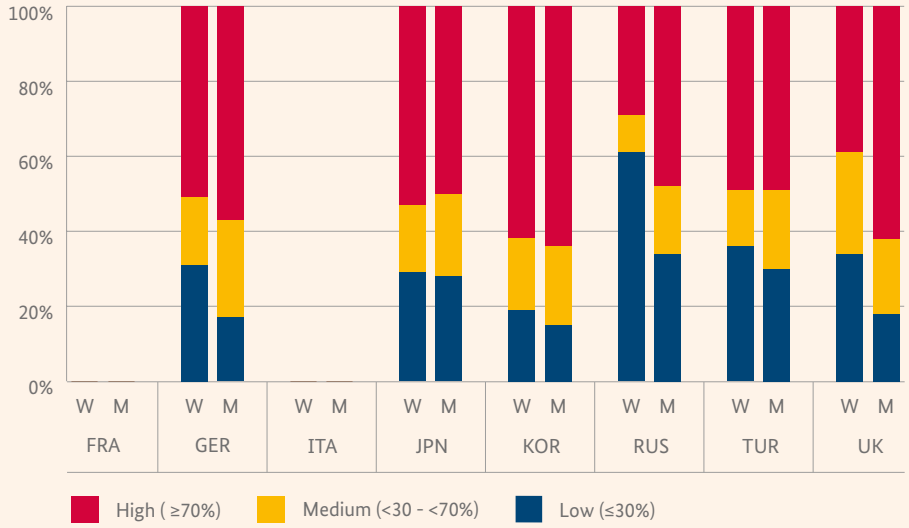
Sources: OECD (2016d); PIAAC; Frey and Osborne (2017); own calculations.

Figure A2.2.3: Susceptibility to digitalization among female and male workers in selected G20 countries, by proficiency in problem solving skills in technology-rich environments

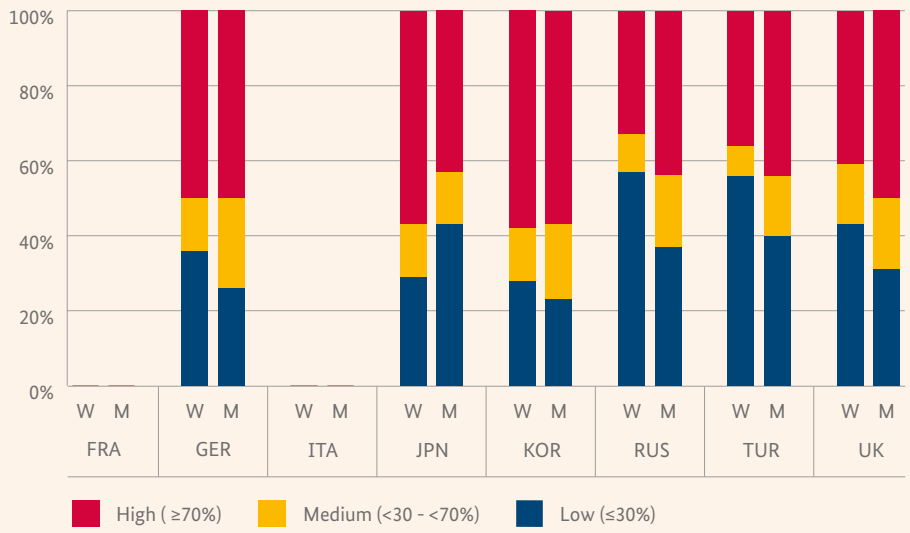
Low proficiency in problem solving skills



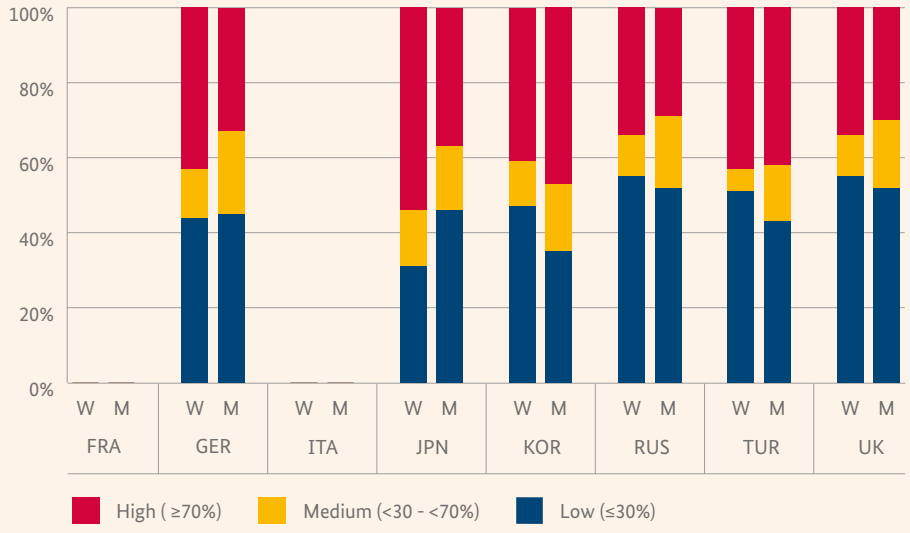
Medium-low proficiency in problem solving skills



Medium-high proficiency in problem solving skills



High proficiency in problem solving skills

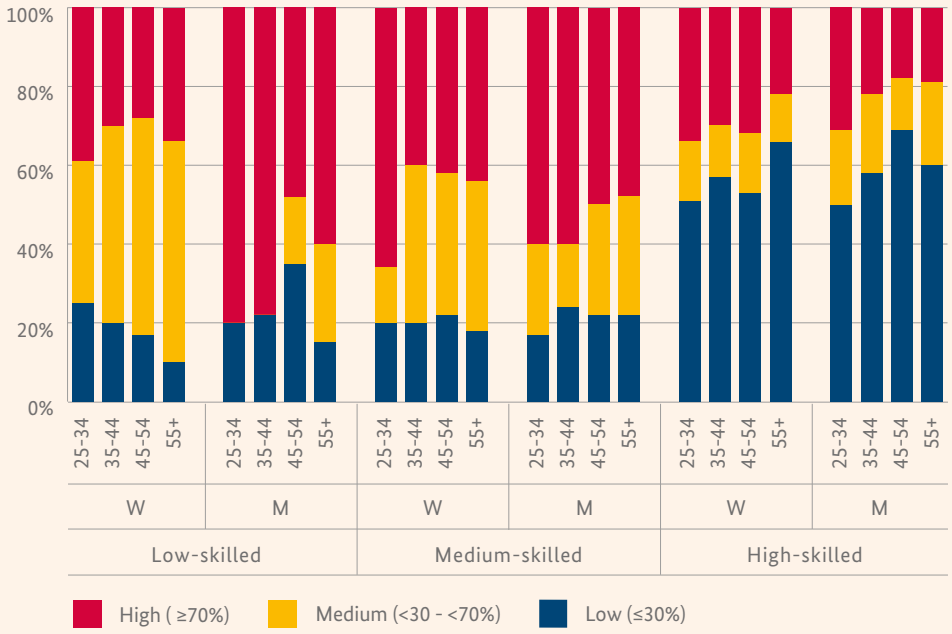


Notes: Average digitalization probabilities of the occupations currently (2012) held by women, resp. men aged 26-65 with the respective proficiency levels. Proficiency levels (PIAAC problem solving in technology-rich environments scores, see OECD 2016: Table 2.3): Lowest (0: no ICT skills), low (<241), medium-low (241-290), medium-high (291-340), highest (>340). FRA: France, GER: Germany, ITA: Italy, JPN: Japan, KOR: Korea, RUS: Russian Federation, TUR: Turkey, UK: United Kingdom; W: Women, M: Men.

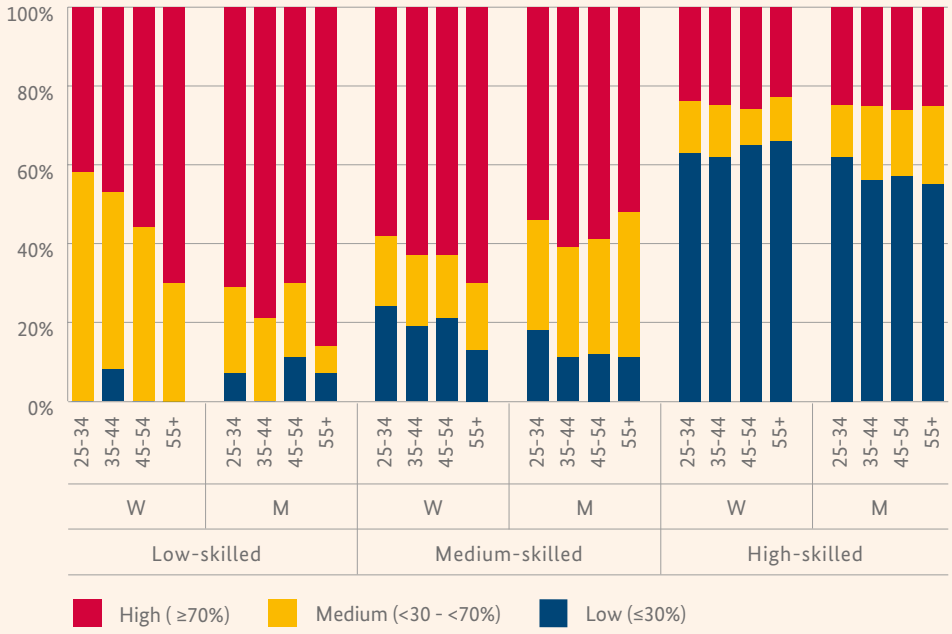
Sources: OECD (2016d), PIAAC; Frey and Osborne (2017); own calculations.

Figure A2.2.4: Susceptibility to digitalization among female and male workers in selected G20 countries, by educational attainment and age

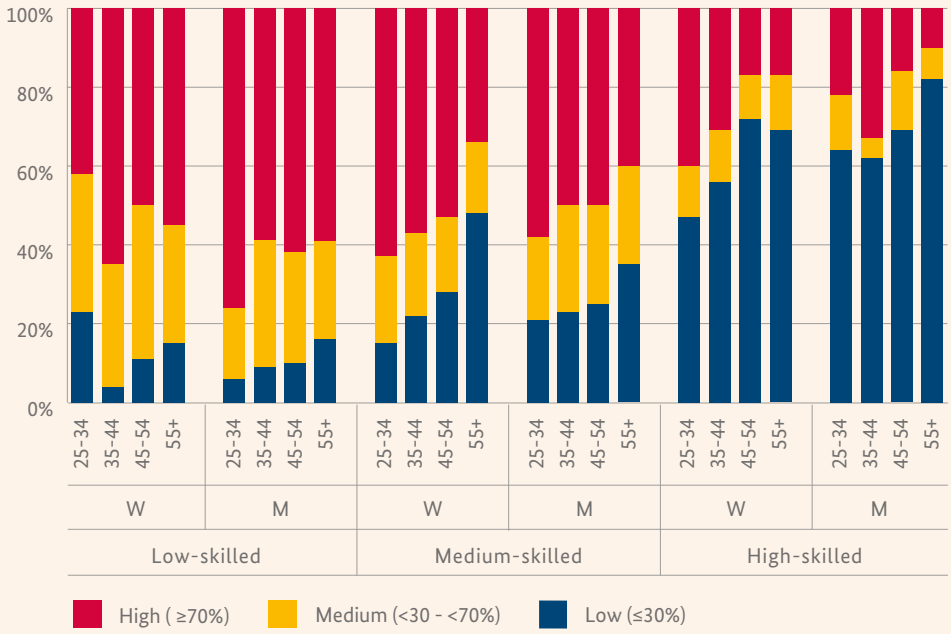
France



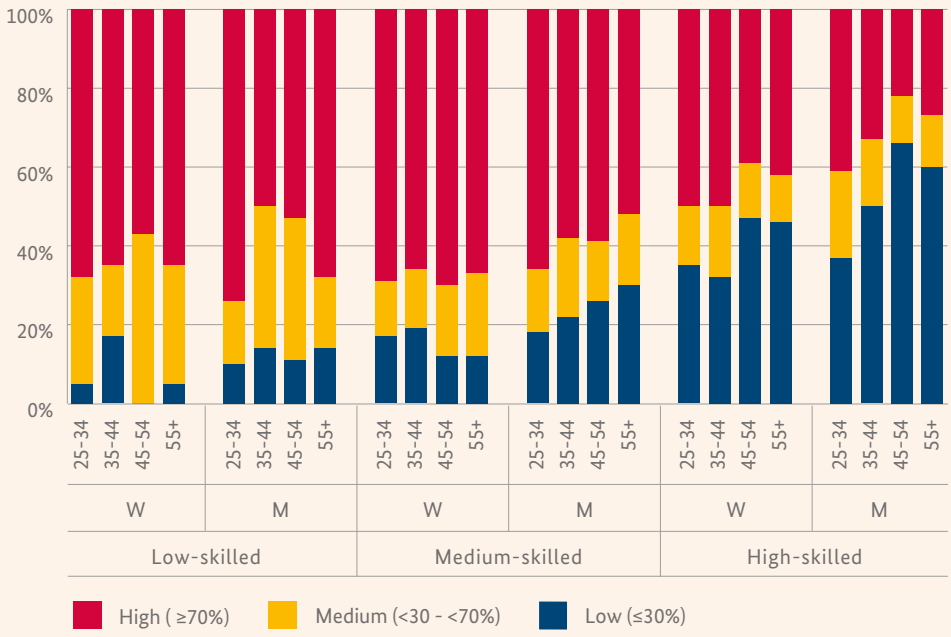
Germany



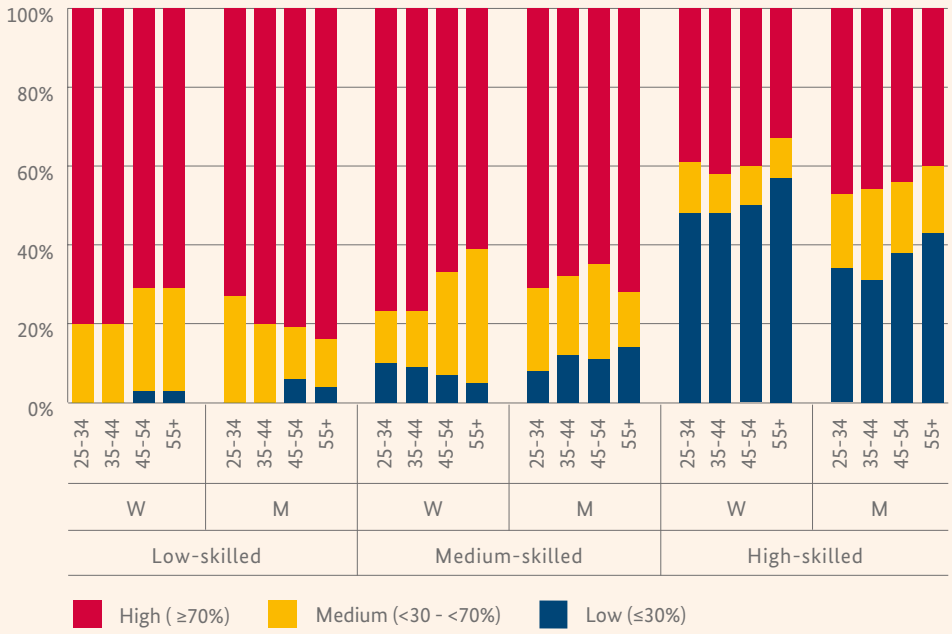
Italy


100%
80%
60%
40%
20%
0%
25-34
35-44
45-54
55+
W
M
Low-skilled
Medium-skilled
High-skilled
High (≥70%)
Medium (<30 - <70%)
Low (≤30%)

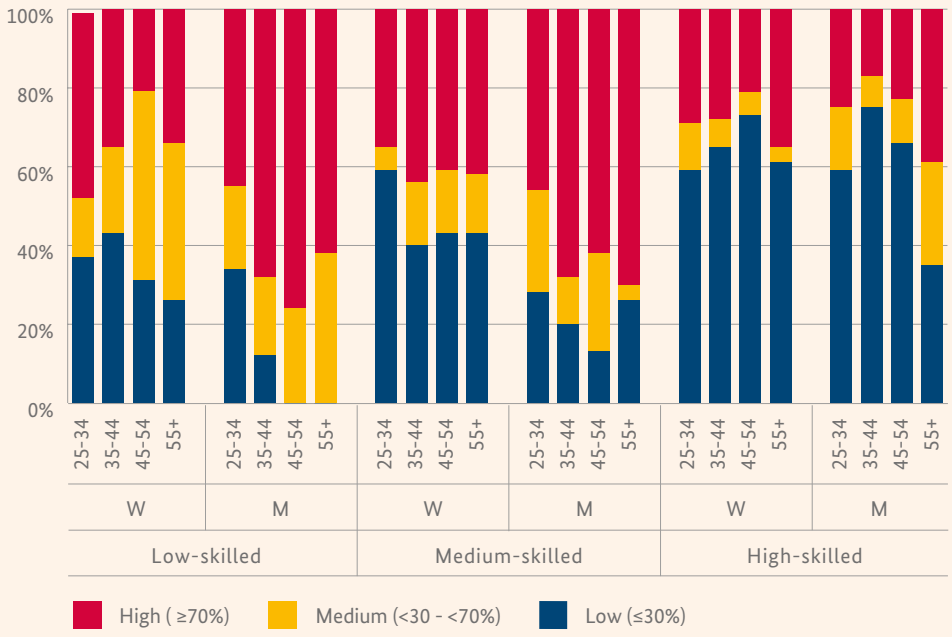
Japan


100%
80%
60%
40%
20%
0%
25-34
35-44
45-54
55+
W
M
Low-skilled
Medium-skilled
High-skilled
High (≥70%)
Medium (<30 - <70%)
Low (≤30%)

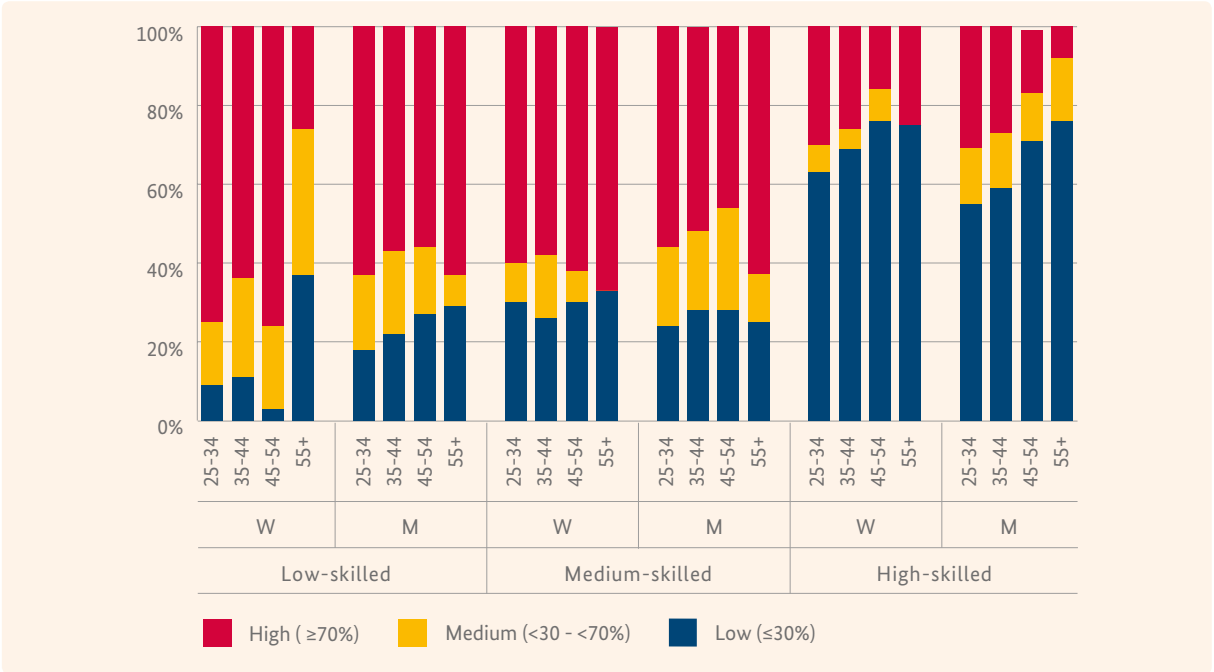
Korea



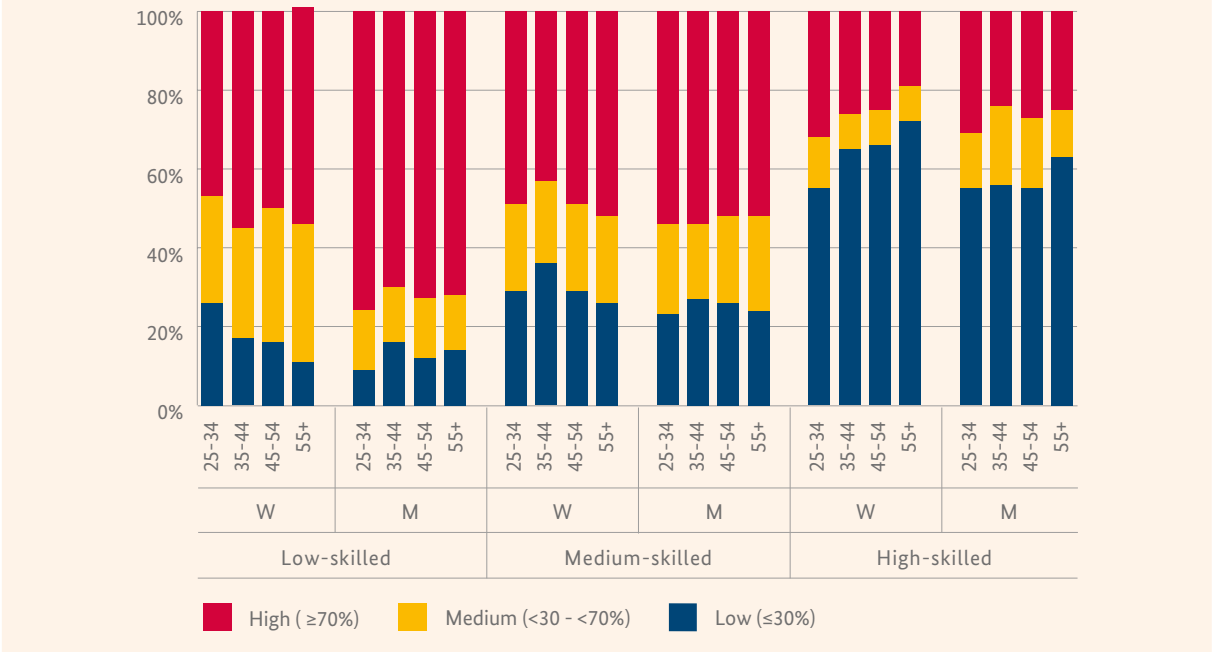
Russia



Turkey



United Kingdom



Notes: Shares in all employed women, resp. men aged 26-65 in the respective skill group whose current (2012) occupations face a low, medium or high estimated probability of being digitalized within the next one or two decades. Education groups: Low-skilled: Up to lower secondary (ISCED 0-2), Medium-skilled: Upper and post-secondary (ISCED 3-4), High-skilled: Tertiary (ISCED 5-8). W: Women, M: Men.

Sources: OECD (2016d), PIAAC; Frey and Osborne (2017); own calculations.

Table A6.1.1: Overview on measures and initiatives addressing the gender digital divide

Project location	Project Title	Typology	Focus
Argentinia	**Girls in Tech (Argentina)**	**Community-building**	**Gender-focused**

Description:
Girls in Tech (GIT) is a global non-profit organization whose focus is to engage, educate and empower girls and women who are passionate about technology. Our goal is to accelerate the development of innovative women who are accessing the high-tech industry and building successful startups. The program includes: Lady Pitch Night, Catalyst Conference, Bootcamps Programming and Design, Hackathones, XChange, Global Classroom, GIT WORK and others.

Website:
www.argentina.girlsintech.org

Implementer stakeholder:
Girls in Tech (Argentina)

Argentina	**Chicas en Tecnologia**	**Networking**	**Gender-focused**

Description:
Girls in Technology is a non-profit organization that seeks to motivate, empower and increase the knowledge and enthusiasm of young women for technology. Motivation: The main focus of our Programs is that the participants have experience in a real professional ecology. That is from the physical space and the methodologies of work to the guests specialists, mentors and challenges. The participants experience what it really is to immerse themselves in the technological entrepreneurial environment. Forming: We approach tools of logical thinking, problem solving skills, creativity, communication, design, teamwork and strategies to undertake. With a focus on the use of technology as a source of real problem solving, participants are challenged and appropriate the process of developing technological solutions in a practical and close to the professional field.

Website:
www.chicasentecnologia.org

Implementer stakeholder:
Chicas en Tecnologia

Argentina/ national	**Conectar Igualdad/ 2010**	**Infrastructure development**	**Gender-blind**

Description:
This Program aims to deliver a netbook to all students and teachers of public secondary schools, special education, and teacher training institutes. It is also proposed to train teachers in the use of this tool, And elaborate educational proposals that favor their incorporation into the teaching and learning processes

Website:
www.conectarigualdad.gob.ar

Implementer stakeholder:
Chicas en Tecnologia

Argentina	**Plan Federal de Internet**	**Infrastructure development**	**Gender-blind**

Description:
This program aims at providing ICT equipment and training to expand ICT skills among citizens

Website:
www.argentina.gob.ar/comunicaciones/planfederaldeinternet

Argentina	**Agenda de las Mujeres**	**Community-building**	**Gender-focused**

Description:
Provide access to important information produced in the region on the women's movement and gender equality issues. They reproduce articles published throughout the continent and make available key documents, research, statistics and reports related to women's status and the advancement of their rights.

Website:
www.agendadelasmujeres.com.ar

Project location	Project Title	Typology	Focus
Argentina	**Plan Nacional de Conectividad Escolar**	**Infrastructure development**	**Gender-blind**

Description:
The program seeks to connect 2,000 rural schools to internet for pedagogical purpose.

Website:
www.educacion.gob.ar/ministerio-de-educacion-y-deportes/noticias/42/pplan-nacional-de-conectividad-escolarnbspp

Argentina	**Plan Nacional Integral de Educación Digital-PLANIED**	**Infrastructure development**	**Gender-blind**

Description:
The program seeks to promote digitalization in educational institutions.

Website:
www.planied.educ.ar

Argentina	**Servicio Universal from the ENACOM (Ente Nacional de**	**Infrastructure development**	**Gender-blind (no mention of gender)**

Description:
The initiative includes two programs, Programa Conectividad and Internet para Establecimientos Educativos. It seeks to enable the access of population to the ICT services. Another objective is to provide internet access to state-run educational establishments.

Website:
www.enacom.gob.ar/su

Argentina	**Modernization and Innovation for Better Public**	**Infrastructure development**	**Gender-blind**

Description:
The program pursues improvements in digital services for citizens and expanded online services for small- and medium enterprises, among others.

Australia	**ACS Women Board**	**Advocacy**	**Gender-focused**

Description:
To empower women and ACS members by influencing Government policies, providing educational and networking opportunities and by setting a strategic direction for state and territory branches and chapters to support women engaged in the ICT sector.

Website:
www.more.acs.org.au/news-and-media/news/2015/acsw-introduction

Implementer stakeholder:
Australian Computer Society

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Australia	**Women in ICT Award (WIICTA)**	**Awareness raising**	**Gender-focused**

Description:
Over 25 years, ARN has faithfully chronicled the role of women in ICT. The ARN Women in ICT Awards provides a program that promotes and recognises the professional achievements of women in the IT channel. In its fifth year, the Awards program recognises and celebrates the achievements of talented female front runners who have become influential figures in Australia's ICT industry. The awards also recognise the rising stars, women who are quickly growing in importance in our industry, and women working towards improving gender diversity in the ICT workplace.

Website:
www.arnnet.com.au/wiicta

Implementer stakeholder:
ARN from IDG www.arnnet.com.au

Brazil	**Internet and gender, race and other social markers**	**Awareness raising**	**Gender-blind (no mention of gender)**

Description:
Research center, aims to foster academic debate around the issues involving law and technology, especially internet policy.

Website:
www.internetlab.org.br/en/pesquisa/internet-gender-race-and-other-social-markers/

Implementer stakeholder:
InternetLab

Brazil	**Meninas Digitais - UFSC**	**Mentoring**	**Gender-focused**

Description:
Digital Girls - Regional South is a project that is part of a program of the Brazilian Society of Computing that aims to disseminate the exact areas of technology and science. The project's focus is to arouse interest and motivate secondary school students to become better acquainted with the area and thus to develop skills for the search of knowledge in order to demystify the role of women in that area.
The mini-courses of unplugged computing, mobile application development, digital games, robot construction and automation systems, assembly of electric circuits and electronics are offered by the project. And construction of home automation and intelligent cities, among other activities

Website:
www.labtec.ufsc.br/meninasdigitaisufsc

Implementer stakeholder:
Labtec, Universidade Federal de Santa Catarina

Brazil	**Mozilla Women and Web Literacy by Mozilla**	**Capacity-building**	**Gender-focused (main focus on gender)**

Description:
They taught about internet and web for 150 women from a rural region and they provided access to internet to that region

Website:
www.mozilla.github.io/womenandweb

Brazil - Amazonic region/ national	**Barco Hacker/ 2014**	**Awareness raising**	**Partial gender dimension (some focus on gender)**

Description:
It is a citizenship project focused on technology and internet/information access to Amazonia region Barco Hacker project is leaded by a woman entrepreneur in technology who has been role model for many women and girls in the region

Website:
www.barcohacker.com.br

Project location	Project Title	Typology	Focus
Brazil - Amazonic region/ national	**PoliGen**	**Capacity building**	**Gender-focused**

Description:
They often do workshops about security and privacy on the Internet They promote digital literacy workshops focused on women, through activities that go beyond the university walls The group is composed of undergraduate and graduate students, teachers and non-teaching staff of the University of São Paulo Most of the group members have some relation to the areas of so-called hard sciences, but there is no restriction on participation because it is understood that diversity stimulates equity and innovation The group that includes men and women and is open to any interested (as) to act, discuss and/or research gender issues, such as feminism, science, technology, etc

Website:
www.poligen.polignu.org

Brazil - Amazonic region/ national	**MariaLab Hacker Space**	**Community building**	**Gender-focused**

Description:
The MariaLab is a feminist hackerspace, a collective and open space dedicated to the creation and exchange of knowledge

Website:
www.marialab.org

Brazil national	**Elas nas Extatas/ 2015**	**Capacity building**	**Gender-focused (main focus on gender)**

Description:
The initiative aims to contribute to reducing the impact of gender inequalities on professional choices and access to higher education for students, also impacting access to Information and Communication Technologies. The focus is on high school girls, students from public schools . Girls are offered workshops on electrical circuits, classroom-performance on female scientists, training in robotics, programming with free software, webseries production on the performance of black women in the history of sciences

Website:
www.fundosocialelas.org

Brazil/ national	**Byte Girl**	**Capacity building**	**Gender- focused (main focus on gender)**

Description:
It is an annual conference focused in bringing women from across the country to talk about gender The event is particularly focused in empowerment through gender-sensitive knowledge diffusion and capacity building through several workshops

Website:
www.bytegirl.com.br

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Brazil/ national	**trans TI/ 2016**	**Capacity building**	**Gender-focused (main focus on gender)**

Description:
This initiative was born along with my experience with TransENEM, a community prep course in Porto Alegre, Brazil, which is aimed at social inclusion of transgender women, men and non-binary people The importance of digital inclusion of transgender and non-binary population comes with the fact social inclusion via inclusion in college and formal education takes a long way to be effective and to change their lives Nowadays, 92% of transgender women in Brazil have their incomes derived from sexual work, and a significant part of these women do this because it's the best way to have an income given the barriers they face in face of social and institutional discrimination Therefore, digital inclusion is key for not only including them in the new world's reality and spectre of interpersonal relations, but also to change their lives without having to rely on solving traditional educational gaps Therefore, trans TI works in two ways: i) through the capacitation of workforce by providing IT related and English courses; ii) developing and building healthy and friendly workplace environment in IT companies by providing consultancy related to or targeted social group. or our presentation

Website:
www.facebook.com/transtipoa
(in Portuguese): www.tinyurl.com/trans-TI-apresentacao

Brazil	**Women Makers**	**Community-building**	**Gender-focused (main focus on gender)**

Description:
Women Makers aims to boost, empower, encourage and inspire the participation of women in the areas of Technology, Engineering and Entrepreneurship. Through the connection with the three topics, the project seeks educational, motivational and inspiring through events, workshops and meetings to attract girls and women to the areas.

Website:
www.facebook.com/WomenMakers

Brazil	**Meninas Digitais - UFSC**	**Mentoring**	**Gender-focused**

Description:
RodAda Hacker is a network focused on stimulating the appropriation of new technologies by girls and women, which is based on the realization of collaborative workshops specially designed for the female audience. The meetings, for those who want to imagine and build incredible projects and recreate network technologies, have been taking place since 2012 in various parts of the country

Website:
www.rodadahacker.org

Implementer stakeholder:
Labtec, Universidade Federal de Santa Catarina

Brazil/ regional	**Governança da Internet e Gênero/ May 2016**	**Capacity-building**	**Gender- focused (main focus on gender)**

Description:
This is an experiment on using webinars, mobile messaging and onsite events to gather inputs on gender digital divide and hopefully it will gather more regional perspectives. ... This mobile messaging group was created to support an activity on gender digital divide in IGF Brazil and fostered debate among participants. Currently, a report is being produced on the summary of the meeting and expansion of those activites are being planned.

Website:
www.intgovforum.org/multilingual/content/bpf-gender-and-access

Implementer stakeholder:
Renata Aquino Ribeiro

Project location	Project Title	Typology	Focus
Brazil/São Paulo/ national	**Reprograma**	**Training**	**Gender-focused (main focus on gender)**

Description:
It focuses on teaching women on coding and enterpreneurship

Website:
www.reprograma.com.br

Brazil	**CEMINA Communication, Education and Information on Gender**	**Capacity-building**	**Gender-focused**

Description:
CEMINA aims to empower women communicators by providing them access to the Internet through the creation of community radio telecentres and a defined space on the Internet with gender content.

Website:
www.comminit.com/content/cyberela-network

Canada	**Accelerating Women**	**Capacity-building**	**Gender-focused**

Description:
Accelerating Women is an exciting new pilot project designed to help women better access critical supports to help them start and grow successful companies.

Website:
www.canadaone.com/awys/index.html

Implementer stakeholder:
Canada One

Canada	**Ladies learning code**	**Training**	**Gender-focused**

Description:
Our adult programming offers women (and men) hands-on, project-based learning experiences that are designed to give beginners the skills and confidence they need to become digital creators. Our workshops and educational events are open to adults of all ages. Workshops cover everything from introductory HTML & CSS, to WordPress, Python, Ruby, web design and more. They are especially popular and successful because of the 4:1 ratio of students to volunteer instructors at every workshop, which is only possible because of overwhelming support from the technology and startup communities in the cities where we operate.

Website:
www.ladieslearningcode.com/program/ladies-learning-code

Implementer stakeholder:
Ladies Learning Code

Canada	**Girls learning code**	**Capacity-building**	**Gender-focused**

Description:
Girls Learning Code programs are designed to help girls see technology in a whole new light–as a medium for self-expression, and as a means for changing the world. Workshops, camps and after school programs cover a variety of topics from HTML & CSS and Ruby to image editing and blog creation, to 3D printing to hardware hacking with arduinos and more. We maintain a 4:1 ratio of youth to instructors at these workshops and focus on selecting volunteers who will serve as especially effective role models for the young women.

Website:
www.ladieslearningcode.com/program/girls-learning-code/

Implementer stakeholder:
Ladies Learning Code

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Canada	**Georgian Partners Scholarship Fund**	**Training**	**Gender-focused**

Description:
technology-based workshops, camps and afterschool programs for girls ages 6-16 to inspire them to be passionate builders and not just consumers of technology and to use technology as a creative tool to change the world.

Website:
www.ladieslearningcode.com/georgian-partners-scholarship-fund

Implementer stakeholder:
Ladies Learning Code

Canada	**GIRLsmarts4tech**	**Training**	**Gender-focused**

Description:
Computer Science Workshops for Girls Computer Science Workshops for Girls

Website:
www.cs.ubc.ca/girlsmarts4tech

Implementer stakeholder:
The University of British Columbia

Canada	**Women in Global Science and Technology**	**Advocacy**	**Gender-focused**

Description:
In 2003, WISAT worked with Orbicom and Statistics Canada on the project, Women in the Information Society, part of the Orbicom project From the Digital Divide to Digital Opportunity: Measuring Infostates for Development. The project: collected and assessed existing national level sex-disaggregated data on women's participation in the information society in both developed and developing countries; generated and analysed qualitative and quantitative data on women's participation in the information society at the national level; and provided qualitative analysis on the factors affecting women's participation.

Website:
www.wisat.org

Implementer stakeholder:
Women in Global Science and Technology

Canada	**Workshop in Computer Science for Young Women (wisat)**	**Training**	**Partial gender dimension (some focus on gender)**

Description:
The CEMC Workshop in Computer Science for Young Women was designed to encourage young women considering computer science as a career for the first time

Website:
www.cemc.uwaterloo.ca/events/csgirls.html

Implementer stakeholder:
Centre for Education in Mathematics and Computing (CEMC)

China, PR	–	–	–

Description:
–

Website:
–

Project location	Project Title	Typology	Focus
France	**Capital Filles**	**Mentoring**	**Gender-focused**

Description:
Individual tutoring, workshops; for equal opportunities for women

Website:
www.capitalfilles.fr

Implementer stakeholder:
Orange - public private

Germany	**Diversity Charter**	**Advocacy**	**Gender-blind (no mention of gender)**

Description:
The Diversity Charter is a corporate initiative to promote diversity in business enterprises. All employees deserve respect and appreciation - regardless of gender, nationality, ethnic origin, religion and belief, disability, age, sexual orientation and identity. The Diversity Charter was founded by Deutsche Telekom together with Daimler, BP Europa SE and Deutsche Bank in December 2006. More than 1000 companies and public utilities have since joined and new members continue to sign up.

Website:
www.telekom.com/en/company/human-resources/content/diversity-charter-352978

Implementer stakeholder:
Deutsche Telekom

Germany	**Womens' STEM Award**	**Awareness raising**	**Gender-focused**

Description:
Price for thesis in the STEM-area handed in from women

Website:
http://www.telekom.com/women-stem-award

Implementer stakeholder:
Deutsche Telekom

Germany	**Girls' Day**	**Awareness raising**	**Gender-focused**

Description:
At Girls'Day, companies, businesses and universities throughout Germany open their doors to schoolchildren from the 5th grade

Website:
www.girls-day.de

Implementer stakeholder:
Girls' Day

India	**Uninor - Project Sampark**	**Capacity-building**	**Gender-focused**

Description:
Telenor Group's subsidiary in India has developed and launched a pilot strategy, Project Sampark, to bridge the gender gap in rural India, drive commercial revenue, and create value for women.

Website:
www.gsma.com/mobilefordevelopment/programme/connected-women/uninor-project-sampark

Implementer stakeholder:
Telenor India

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
India	**WoMoz India - Women in Tech**	**Training**	**Gender-focused**
Description: Women and Mozilla is a community composed of members from different Open Source projects. It is mainly dedicated to improving women's visibility and involvement in Free/Open Source and Mozilla, and to increase the number of women contributors.			
Website: www.womoz.org/blog/womoz-india-women-in-tech-community-development/		**Implementer stakeholder:** Mozilla	
India	**SEWA–Support for Empowering Women in Adversity**	**Training**	**Gender-focused**
Description: The project demonstrated that contrary to what might be expected, gender patterns in Internet use do not correspond to Internet penetration and that women's rates of Internet access and use do not automatically rise with national rates of Internet expansion. A range of socioeconomic and political factors were identified which affect and frame the gender digital divide, including social and cultural barriers to technology use; education and skill levels; employment and income trends; media and content; privacy and security and location/mode of access.			
Website: www.telenor.com/media/articles/2013/uninor-pilots-female-empowerment-initiative/		**Implementer stakeholder:** Telenor India	
India	**IT for Change**	**Capacity-building**	**Partial gender dimension (some focus on gender)**
Description: IT for Change (ITfC) focuses on theory-building and policy research, adopting a pro-South feminist approach. ITfC seeks to build a theoretical framework of gender and information society that problematises women's citizenship in the changing social order. ITfC's research and advocacy have critiqued market-based approaches in policy making–globally and nationally–and have pushed for new frameworks based on citizenship and rights-based approaches.			
Website: www.itforchange.net/gender		**Implementer stakeholder:** IT for Change	
India	**Banduria ICT Centre**	**Capacity-building**	**Gender-focused**
Description: learning to use a computer and accessing and distributing information to local people			

Project location	Project Title	Typology	Focus
Indonesia	**Indosat Ooredoo Wireless Innovation Contest**	**Capacity-building**	**Partial gender dimension (some focus on gender)**

Description:
Since 2006, Indosat Ooredoo consistently presents Indosat Ooredoo Wireless Innovation Contest (IWIC) to stimulate Indonesia young generation interest in digital world. This mobile application competition event also has a purpose to fulfill the need of nation digital talent in the midst of high trend of online application usage nowadays. 10th IWIC brings many categories to be followed; one of it is Special Category for Women & Girls, along with Indosat Ooredoo commitment to keep supporting women empowerment through Women Connected to Mobile Internet program. Participant can send idea and application that can help women activities either in her professions or her daily activities. This category is brought to increase the number of women that connected to internet, and in the end help increase her life quality.

Website:
www.iwic.indosatooredoo.com/en/faq

Implementer stakeholder:
Ooredoo Corporate

Italy	**DolceVita Institute of Technolog**	**Training**	**Gender-focused**

Description:
DolceVita Institute of Technology‘s outreach program that offers free high-tech camps for Italian high school girls

Website:
www.dolcevitatech.education/girls-in-stem.html

Italy	**“In estate si imparano le STEM” – Summer Camps in Sciences, mathematics, IT & coding**	**Training**	**Gender-focused**

Description:
The initiative was launched in 2017 and it is supported by Department of Equal Opportunity (DPO) and Ministry of Education, University and Research (MIUR). The aim is to finance projects of in-depth courses in STEM subjects dedicated to young girls of primary and secondary schools (from 6 to 14 years old). The purpose is to tackle early-developed gender stereotypes; stimulate STEM learning through innovative forms of education.

Implementer stakeholder:
Department of Equal Opportunity (DPO); Minister of Education, University and Research (MIUR)

Italy	**(PNSD) National Plan for a Digital School: Action #20 – Girls in Tech & Science**		**Gender-focused**

Description:
The PNSD promoted by Ministry of Education, University and Research (MIUR) supports the recent reform La Buona Scuola [Law 107/2015] and it is a National Plan aimed at tackling girls’ confidence-gap in STEM subjects, and developing teachers’ competences in breaking gender stereotypes.

Implementer stakeholder:
Minister of Education, University and Research (MIUR)

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Italy	**#DigiWomen**	**Awareness raising**	**Gender-focused**

Description:
Digitalic (Italian magazine on technology) publishes from 2016 a list of the most influential women in technology to promote women as role models for young female professionals.

Implementer stakeholder:
Digitalic (Italian magazine on technology)

Italy	**#STEMintheCity**	**Training**	**Gender-focused**

Description:
Municipality of Milan organizes a three-days event dedicated to the discovery of STEM opportunities for women and girls, including the organization of courses, workshops, laboratories, hackatons and round tables.

Implementer stakeholder:
Municipality of Milan

Italy	**CodingGirls Roma - US**	**Training**	**Gender-focused**

Description:
Digital World Foundation and the U.S. Embassy in Italy organizes a training course on coding, addressed to different Roman schools, and an immersive experience of digital manufacturing and robotics with a final competition Marathon to create applications and educational products

Implementer stakeholder:
Digital World Foundation and the U.S. Embassy in Italy

Italy	**Digital Girls**	**Training**	**Gender-focused**

Description:
Summer camp dedicated to informatics and technology matters, solely for young girls, is organized from 2014 by the University of Modena and Reggio Emilia and European Women.

Implementer stakeholder:
University of Modena and Reggio Emilia and European Women Development Management Association (EWMD) of Reggio Emilia

Italy	**Digitale Rosa (DIGITAL PINK)**	**Training**	**Gender-focused**

Description:
Europa Cube Innovation Business School organizes one full day of training and networking dedicated to digital topics and addressed to web marketing women professionals.

Implementer stakeholder:
Europa Cube Innovation Business School

Italy	**Nuvola Rosa (Pink Cloud)**	**Training**	**Gender-focused**

Description:
Microsoft provides since 2013 training courses on STEM dedicated to young women. In recent years Nuvola Rosa also went on tour in South Italy.

Implementer stakeholder:
Microsoft

Project location	Project Title	Typology	Focus
Italy	**#DigiWomen**	**Awareness raising**	**Gender-focused**

Description:
Digitalic (Italian magazine on technology) publishes from 2016 a list of the most influential women in technology to promote women as role models for young female professionals.

Implementer stakeholder:
Digitalic (Italian magazine on technology)

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Implementer stakeholder:
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Implementer stakeholder:
Digital World Foundation and the U.S. Embassy in Italy

Italy	**Digital Girls**	**Training**	**Gender-focused**

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Summer camp dedicated to informatics and technology matters, solely for young girls, is organized from 2014 by the University of Modena and Reggio Emilia and European Women.

Implementer stakeholder:
University of Modena and Reggio Emilia and European Women Development Management Association (EWMD) of Reggio Emilia

Italy	**Digitale Rosa (DIGITAL PINK)**	**Training**	**Gender-focused**

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Implementer stakeholder:
Europa Cube Innovation Business School

Italy	**Nuvola Rosa (Pink Cloud)**	**Training**	**Gender-focused**

Description:
Microsoft provides since 2013 training courses on STEM dedicated to young women. In recent years Nuvola Rosa also went on tour in South Italy.

Implementer stakeholder:
Microsoft

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Italy	**Pink Week – Empowerment in business & STEM**	**Capacity-building**	**Gender-focused**

Description:
Lazio Region organizes a week of initiatives to enhance women individual skills on business and STEM topics; and involving women and girls in all social innovation fields, from startupping to talent management and teaching of digital topics.

Implementer stakeholder:
Lazio Region

Italy	**Settimana del rosa digitale (DIGITAL PINK WEEK)**	**Awareness raising**	**Gender-focused**

Description:
ICT and technology events organized by Digital Pink Movement in all Italian Regions with the aim to reduce the gender gap in technology and digital. Each event is called “pink petal”; main addressees are the young generations of men and women.

Implementer stakeholder:
Digital Pink movement

Italy	**WIT-Women in technology**	**Training**	**Gender-focused**

Description:
Sponsored by Costa Crociere Foundation, an initiative of Fondazione Mondo Digitale includes a series of training to support digital skills, targeting 150 young women living in the South of Italy.

Implementer stakeholder:
Fondazione Mondo Digitale

Italy	**Women at the hearth of digital innovation**	**Awareness raising**	**Gender-focused**

Description:
Press Conference organized by CA Technologies, Sodalitas Foundation and NetConsulting Cube to present „Digital gender gap: enhancing the female talent in the technology industry“, a research that analysed 60 companies and 216 high school students

Implementer stakeholder:
CA Technologies, Sodalitas Foundation and NetConsulting Cube

Japan	**WomanWill**	**Training**	**Gender-focused**

Description:
Womenwill /today is a forum to explore game-changing ways we can erase gender gaps and accelerate prosperity. Hear from regional and global thought leaders and women around the world who are coming together to learn, grow, make their voices heard, and change our future for the better.

Website:
www.womenwill.com/initiatives

Project location	Project Title	Typology	Focus
Korea	**Kyonggi Province Program**	**Training**	**Gender-focused**

Description:
provides training for women as IT professionals. The programme is tailored for women in different life situations. For example, unemployed women, women heads of households and handicapped women who want to enter the work force

Website:
www.we-apec.com/directory/gyeonggi-women%E2%80%99s-development-center

Implementer stakeholder:
Government

Korea	**Women's informatization survey and index development**	**Research**	**Gender-focused**

Description:
Research report on gender digital divide. The results showed that women's informatization index (defined as the process by which information technologies have transformed economy and society) measured 88 per cent that of men's. Although women scored very high on awareness, skills and effect, the situation of women was particularly deficient in terms of access and usage, with women having only 22.9 per cent the access of men and using the Internet 28.2 per cent as much as men.

Website:
Can't find the respective work

Implementer stakeholder:
Ministry

Korea	**Act on Fostering and Supporting Women in S&T**	**Advocacy**	**Gender-focused**

Description:
Of 2002, to increase number of female scientists and engineers: number of graduates as well as number of employees in public S&T institutions and private S&T enterprises

Website:
WISAT country report Korea

Implementer stakeholder:
Government

Mexico and LatAm/regional	**Epic Queen/ 2014**	**Awareness raising**	**Gender-focused (main focus on gender)**

Description:
They seek to grow the leadership of more women and girls in technology, science and entrepreneurship.

Website:
www.epicqueen.com

Implementer stakeholder:
Epic Queen

Russian Federation	**Love 2 Code**	**Training**	**Gender-focused**

Description:
Online platform developed by Microsoft that provides online programming courses for girls

Implementer stakeholder:
www.tceh.com/e/love2code/

Implementer stakeholder:
Microsoft

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Saudi-Arabia	**Glowork "women working from home"**	**Capacity-building**	**Gender-focused**

Description:
Glowork introduced a new staffing model, called "women working from home"

Website:
www.glowork.net

South Africa	**Code4CT**	**Training**	**Gender-focused**

Description:
We want to see young women empowered to leverage technology for social innovation, so that there is greater diversity in the African tech industry. We want high school girls to have an enabling environment to imagine and create new technology that is relevant to a South African context

Website:
www.code4ct.com

Implementer stakeholder:
Code for Cape Town (Code4CT)

South Africa	**ICT training for organizations**	**Training**	**Gender-focused**

Description:
WomensNet creates needs-based training courses for women's NGO's on using technology more effectively. The training focuses on strategic use of technology to meet the direct needs of women. We conduct training on producing audio files for community radio and the internet, creating digital stories, on using the internet and email effectively, on advocacy and lobbying online and other tailor made courses.

Website:
www.womensnet.org.za/projects

Implementer stakeholder:
Women's Net

United States	**Black Girls Code**	**Training**	**Gender-focused**

Description:
To increase the number of women of color in the digital space by empowering girls of color ages 7 to 17 to become innovators in STEM fields, leaders in their communities, and builders of their own futures through exposure to computer science and technology. To provide African-American youth with the skills to occupy some of the 1.4 million computing job openings expected to be available in the U.S. by 2020, and to train 1 million girls by 2040.

Website:
www.blackgirlscode.com

Implementer stakeholder:
Black Girls Code

United States	**Tech Girls Rock**	**Mentoring**	**Partial gender dimension (some focus on gender)**

Description:
empowering girls to explore a future in technology. The Tech Girls Rock initiative helps girls discover and cultivate an interest in information technology (IT), and ultimately tech-related educational opportunities and careers.

Website:
www.bgca.org/newsevents/PressReleases/Pages/GirlsRock_CA-Tech.aspx

Implementer stakeholder:
CA Technologies

Project location	Project Title	Typology	Focus
United States	**Be the Video Game Developer**	**Training**	**Gender-focused**

Description:
support Information Communications Technology programming for underserved girls and a number of Girl Scout councils with the enhanced „Be the Video Game Developer“ Program. Engaging girls with technology at a young age is critical to developing the next generation of female business leaders.

Website:
www.girlscouts.org/en/press-room/press-room/news-releases/2014/investing-in-opportunities.html

Implementer stakeholder:
Dell

United States	**Scholarship for Women Studying Information Security**	**Training**	**Partial gender dimension (some focus on gender)**

Description:
Increasing the success and participation of women in computing research.

Website:
www.cra.org/cra-w/2016-scholarship-women-studying-information-security-winners-announced/

Implementer stakeholder:
Hewlett-Packard

United States	**Women Innovation Council**	**Community-building**	**Partial gender dimension (some focus on gender)**

Description:
The Women’s Innovation Council was founded in 2013 to provide women technology leaders with a collaborative forum to drive and share technology innovations to make a difference in their businesses and communities.

Website:
www.community.hpe.com/t5/Behind-the-scenes-Labs/Energizing-Young-Women-to-Become-High-Tech-Innovators/bap/6795656#.WLbP8_4iyHs

Implementer stakeholder:
Hewlett-Packard

United States	**Kode With Klossy**	**Training**	**Gender-focused**

Description:
Kode With Klossy Summer Camp is a free two week program for girls 13-18 years old. Girls will be in classes of 20 learning to build real apps with code. Every month a Kode with Klossy Career Scholarship will be awarded to a woman who is passionate about building a career in code. Scholars will be enrolled in Flatiron School‘s online Full Stack Web Development curriculum using Learn.co.

Website:
www.kodewithklossy.com

Implementer stakeholder:
Kode with Klossy

United States	**Next Generation Awards**	**Awareness raising**	**Gender-focused**

Description:
L‘Oréal USA‘s Women in Digital program focuses on all women working in digital marketing, technology and IT functions by providing recognition, testing and recruitment opportunities. We are focused on how technology is revolutionizing the beauty industry. Our vision is to address the beauty industry with technology created by women for women.

Implementer stakeholder:
www.lorealwomenindigital.com

Implementer stakeholder:
L‘Oréal USA‘s Women in Digital

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
United States	**La TechLa**	**Training**	**Gender-focused**

Description:
Black Girls CODE and the Latino Startup Alliance are teaming up to empower young girls of color, by introducing them to coding and the transformative power of tech.

Website:
www.latechla.weebly.com

Implementer stakeholder:
Latino Startup Alliance

United States	**Soy Empresaria**	**Mentoring**	**Gender-blind (no mention of gender)**

Description:
The goal is to help Latino tech entrepreneurs gain access to the resources, capital, and networks they need to succeed.

Website:
www.latinostartupalliance.org/2014/11/14/square-and-xoom-team-with-latino-startup-alliance-to-award-latina-owned-businesses-in-california/

Implementer stakeholder:
Latino Startup Alliance

United States	**FOSS Outreach Program**	**Mentoring**	**Gender-focused**

Description:
Outreach Program for Women has been helping women (cis and trans), trans men, and genderqueer people get involved in free and open source software.

Website:
www.gnome.org/opw

Implementer stakeholder:
Linux Foundation

United States	**Black Girls Code**	**Training**	**Gender-focused**

Description:
To increase the number of women of color in the digital space by empowering girls of color ages 7 to 17 to become innovators in STEM fields, leaders in their communities, and builders of their own futures through exposure to computer science and technology. To provide African-American youth with the skills to occupy some of the 1.4 million computing job openings expected to be available in the U.S. by 2020, and to train 1 million girls by 2040.

Website:
www.blackgirlscode.com

Implementer stakeholder:
Black Girls Code

United States	**Tech Girls Rock**	**Mentoring**	**Partial gender dimension (some focus on gender)**

Description:
empowering girls to explore a future in technology. The Tech Girls Rock initiative helps girls discover and cultivate an interest in information technology (IT), and ultimately tech-related educational opportunities and careers.

Website:
www.bgca.org/newsevents/PressReleases/Pages/GirlsRock_CA-Tech.aspx

Implementer stakeholder:
CA Technologies

Project location	Project Title	Typology	Focus
United States	**DigiGirlz Day**	**Training**	**Gender-focused**

Description:
This one-day event, held at multiple Microsoft locations worldwide, is designed to provide high school girls with a better understanding of what a career in technology is all about.

Website:
www.microsoft.com/en-us/diversity/programs/digigirlz/digigirlz-day.aspx

Implementer stakeholder:
Microsoft

United States	**DigiGirlz High Tech Camps**	**Training**	**Gender-focused**

Description:
Camps to dispel stereotypes of the high-tech industry and to give young people a chance to experience what it is like to develop cutting-edge technology.

Website:
www.microsoft.com/en-us/diversity/programs/digigirlz/hightechcamp.aspx

Implementer stakeholder:
Microsoft

United States	**Million Women Mentors**	**Mentoring**	**Gender-focused**

Description:
Million Women Mentors supports the engagement of one million Science, Technology, Engineering and Math (STEM) mentors (male and female) to increase the interest and confidence of girls and women to persist and succeed in STEM programs and careers

Website:
www.millionwomenmentors.org

Implementer stakeholder:
Million Women Mentors

United States	**Aspirations in Computing**	**Community-building**	**Gender-focused**

Description:
long-term community for female technologists, from K-12 through higher education and beyond, encouraging persistence in computing through continuous engagement and ongoing encouragement at each pivotal stage of their educational and professional development

Website:
www.aspirations.org/aspirations-computing

Implementer stakeholder:
National Center for Women and Information Technology

United States	**Pacesetters Program**	**Capacity-building**	**Gender-focused**

Description:
NCWIT is a non-profit community that convenes, equips, and unites change leader organizations to increase the meaningful participation of all women — at the intersections of race, ethnicity, class, age, sexual orientation, and disability status — in the influential field of computing, particularly in terms of innovation and development.

Implementer stakeholder:
www.ncwit.org/programs-campaigns/pacesetters

Implementer stakeholder:
National Center for Women and Information Technology

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
United States	**Extension Services for Undergraduate Programs (ES-UP) for recr**	**Capacity-building**	**Gender-focused**

Description:
Helps academic departments of computing develop high-impact strategies for recruiting and retaining more women students with advice that is customized to local needs and conditions.

Website:
www.ncwit.org/project/extension-services-undergraduate-programs

Implementer stakeholder:
National Center for Women and Information Technology

United States	**Latinas in Technology**	**Awareness raising**	**Gender-focused**

Description:
TECHNOLOchicas is a collaborative project between the National Center for Women & IT (NCWIT) and Fundación Televisa designed to sensitize young Latinas and their families about opportunities and careers in technology.

Website:
www.ncwit.org/latinas-information-technology

Implementer stakeholder:
National Center for Women and Information Technology

United States	**NCWIT AspireIT Program**	**Mentoring**	**Gender-focused**

Description:
NCWIT AspireIT connects high school and college women with K-12 girls interested in computing. Using a near-peer model, program leaders teach younger girls fundamentals in programming and computational thinking in fun, creative environments that are supported by program partners from the NCWIT community.

Website:
www.ncwit.org/project/aspireit-k-12-outreach-program

Implementer stakeholder:
National Center for Women and Information Technology

United States	**Qualcomm Employee Networks**	**Capacity-building**	**Gender-blind**

Description:
invent mobile technology breakthroughs; fostering inclusive teams of diverse employees, by reaching out to diverse communities to promote technology education.

Website:
www.qualcomm.com/company/sustainability/priorities/diversity-inclusion

Implementer stakeholder:
Qualcomm

United States	**Thinkabit Lab**	**Training**	**Gender-blind**

Description:
An engineering lab, maker space and classroom for everyone.

Website:
www.thinkabitlab.com

Implementer stakeholder:
Qualcomm

Project location	Project Title	Typology	Focus
United States	**PR school**	**Training**	**Gender-focused**

Description:
Savor the Success is a virtual business school, community center, and wellness lifestyle hub for women entrepreneurs, makers and creators.

Website:
www.join.savorthesuccess.com/pr-school

Implementer stakeholder:
Savor the Success

United States	**TECHNOLOchicas**	**Awareness raising**	**Gender-focused**

Description:
TECHNOLOchicas is a collaborative project between the National Center for Women & IT (NCWIT) and Fundación Televisa designed to sensitize young Latinas and their families about opportunities and careers in technology.

Website:
www.ncwit.org/node/11782

Implementer stakeholder:
Televisa, NCWIT

United States	**STEM for Latinas**	**Awareness raising**	**Gender-focused**

Description:
primary purpose is to spread awareness about STEM and inspire and encourage middle school and high-school Latinas, especially within underserved communities, to strongly consider pursuing a STEM career

Website:
www.latinasinstem.com

Implementer stakeholder:
Televisa Foundation

United States	**Clubs Program**	**Training**	**Gender-focused**

Description:
Free after-school programs for 6-12th grade girls to use computer science to impact their community and join our sisterhood of supportive peers and role models

Website:
www.girlswhocode.com/clubs

Implementer stakeholder:
Verizon

United States	**Women in Technology International (WITI)**	**Community-building**	**Gender-focused**

Description:
programs and partnerships that provide connections, resources, opportunities and a supportive environment of women committed to helping each other; Networking, WITI Marketplace, Career Services/Search, National Conferences and Regional Events, Publications and Resources, Small Business Programs, Research, Bulletin Boards

Implementer stakeholder:
www.witi.com/setsymposium

Implementer stakeholder:
Women in Technology International (WITI)

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
United States	**Hack Bright Academy**	**Training**	**Gender-focused**
Description: Hackbright Academy is the leading engineering school for women with a mission to increase female representation in tech through education, mentorship and community			
Website: www.hackbrightacademy.com		**Implementer stakeholder:** Hackbright Academy	
United States	**She++**	**Awareness raising**	**Gender-focused**
Description: empowers high school students to hold workshops, host hackathons, organize clubs, and bring computer science to their communities			
Website: www.sheplusplus.org		**Implementer stakeholder:** She++	
United States	**Ada Initiative**	**Advocacy**	**Gender-focused**
Description: The Ada Initiative closed in October 2015, materials (workshop slides etc.) still available at the homepage			
Website: www.adainitiative.org		**Implementer stakeholder:** Ada Initiative	
United States	**Girl Develop It**	**Training**	**Gender-focused**
Description: Girl Develop It is a nonprofit organization that exists to provide affordable and judgment-free opportunities for women interested in learning web and software development. Through in-person classes and community support, Girl Develop It helps women of diverse backgrounds achieve their technology goals and build confidence in their careers and their every day lives.			
Website: www.girldevelopit.com		**Implementer stakeholder:** Girl Develop It	
United States	**CodeChix**	**Community-building**	**Gender-focused**
Description: CodeChix is a non-profit organization dedicated to the Education, Advocacy and Mentoring, of women engineers in industry and academia. We aim to increase the number of women engineers in industry through our technical and mentoring/networking programs.			
Website: www.codechix.org		**Implementer stakeholder:** Code Chix	
United States	**Femmes Duke**	**Networking**	**Gender-focused**
Description: The FEMMES organization seeks to improve female participation in STEM subjects with three main components: an annual one-day capstone event, an after-school program, and a summer camp program. The FEMMES organization seeks to improve female participation in STEM subjects with three main components: an annual one-day capstone event, an after-school program, and a summer camp program.			
Website: www.sites.duke.edu/femmes		**Implementer stakeholder:** Femmes	

Project location	Project Title	Typology	Focus
United States	**Project Include**	**Awareness raising**	**Partial gender dimension (some focus on gender)**

Description:
Project Include is an open community working toward providing meaningful diversity and inclusion solutions for tech companies.

Website:
www.projectinclude.org

Implementer stakeholder:
Project Include

United States	**Built by Girls**	**Training**	**Gender-focused**

Description:
Visit tech companies, preparation for internships, connecting with boss advisors.

Website:
www.builtbygirls.com

Implementer stakeholder:
Built by Girls

United States	**Ada Developers Academy**	**Training**	**Gender-focused**

Description:
It is a training program located in Seattle, Washington for women and non-binary people who want to become software developers; it is tuition-free and is comprised of 6 months of full-time classroom training followed by 5 months in a paid industry internship

Website:
www.adadevelopersacademy.org

Implementer stakeholder:
Ada Developes Academy

United States	**Women Techmakers**	**Capacity-building**	**Gender-focused**

Description:
Women Techmakers is continually launching global scalable initiatives and piloting new programs to support and empower women in the industry.

Website:
www.womentechmakers.com

Implementer stakeholder:
Google

United States	**Women 2.0**	**Capacity-building**	**Gender-focused**

Description:
media brand for women in tech

Implementer stakeholder:
www.women2.com

Implementer stakeholder:
Women 2.0

United Kingdom	**Stemettes**	**Awareness raising**	**Gender-focused**

Description:
Running public events, school trips, a more-than-mentoring programme & an app.

Website:
www.stemettes.org

Implementer stakeholder:
Stemettes

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
United Kingdom	**Women in IT Awards**	**Awareness raising**	**Gender-focused**
Description: The Women in IT Awards is the world's largest event dedicated to tackling the technology industry's disheartening gender imbalance. It does this by showcasing the achievements and innovation of women in technology, identifying new role models and promoting further dialogue around diversity among industry influencers.			
Website: www.womeninitawards.com		**Implementer stakeholder:** Information Age, Vitesse Media	
United Kingdom	**Women in IT Awards**	**Awareness raising**	**Gender-focused**
Description: The Women in IT Awards is the world's largest event dedicated to tackling the technology industry's disheartening gender imbalance. It does this by showcasing the achievements and innovation of women in technology, identifying new role models and promoting further dialogue around diversity among industry influencers.			
Website: www.womeninitawards.com		**Implementer stakeholder:** Information Age, Vitesse Media	
United Kingdom	**The Women in Leadership programme**	**Mentoring**	**Gender-focused**
Description: Business conference to support senior women in the business to develop the skills and confidence they need to progress to the highest levels			
Website: www.news.o2.co.uk/wp-content/uploads/2015/01/Breaking-the-Boardroom.pdf		**Implementer stakeholder:** Telefónica - O2	
UK and global	**Women into Information Technology (WIT)/ 1980s**	**Mentoring**	**Gender-focused (main focus on gender)**
Description: Sends role models and mentors into schools and follows this through into the workplace			
UK and global	**Woment into Science and Engineering web site**	**Mentoring**	**Gender-focused (main focus on gender)**
Description: CodeChix is a non-profit organization dedicated to the Education, Advocacy and Mentoring, of women engineers in industry and academia. We aim to increase the number of women engineers in industry through our technical and mentoring/networking programs.			
Implementer stakeholder: 2) Woment into Science and Engineering			

Project location	Project Title	Typology	Focus
Multi-country (Europe)	**Mind the Gap**	**Awareness raising**	**Gender-focused**

Description:
The GAP project will bring together Vocational Education & Training (VET) teachers and individuals working in gender, diversity & STEM related subjects to combat a clear problem: the widening skills gap in the sector and the clear division between men & women. A number of efficient practices will be used in order to recruit/retain girls in STEM ensuring they are not lost during the transition to professional work. In addition, GAP will support VET teachers of STEM subjects to be more inclusive and gender aware in their teaching.

Website:
www.vhto.nl/over-vhto/english- page/activities-and-projects/mind-the- gap/

Implementer stakeholder:
VHTO, the Dutch National Expert Organisation on Girls/ Women and Science/Technology

Multi-country (Europe)	**Code to Change**	**Training**	**Gender-focused**

Description:
The Code to Change program is an extensive 5-month program aimed at women who are looking for new challenges and want to kick-start a career in ICT.

Website:
www.chunrichoupaal.org/projects/the- code-to-change-program/

Implementer stakeholder:
Chunri Choupaal

Multi-country (Europe)	**Leveraging Digital Competences Senior Women (LIST)**	**Training**	**Gender-focused**

Description:
LIST is a project aiming at supporting senior women's inclusion in the knowledge society by closing the gender & age digital divides. The main objective is to increase the ICT competences and digital literacy (e-skills) of women aged 50+ and to promote their access to web based services and information. LIST will do it using innovative methodologies based on tools and training offers on intergenerational exchange with digital natives

Website:
www.ecwt.eu/en/initiative-content?id=2

Implementer stakeholder:
European Centre for Women and Technology (ECWT)

Multi-country (Europe)	**Inspireyowup**	**Training**	**Partial gender dimension (some focus on gender)**

Description:
INSPIRE YoWUp is a two year project running from 1.10.2013 to 31.10.2015. The project will adapt and develop an innovative training package on entrepreneurship skills targeting unemployed and inactive young people and women to be tested and evaluated by the target groups (TGs).

Website:
www.inspireyowup.eu

Implementer stakeholder:
European Centre for Women and Technology (ECWT)

Multi-country (Europe)	**EU Prize for Women Innovators**	**Awareness raising**	**Gender-focused**

Description:
yearly prize for woman entrepreneurs.

Implementer stakeholder:
www.ec.europa.eu/research/innovation-union/index_en.cfm?section=women-innovators

Implementer stakeholder:
European Union

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Multi-country (Europe)	**European Centre for Women and Technology**	**Multi-stakeholder partnership**	**Gender-focused**

Description:
European multi- stakeholder partnership of more than 130 organizations and a rapidly growing member of individuals representing high-level expertise in women and technology development from government, business, academia and non-profit sectors working together to measurably and significantly increase the number of girls and women in technology and ICT in specific.

Website:
www.ecwt.eu/en/home

Implementer stakeholder:
European Centre for Women and Technology (ECWT)

Multi-country (Europe)	**Digital Innovations for Growth Academy (DIGA)**	**Training**	**Partial gender dimension (some focus on gender)**

Description:
Digital Innovations for Growth Academy (DIGA) will develop a new, innovative ICT and digital training programme for staff delivering vocational education and training in the fields of entrepreneurship and business development. This training wiDll provide opportunities for Enterprise Trainers and Educators (ETE) to attain focused learning on digital literacy, digital knowledge and understanding, digital skills and digital tools and processes. Ensure that VET programmes are equally open and accessible to women and men learners.

Website:
www.thewomensorganisation.org.uk/projects-and-partnerships/diga

Implementer stakeholder:
The Women‘s Organization

Multi-country (Europe)	**Women in ICT Sharing Experiences (WISE)**	**Community-building**	**Gender-focused**

Description:
WISE - Women in ICT Sharing Experiences is a business community and professional network of talented women in ICT. Its objective is to facilitate networking, build professional knowledge and stimulate personal development in a business and industry specific context with high level speakers and active participants. WISE consists of high quality and high impact Networking Events and a dedicated LinkedIn group.

Website:
www.wise-network.eu

Implementer stakeholder:
Women in ICT Sharing Experiences (WISE)

United States	**Girl Develop It**	**Training**	**Gender-focused**

Description:
Girl Develop It is a nonprofit organization that exists to provide affordable and judgment-free opportunities for women interested in learning web and software development. Through in-person classes and community support, Girl Develop It helps women of diverse backgrounds achieve their technology goals and build confidence in their careers and their every day lives.

Website:
www.girldevelopit.com

Implementer stakeholder:
Girl Develop It

Project location	Project Title	Typology	Focus
Multi-country (Europe)	**Inspiring Fifty**	**Mentoring**	**Gender-focused**

Description:
Inspiring Fifty is a pan-European programme that identifies, encourages, develops and showcases women in leadership positions within the technology sector. The aim is to improve diversity for women in tech by appointing role models, creating visibility and spreading awareness. More diverse technology companies make for better business.

Website:
www.inspiringfifty.com

Implementer stakeholder:
Inspiring Fifty

Multi-country (Europe)	**ICT-Go-Girls**	**Awareness raising**	**Gender-focused**

Description:
ICT-Go-Girls is an European project, co-financed by the European Commission, under Comenius LLP program. Its main goal is to empower secondary school girls with the knowledge, skills and values to help them be able to create future opportunities for innovation and quality ICT related employment.

Website:
www.ictgogirls.eu/index_en.htm

Implementer stakeholder:
ICT-Go-Girls

Multi-country (Europe)	**WiTEC The European Association for Women in Science, Engineering and Technology**	**Training**	**Gender-focused**

Description:
WiTEC has the following aims at European level:
- To increase the number of girls and women studying SET subjects and to help them progress into related careers.
- To develop women's technical and entrepreneurial skills through training initiatives and projects.
- To create information exchanges and networking opportunities for women in SET.
- To promote and support research in areas relating to women in SET.
- To support initiatives to promote the Gender Mainstreaming Policy.
- To promote regional, national and international awareness and interest in this field.

Website:
www.witec-eu.net

Multi-country (Europe)	**WeHubs**	**Community-building**	**Gender-focused**

Description:
WeHubs is the first European community, powered by Startup Europe, that connects business ecosystems and provides them with mentoring tools to support women entrepreneurs in the digital sector.

Website:
www.wehubs.eu

Implementer stakeholder:
EBN

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Multi-country (Europe)	**Women Mayors' Link**	**Multi-stakeholder partnership**	**Gender-focused**

Description:
The project aimed to promote the use of ICT to improve local and community governance, and to promote gender issues within constituencies. Half of the women mayors had developed strategies on ICT in local government institutions and agencies and 64 per cent had specialized departments dealing with the Internet, e-mail and network issues.

Website:
www.mygem.genderevaluation.net/?q=showcase/women_mayors%E2%80%99_link_using_icts_mainstream_gender_lo

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Multi-country (Europe)	**#MakeWhatsNext**	**Awareness raising**	**Gender-focused**

Description:
Microsoft is hosting 50 events across 27 countries for girls and young women in Europe, as part of the Microsoft YouthSpark initiative to create greater access to computer science education for young people everywhere.

Website:
www.makewhatsnext.eu

Implementer stakeholder:
Microsoft

Multi-country (Europe)	**Gender and ICT data in the ECE region**	**Research**	**Gender-focused**

Description:
The results indicated a wide range in data collected in the 19 countries reporting the availability of sex-disaggregated data. Some countries, such as Finland, have highly developed ICT data collection systems which include extensive sources on new technologies; while others, such as Russia, only collect data in relation to education. Thirteen of the 42 reporting NSOs had not started any official ICT data collection, eleven of which were CIS and Balkan countries.

Implementer stakeholder:
United Nations Economic Commission for Europe's Statistical Division

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Multi-country (Asia Pacific)	**WomanWill**	**Training**	**Gender-focused**

Description:
Womenwill /today is a forum to explore game-changing ways we can erase gender gaps and accelerate prosperity. Hear from regional and global thought leaders and women around the world who are coming together to learn, grow, make their voices heard, and change our future for the better.

Website:
www.womenwill.com/initiatives

Multi-country (Africa and Asia)	**Mobile Technology Program**	**Capacity-building**	**Gender-focused**

Description:
The Foundation's Mobile Technology Programme leverages mobile technology to support women entrepreneurs in becoming successful business owners. The programme works with a wide range of partners in the mobile ecosystem to provide women entrepreneurs with access to training, technology, networks and capital. We combine research, projects and advocacy

Website:
www.cherieblairfoundation.org/programmes/mobile

Implementer stakeholder:
Cherie Blair Foundation for Women

Project location	Project Title	Typology	Focus
Multi-country (Africa)	**Women's Electronic Networking Training (WENT) Africa**	**Training**	**Gender-focused**

Description:
The WENT Africa training workshops aim to build the capacities of women and their organisations in Africa to use ICTs in women's empowerment, social change work and policy advocacy.

Website:
www.apc.org/en/projects/women-s-electronic-networking-training-went-africa

Implementer stakeholder:
Association for Progressive Communication (APC)

Multi-country (Africa)	**She Will Connect**	**Training**	**Gender-focused**

Description:
digital literacy training, online peer network, gender relevant content

Website:
www.intel.com/content/dam/www/public/us/en/documents/corporate-information/she-will-connect-exec-summary.pdf

Implementer stakeholder:
Intel Corporation

Multi-country (Africa)	**The African Girls STEM Camp**	**Training**	**Gender-focused**

Description:
Empowering African Women to become impactful leaders to benefit Africa through experiential STEM Education, Leadership and Entrepreneurship Training.

Website:
www.waawfoundation.org/what-we-do

Implementer stakeholder:
Working to Advance African Women (WAAW) Foundation

Multi-country (Africa)	**STEM Outreach and Mentoring Program**	**Mentoring**	**Gender-focused**

Description:
Empowering African Women to become impactful leaders to benefit Africa through experiential STEM Education, Leadership and Entrepreneurship Training.

Website:
www.waawfoundation.org/what-we-do

Implementer stakeholder:
Working to Advance African Women (WAAW) Foundation

Multi-country (Africa)	**STEM Outreach and Mentoring Program**	**Training**	**Gender-focused**

Description:
Empowering African Women to become impactful leaders to benefit Africa through experiential STEM Education, Leadership and Entrepreneurship Training.

Implementer stakeholder:
www.waawfoundation.org/what-we-do

Implementer stakeholder:
Working to Advance African Women (WAAW) Foundation

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Multi-country (Africa)	**Academic Scholarship**	**Training**	**Gender-focused**

Description:
Empowering African Women to become impactful leaders to benefit Africa through experiential STEM Education, Leadership and Entrepreneurship Training.

Website:
www.waawfoundation.org/what-we-do

Implementer stakeholder:
Working to Advance African Women (WAAW) Foundation

Multi-country (Africa)	**Code Workshop for Girls**	**Training**	**Gender-focused**

Description:
Empowering African Women to become impactful leaders to benefit Africa through experiential STEM Education, Leadership and Entrepreneurship Training.

Website:
www.waawfoundation.org/what-we-do

Implementer stakeholder:
Working to Advance African Women (WAAW) Foundation

Multi-country (Africa)	**Women in Tech Africa**	**Mentoring**	**Gender-focused**

Description:

- First Pan African Women in Tech virtual conference
- Quarterly meetings in Ghana showcasing successful women in tech in that country including head of Google, head of Microsoft Africa
- Joint Women and Tech and USAID Program on the subject of women and technology, the future of Africa
- Women in Technology sessions in Lagos Nigeria at Africa biggest social media event , social media Lagos
- Training for Women Entrepreneurs on the use on technology for business growth

Website:
www.womenintechafrica.com

Implementer stakeholder:
Women in Tech Africa

Multi-country (Africa)	**1) Web We Want**	**Capacity-building**	**Partial gender dimension (some focus on gender)**

Description:
1) Focused on content that will bring women on line Needs more focus and funding

Website:
www.webwewant.org

Multi-country (Africa)	**2) Intel She Will Connect**	**Capacity-building**	**Gender-focused (main focus on gender)**

Description:
2) potentially very high-impact, as it's working in countries, directly with policy influencers digital literacy, peer training, relevant content

Website:
www.intel.com/content/www/us/en/technology-in-education/technology-empowerment.html

Project location	Project Title	Typology	Focus
Multi-country (Africa)	**Support to national machineries in Africa to effectively use ICT**	**Capacity building**	**Gender-focused**

Description:
enhance the capacity of national machineries for the advancement of women in Africa to systematically and effectively use traditional and new forms of ICT to achieve their goals.

Website:
www.un.org/womenwatch/daw/TechnicalCooperation/tcprog_natmach_bg.htm

Implementer stakeholder:
United Nations Division for the Advancement of Women

Multi-country (Africa)	**Several Health information-related radio projects**		**Gender-focused**
Multi-country (CEE/CIS countries)	**Assessment of gender mainstreaming in Central Eastern European/Commonwealth of Independent States (CEE/CIS) countries**	**Research**	**Gender-focused**

Description:
Most countries in the CEE/CIS region are developing National Action Plans for Information Policies, which guide national ICT development. A gender perspective is largely absent from these plans. At the same time, women's organizations in the region have rarely engaged with ICT issues and little pressure is on policy makers to take gender perspectives into account in relation to ICT.

Multi-country (América Latina y el Caribe)	**AMARC ALC**	**Outreach and communication**	**Gender-focused (main focus on gender)**

Description:
La Red de Mujeres de AMARC ALC es una asamblea de mujeres comunicadoras que trabajan para garantizar el derecho a comunicación de las mujeres con el apoyo y por medio del movimiento de radios comunitarias La propuesta es promover la discusión con perspectiva de género en las radios comunitarias, apoyando el trabajo de las mujeres principalmente a partir de la formación, y el intercambio de informaciones y experiencias

Website:
www.amarcalc.org

Multi-country (América Latina/ regional)	**Claudia Calvin**	**Community-building**	**Gender-focused**

Description:
México pero estan en toda américa latina desconozco el año, pero tienen mucho trabajando el tema

Implementer stakeholder:
www.mujeresconstruyendo1.blogspot.mx

América Latina/ regional	**Alerta Machitroll / 2015**	**Community-building**	**Gender-focused**

Description:
detectar a los machitroll, estrategias para defender en las redes sociales

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Multi-country	**StrongHer**	**Community-building**	**Gender-focused**
Description: Employee initiative of Alcatel-Lucent (Nokia). Wants to strenghen the position of woman in the company			
Website: www.networks.nokia.com/stronger		**Implementer stakeholder:** Nokia	
Multi-country	**ConnectEd**	**Training**	**Partial gender dimension (some focus on gender)**
Description: Our ConnectEd program helped disadvantaged youth, particularly girls and young women, achieve better learning outcomes, become better prepared for the world of work, and engage meaningfully in their communities. Programm for training young people			
Website: www.prd-www-origin.alcatel-lucent.com/sustainability/foundation/connected-using-technology-education		**Implementer stakeholder:** Nokia	
Multi-country	**Mentoring Women in Business**	**Mentoring**	**Gender-focused**
Description: We match women in developing and emerging countries with male and female mentors around the world. Using our online platform, they spend 12 months working one-on-one to achieve key business goals. Participants build their business skills and digital literacy through our trainings, and become part of a global community of committed, ambitious entrepreneurs who are invested in each other's success.			
Website: www.cherieblairfoundation.org/programmes/mentoring		**Implementer stakeholder:** Cherie Blair Foundation for Women	
Multi-country	**Girls Power Tech**	**Mentoring**	**Gender-focused**
Description: We open our doors to young women all over the world and inspire them to pursue a career in information and communications technology (ICT) through hands-on exposure to the latest technology and engagement with industry professionals			
Website: www.csr.cisco.com/casestudy/girls-in-ict-day		**Implementer stakeholder:** Cisco Systems, Inc.	
Multi-country	**CISCO Empowered Women Network**	**Awareness raising**	**Gender-focused**
Description: Blog			
Website: www.blogs.cisco.com/tag/cisco-empowered-womens-network		**Implementer stakeholder:** Cisco Systems, Inc.	

Project location	Project Title	Typology	Focus
Multi-country	**Technology Initiative**	**Capacity-building**	**Gender-focused**

Description:
Access to technology, control of it, and the ability to create and shape it, is a fundamental issue of women's human rights. Global Fund for Women's Technology Initiative aims to help end the gender technology gap and empower women and girls to create innovative solutions to advance equality in their communities

Website:
www.globalfundforwomen.org/our-ap-proach/initiatives/techno-logyinitiative/

Implementer stakeholder:
Global Fund for Women

Multi-country	**GSMA Connected Women**	**Capacity-building**	**Gender-focused**

Description:
to introduce more than 600,000 15- to 25-year-old Kenyan and Nigerian women and girls to the Internet and engage them in using it as a tool for social and economic empowerment.

Website:
www.gsma.com/mobilefordevelopment/programmes/connec-ted-women

Implementer stakeholder:
GSMA

Multi-country	**Women and the Web Alliance**	**Capacity-building**	**Gender-focused**

Description:
to introduce more than 600,000 15- to 25-year-old Kenyan and Nigerian women and girls to the Internet and engage them in using it as a tool for social and economic empowerment.

Website:
www.womenandtheweballiance.org/about

Implementer stakeholder:
Intel Corporation

Multi-country	**Beyond Access**	**Training**	**Partial gender dimension (some focus on gender)**

Description:
maximize existing resources and extend inclusive access to information and technology, mobilizing communities to drive local support for reading and literacy outside of schools, help governments and the private sector connect their existing employability initiatives to the people

Website:
www.beyondaccess.net

Implementer stakeholder:
IREX

Multi-country	**The Tech Age Girls (TAG) Pro-gramme**	**Training**	**Gender-focused**

Description:
The Tech Age Girls (TAG) program provides young women with specialized leadership and information technology training, mentors, and hands-on opportunities

Website:
www.irex.org/project/tech-age-girls

Implementer stakeholder:
IREX

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Multi-country	**Girls in ICTs**	**Advocacy**	**Gender-focused**

Description:
ITU's Girls in ICT Day initiative is a global effort to encourage girls and young women to consider studies and careers in information and communication technologies (ICT).It takes place every year

Website:
www.itu.int/en/action/women/girls-ict-day/Pages/default.aspx

Implementer stakeholder:
ITU

Multi-country	**LinuxChix**	**Community-building**	**Gender-focused**

Description:
LinuxChix is a community for women who like Linux and for anyone who wants to support women in computing.

Website:
www.linuxchix.org

Implementer stakeholder:
LinuxChix

Multi-country	**Women in Telco**	**Community-building**	**Gender-focused**

Description:
SAP's Connected Women initiative is all about creating awareness, opening a dialogue and providing networking opportunities for everyone in the industry to ultimately achieve greatness together in the new digital economy.

Website:
www.discover.sap.com/women-in-telco

Implementer stakeholder:
SAP

Multi-country	**Act on Promotion of Women's Participation and Advancement in the workplace**	**Advocacy**	**Partial gender dimension (some focus on gender)**

Description:
It is in Sony's DNA - and a source of our innovation - to value different perspectives and backgrounds as we conduct our business activities globally and rise to new challenges. Sony promotes diversity across the Sony Group as a key management strategy by ensuring an inclusive work environment and by recruiting, hiring, training and promoting employees from diverse backgrounds.

Website:
www.sony.net/SonyInfo/diversity/activity/05_08.html

Implementer stakeholder:
Sony

Multi-country	**Women at Microsoft**	**Community-building**	**Gender-focused**

Description:
Microsoft is involved in a wide range of programs aimed at trying to attract, recruit, retain, and develop women from around the world in the field of computer technology. We start early in the pipeline by sparking girls' interest in technology careers. We promote the study of computer science at traditionally female colleges and other universities. We invest in women-focused organizations, seek out women-owned suppliers, and provide support to women once they are employees at Microsoft.

Website:
www.microsoft.com/en-us/diversity/inside-microsoft/women-at-microsoft/default.aspx

Implementer stakeholder:
Microsoft

Project location	Project Title	Typology	Focus
Multi-country	**WPC Women**	**Training**	**Gender-focused**

Description:
As proof positive, WIT communities around the globe are involved in encouraging young women to consider careers in Information Technology by dedicated time and effort to programs such as DigiGirlz, Girls Who Code, Students 2 Business (S2B) and YouthSpark.
WIT communities also form strategic connections with organizations like Women in Technology International (WITI) and The Gates Foundation to strengthen the impact we can make.

Website:
www.iamcp.org/?page=WIT

Implementer stakeholder:
International Association of Microsoft Channel Partners

Multi-country	**Surf Smart**	**Capacity-building**	**Gender-focused**

Description:
Surf Smart is a non-formal education curriculum designed to inform young people about how to connect positively online, protect themselves from online threats and respect their rights and reputation on the internet.

Website:
www.wagggs.org/en/what-we-do/surf-smart/about-surf-smart

Implementer stakeholder:
World Association of Girl Guides and Girl Scouts

Multi-country	**Technovation**	**Training**	**Gender-focused**

Description:
Technovation offers girls around the world the opportunity to learn the necessary skills to become tech entrepreneurs and leaders. Girls ages 10 to 18 learn to identify a problem in their community and create a mobile app solution to address that problem, and then learn how to communicate these ideas and translate them into a fully launched business.

Website:
www.technovationchallenge.org

Implementer stakeholder:
Technovation

Multi-country	**Gender and Science**	**Advocacy**	**Gender-focused**

Description:
working to overcome gender disparities in access to, influence over, and use of science, technology, engineering and mathematics (STEM).

Website:
www.unesco.org/new/en/natural-sciences/priority-areas/gender-and-science/

Implementer stakeholder:
UNESCO

Multi-country	**iBelieve Programme**	**Capacity-building**	**Gender-focused**

Description:
empower less privileged women by improving their access to knowledge and information through digital literacy, equip girl students with life skills, make them digitally literate, and spur them to have career aspirations and the enthusiasm to pursue higher studies, enable women to resume IT / BPO jobs after a career break, motivate women by connecting them with women leaders, and enabling them to understand how to manage their priorities and develop necessary leadership and networking capabilities to stay successful in their careers

Website:
www.techwomen.in

Implementer stakeholder:
HCL Tech Women

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Multi-country	**Rails Girls**	**Training**	**Gender-focused**

Description:
Our aim is to give tools and a community for women to understand technology and to build their ideas. We do this by providing a great experience on building things and by making technology more approachable. Learn sketching, prototyping, basic programming and get introduced to the world of technology

Website:
www.railsgirls.com

Implementer stakeholder:
Rails Girls

Multi-country	**Anita Borg Institute**	**Advocacy**	**Gender-focused**

Description:
Women in technology are at the heart of ABI's mission. We are on a quest to accelerate the pace of global innovation by working to ensure that the creators of technology mirror the people and societies who use it.

Website:
www.anitaborg.org

Implementer stakeholder:
Anita Borg Institute

Multi-country	**Ladies that UX**	**Networking**	**Gender-focused**

Description:
Ladies that UX is a monthly meet up that creates a welcoming, transparent community of women that work in UX, who positively promote and teach each other.

Website:
www.ladiesthatux.com

Implementer stakeholder:
Ladies that UX

Multi-country	**Women in Technology**	**Community-building**	**Gender-focused**

Description:
It is in Sony's DNA - and a source of our innovation - to value different perspectives and backgrounds as we conduct our business activities globally and rise to new challenges. Sony promotes diversity across the Sony Group as a key management strategy by ensuring an inclusive work environment and by recruiting, hiring, training and promoting employees from diverse backgrounds.

Website:
www.fujitsu.com/uk/news/events/women-in-technology

Implementer stakeholder:
Fujitsu

Multi-country	**CHAYN**	**Capacity-building**	**Gender-focused**

Description:
open-source project that leverages technology to empower women against violence and oppression so they can live happier and healthier lives. Running solely on the passion of more than 300 skilled volunteers from 13 countries, Chayn leverages technology to address the problems women face today in a dozen countries

Website:
www.chayn.co

Implementer stakeholder:
Chayn

Project location	Project Title	Typology	Focus
Multi-country	**Alerta Machitroll**	**Awareness raising**	**Gender-focused**

Description:
Alerta Machitroll is a digital campaign launched in Colombia in 2015 on 16 days of activism against violence against women with the aim of generating reflection on the violence suffered by women in digital environments. The campaign, developed by the Foundation Karisma, an organization that specializes in „technology for development" and human rights, wants to use humor to identify behaviors that undermine women's rights to express themselves and share opinions on the Internet. For this purpose, Karisma has developed a tool that makes it possible to intervene images for Insert one of two types of „machitroll certification" -incurable or salvageable-in those misogynistic, sexist or sexist public comments that can be found in digital forums. The campaign was developed as part of the Women's Rights Online project, of the World Wide Web Foundation.

Website:
www.actua.karisma.org.co/alertamachitroll

Implementer stakeholder:
Fundación Karisma

Multi-country	**Take back the tech!**	**Awareness raising**	**Gender-focused**

Description:
Take Back The Tech! is a call to everyone, especially women and girls, to take control of technology to end violence against women. It's a global, collaborative campaign project that highlights the problem of tech-related violence against women, together with research and solutions from different parts of the world. The campaign offers safety roadmaps and information and provides an avenue for taking action.

Website:
www.takebackthetech.net

Implementer stakeholder:
Take Back the Tech!

Multi-country	**Follow Her**	**Capacity-building**

Implementer stakeholder:
Follow Her

Global	**Connected Women Programme**	**Awareness raising**	**Gender-focused**

Description:
to reduce the gender gap in mobile internet and mobile money services in low- and middle-income countries and unlock significant commercial and socio-economic opportunities.

Website:
www.gsma.com/mobilefordevelopment/programmes/connected-women

Implementer stakeholder:
GSMA

Global	**Global Alliance on Media and Gender**	**Multi-stakeholder partnership**	**Gender-focused**

Description:
The Global Alliance for Media and Gender (GAMAG) is a global movement to promote gender equality in and through media

Website:
www.unesco.org/new/en/communication-and-information/crosscutting-priorities/gender-and-media/global- alliance-on-media-and-gender/homepage/

Implementer stakeholder:
UNESCO

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Global	**Women @ ICT**		**Gender-focused (main focus on gender)**
Website: Can‘t find the respective work		**Implementer stakeholder:** Rails Girls	
Global	**Technovation Challenge/ 2009**	**Mentoring**	**Gender-focused (main focus on gender)**
Description: Technovation is a program of Iridescent, that helps scientists, engineers and technology professionals to share their passion with girls from underrepresented groups We believe that girls who are encouraged to be curious, daring, and driven stand the best chance at success in life			
Website: www.technovationchallenge.org			
Global	**WoMakers Code**	**Capacity-building**	**Gender-focused (main focus on gender)**
Description: WoMakersCode is a project aimed at inclusion of women in technology in areas such as robotics, development and software quality			
Website: www.womakerscode.org			
Global	**Girls in ICT/ 2011**	**Awareness raising**	**Gender- focused (main focus on gender)**
Description: The Girls in ICT Portal is a tool for girls and young women to get an insight into the ICT sector as well as for partners to understand the importance of the International Girls in ICT Day			
Global	**DNS Women / 2010**	**Community-building**	**Gender- focused (main focus on gender)**
Description: our international women movement DNS WOMEN are around the world encourage women to enter internet business, enlarge network for this to happen WE have been meeting now in all 5 continents We had last meeting in Helsinki and next one will be in Hyderabad , India ...We started DNS women X years ago realizing inside ICANN there was no balance between women X men We then started to meet in all ICANN meetings organizing our group, set up a formal identity, looking for sponsorship for our meetings at each meeting we debate issues related to Internet business, we focus on enlarge network, and we invite all women from the region we meet to attend (is free of charge), giving the floor to locals to explain their work there and difficulties women have is such region Nowadays we are starting chapters around the world and debating our mission and how expand our activities to be locally more effective (website is not up to date since Karla, from US had a familiar problem and was not able to update the site but it will be done)			
Website: www.dnswomen.org			

Project location	Project Title	Typology	Focus
Global	**WomenWatch: the United Nations website**	**Awareness raising**	**Gender-focused**

Description:
Through WomenWatch, information is disseminated on intergovernmental processes, in particular the Commission on the Status of Women, the work of the Convention on the Elimination of All Forms of Discrimination against Women, research and statistics and operational activities within the United Nations system.

Website:
www.womenwatch.unwomen.org

Global	**#eSkills4Girls**	**Awareness raising**	**Gender-focused**

Description:
gender digital divide at G20

Website:
www.bmz.de/de/themen/nachhaltige_wirtschaftsentwicklung/ikt/g20/eskills4girls/index.html

Global	**The Alliance for Affordable Internet**	**Multi-stakeholder partnership**	**Partial gender dimension (some focus on gender)**

Description:
Partnership to promote women's empowerment through the Web

Website:
www.gsma.com/mobilefordevelopment/programmes/connected-women

Implementer stakeholder:
Alliance for Affordable Internet (A4AI)

Global	**Women's Rights Programme**	**Advocacy**	**Gender-focused**

Description:
The Women's Rights Programme (WRP) is both a programme within APC and a network of women throughout the world committed to using technology for women's empowerment. We promote gender equality in the design, implementation, access and use of information and communication technologies (ICTs) and in the policy decisions and frameworks that regulate them.

Website:
www.apc.org/en/news/apc-womens-networking-support-programme-apc-wsnp-celebrates-decade-empowering-women-through

Implementer stakeholder:
GAssociation for Progressive Communication (APC)

Global	**Feminist techExchange**	**Training**	**Gender-focused**

Description:
Through skills diffusion and capacity building, the Feminist Tech Exchange (FTX) seeks to empower women's rights organisations, advocates and feminists sidelined in the growth of the global digital commons. The Exchange has been developed in response to the expressed needs of feminist and women's rights movements for greater understanding of emerging ICT and applications.

Website:
www.apc.org/en/projects/feminist-tech-exchange

Implementer stakeholder:
Association for Progressive Communication (APC)

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Global	**She Means Business**	**Awareness raising**	**Gender-focused**
Description: Stories of women running businesses			
Website: shemeansbusiness.fb.com		**Implementer stakeholder:** Facebook	
Global	**IGNITE**	**Awareness raising**	**Gender-focused**
Description: IGNITE features stories of women and girls who are leading and innovating in science, technology, engineering and math. The project also highlights the gender gap in technology and advocates for women and girls' increased access to and control of technologies.			
Website: www.ignite.globalfundforwomen.org		**Implementer stakeholder:** Global Fund for Women	
Global	**g4g Day**	**Awareness raising**	**Gender-focused**
Description: Our signature one-day girl-focused event demonstrates the fun in science through hands-on workshops and activities run by volunteer role models in STEM fields. These are events open to the local community and brings 200+ attendees with up to 100 volunteers/workshop leaders per event			
Website: www.greenlightforgirls.org/g4g-day		**Implementer stakeholder:** Greenlight for Girls	
Global	**Women's Entrepreneurship Development - Knowledge Sharing Pl**	**Community-building**	**Gender-focused**
Description: ICT4WED is an online community of information and communication technology (ICT) and women's entrepreneurship development (WED) assessment experts and practitioners from the UN system, governments, academia, women entrepreneurs, civil society and other stakeholders in the development community interested in how the ICT dimension is being integrated into WED assessments and the WED assessment working tools and trainings. ICT4WED was formed by the International Labour Organization (ILO) and the UN Conference on Trade and Development (UNCTAD) in March 2013 as part of the ILO/UNCTAD Project on Leveraging ICTs for Support of Women's Entrepreneurship in Developing Countries funded by the Swedish International Development Agency (Sida). As part of the project, the current WED Assessment Framework, Guidelines and Training are being revised to integrate ICTs.			
Website: www.unctad.org/en/Pages/DTL/STI_and_ICTs/ICT4WED.aspx		**Implementer stakeholder:** ILO - UNCTAD	

Project location	Project Title	Typology	Focus
Global	**She Trades**	**Capacity-building**	**Gender-focused**

Description:
The SheTrades initiative is supported by a web and mobile application. At SheTrades women entrepreneurs are able to share information about their companies, to make them visible, expand networks, connect and internationalise.
SheTrades also helps corporations to include more women entrepreneurs in their supply chains. SheTrades provides women entrepreneurs across the world a unique platform to connect to markets!

Website:
www.shetrades.com

Implementer stakeholder:
International Trade Center

Global	**Gender Equality and Mainstreaming in Technology (GEM-Tech) Award**	**Awareness raising**	**Gender-focused**

Description:
celebrate personal or organizational achievements and innovative strategies to advance Gender Equality and Mainstreaming in the area of ICTs. The GEM-TECH Awards provide a platform for advancing women's meaningful engagement with ICTs and their role as decision-makers and producers in the technology sector.

Website:
www.itu.int/en/action/women/gem/Pages/award-2016.aspx

Global	**The Alliance for Affordable Internet**	**Multi-stakeholder partnership**	**Partial gender dimension (some focus on gender)**

Description:
Partnership to promote women's empowerment through the Web

Website:
www.gsma.com/mobilefordevelopment/programmes/connected-women

Implementer stakeholder:
ITU - UN Women

Global	**Women in STEM**	**Community-building**	**Gender-focused**

Description:
WiSTEM is one of the core Programs of the Meera Kaul Foundation. As a part of this program we grow awareness for STEM as a viable option for girls, women and their institutions across the world, for inspiring a global shift in the attitude towards Women in STEM.

Website:
www.womeninstem.com

Implementer stakeholder:
The Meera Kaul Foundation

Global	**WOMOZ**	**Training**	**Gender-focused**

Description:
Women & Mozilla („WoMoz") a community composed of members from different Open Source projects. We are mainly dedicated to improving women's visibility and involvement in Free/Open Source and Mozilla, and to increase the number of women contributors.

Website:
www.womoz.org/blog

Implementer stakeholder:
Mozilla

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Global	**WikiProject Women in Red**	**Awareness raising**	**Gender-focused**
Description: WikiProject whose objective is to turn „redlinks“ into blue ones within the project scope.			
Website: www.en.wikipedia.org/wiki/Wikipedia:WikiProject_Women_in_Red		**Implementer stakeholder:** Wikimedia Foundation	
Global	**Development of ICT Toolkit**	**Capacity-building**	**Partial gender dimension (some focus on gender)**
Description: What Development Practitioners Need to Know about Gender, ICT and Social Service Delivery			
Website: www.web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXT-GENDER/EXTICTTOOLKIT/0,,contentMDK:20273128~menuP-K:562607~pagePK:64168445~piPK:64168309~theSitePK:542820,00.html		**Implementer stakeholder:** World Bank Group	
Global	**Web Index**	**Awareness raising**	**Partial gender dimension (some focus on gender)**
Description: Designed and produced by the World Wide Web Foundation, the Web Index is the world’s first measure of the World Wide Web’s contribution to social, economic and political progress in countries across the world			
Website: www.thewebindex.org		**Implementer stakeholder:** World Wide Web Foundation	
Global	**ADA's List**	**Networking**	**Gender-focused**
Description: Ada’s List exists to make women in technology stronger as a community and as individuals. We want to create change at scale—change in existing, patriarchal and racist power structures—whether these structures are a part of the culture of a company, a more overt policy, or work processes that consciously or unconsciously sideline women.			
Website: www.adaslist.co		**Implementer stakeholder:** ADA‘s List	
Global	**PyLadies**	**Mentoring**	**Gender-focused**
Description: We are an international mentorship group with a focus on helping more women become active participants and leaders in the Python open-source community. Our mission is to promote, educate and advance a diverse Python community through outreach, education, conferences, events and social gatherings.			
Website: www.pyladies.com		**Implementer stakeholder:** PyLadies	

Project location	Project Title	Typology	Focus
Global	**Women who Code**	**Networking**	**Gender-focused**

Description:
Women Who Code (WWCode) is global non-profit with a set of programs for engineers to help build the careers we want.

Website:
www.womenwhocode.com

Implementer stakeholder:
Women Who Code

Global	**Duchess**	**Networking**	**Gender-focused**

Description:
Duchess is a global organization for women in Java technology, currently with 550 members in over 60 countries. Duchess provides a platform through which women who work with Java can connect with each other and get involved in the greater Java community. It aims to make the role of women and the individual women's contributions visible in the Java community and to teach the benefits of diversity in any team environment - whether corporate or open-source.

Website:
www.jduchess.org

Implementer stakeholder:
Duchess

Global	**Tech Lady Mafia**	**Networking**	**Gender-focused**

Description:
Tech LadyMafia supports women who work in and around the internet. We are astrophysicists and developers, writers and digital strategists.

Website:
www.techladymafia.com

Implementer stakeholder:
Tech LadyMafia

Global	**Latinas in Computing**	**Networking**	**Gender-focused**

Description:
A community created by and for Latinas in computing fields with a mission of promoting their representation and success.

Website:
www.latinasincomputing.org

Implementer stakeholder:
Latinas in Computing

Table A6.1.1 continued

Project location	Project Title	Typology	Focus
Global	**Women's Coding Collective**	**Training**	**Gender-focused**
Description: The WCC is a web development community with a mission to narrow the gender gap in technology. We cultivate supportive, no-stupid-questions environments where women can learn, build, and code together.			
Website: www.thewcc.com		**Implementer stakeholder:** Women's Coding Collective	
Global	**Django Girls**	**Training**	**Gender-focused**
Description: The goal of the Django Girls foundation is to advance the education of the public in particular but not exclusively women in the subject of computer science by providing or assisting in the provision of programming workshops and educational material.			
Website: www.djangogirls.org		**Implementer stakeholder:** Django Girls foundation	
N/A	**Gender, ICTs and Education**	**Training**	**Partial gender dimension (some focus on gender)**
Implementer stakeholder: World Bank Group			
N/A	**UNESCO Chair "Gender, Sciences and Technology"**	**Community-building**	**Gender-focused**
Implementer stakeholder: UNESCO, FLACSO Argentina			

Project location	Project Title	Typology	Focus
Global	**PyLadies**	**Mentoring**	**Gender-focused**

Description:
We are an international mentorship group with a focus on helping more women become active participants and leaders in the Python open-source community. Our mission is to promote, educate and advance a diverse Python community through outreach, education, conferences, events and social gatherings.

Website:
www.pyladies.com

Implementer stakeholder:
PyLadies

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Description:
Women Who Code (WWCode) is global non-profit with a set of programs for engineers to help build the careers we want.

Website:
www.womenwhocode.com

Implementer stakeholder:
Women Who Code

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Description:
Duchess is a global organization for women in Java technology, currently with 550 members in over 60 countries. Duchess provides a platform through which women who work with Java can connect with each other and get involved in the greater Java community. It aims to make the role of women and the individual women's contributions visible in the Java community and to teach the benefits of diversity in any team environment - whether corporate or open-source.

Website:
www.jduchess.org

Implementer stakeholder:
Duchess

Global	**Tech Lady Mafia**	**Networking**	**Gender-focused**

Description:
Tech LadyMafia supports women who work in and around the internet. We are astrophysicists and developers, writers and digital strategists.

Website:
www.techladymafia.com

Implementer stakeholder:
Tech LadyMafia

Global	**Latinas in Computing**	**Networking**	**Gender-focused**

Description:
A community created by and for Latinas in computing fields with a mission of promoting their representation and success.

Website:
www.latinasincomputing.org

Implementer stakeholder:
Latinas in Computing

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