MERSURING INFOSTATES FOR DEVELOPMENT

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George Sciadas Editor

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ITU

The International Telecommunication Union is an international organization and a specialized agency of the United Nations created with the objective of facilitating peaceful relations, international cooperation among peoples and economic and social development by means of efficient telecommunication services with the purpose, among others, of fostering international cooperation in the delivery of technical assistance to developing countries to promote the development of their telecommunication networks and services.

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From the Digital Divide to DIGITAL OPPORTUNITIES

Measuring Infostates for Development

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Chapter 6

WOMEN IN THE INFORMATION SOCIETY

by Sophia Huyer, Nancy Hafkin, Heidi Ertl and Heather Dryburgh*

he economic and societal transformations of the Information Society are far from being complete, though they have been occurring for some time now. For many around the globe, ICTs touch all facets of daily life, whether economic, social, political, or cultural. Not only do ICTs facilitate information sharing and knowledge management – both key elements of the Information Society – but they also provide people, businesses and governments with the essential networks to overcome the challenges of distance and time.

As an area of policy research, the Information Society includes several general issues, such as the Digital Divide, and the linkages between ICTs and economic and social development. Prominent among specific issues is the gender digital divide. Global agreement that gender equality is essential for building a *"sustainable, just and developed society"* was re-affirmed in Beijing at the 1995 United Nations World Conference on Women. At the Geneva WSIS (2003), governments highlighted the importance of gender equality:

We are committed to ensuring that the Information Society enables women's empowerment and their full participation on the basis of equality in all spheres of society and in all decisionmaking processes. To this end, we should mainstream a gender equality perspective and use ICTs as a tool to that end (WSIS Declaration of Principles, para. 12).

Recognizing the pervasive influence of ICTs in the global economy and society, equal access for both women and men to ICTs is insufficient to obtain true gender equality. Instead, women need the opportunity to participate equally in, and benefit equally from: i) the design, development and application of ICTs; ii) the use of the information and knowledge generated in the Information Society, and; iii) the opportunities and resources of the Information Society.

Women are central to economic and social development, through their productive, reproductive, and community management responsibilities. They make a major contribution to the production of food, the provision of energy, water, health care, and family income in developing countries (ECOSOC 2004). As well, they make up the majority of the population in rural areas in most developing regions, which are traditionally poorer and have less access to support services and infrastructure (UNIFEM and ENU/INTECH 2000). Poverty has a severe impact on women and girls, and households headed by women are especially affected. Societies that discriminate on the basis of gender pay a high price in terms of their ability to reduce poverty and develop.

^{*} Sophia Huyer and Nancy Hafkin are with Women in Global Science and Technology, Heidi Ertl and Heather Dryburgh are with Statistics Canada. The authors wish to thank Savitri Bisnath, from the ITU, for valuable comments and suggestions.

Higher household income and education for mothers are associated with higher survival rates of children, as additional income for women has a larger positive impact on family well-being than additional income for men. Low investment in female education reduces a country's overall output, while improving women's education and skill levels increases productivity, household income, food security and reduces poverty. Thus, *"countries with smaller gaps between women and men in areas such as education, employment, and property rights not only have lower child malnutrition and mortality, they also have more transparent business and government and faster economic growth, which in turn helps to further narrow the gender gap"* (World Bank 2001).
The Millennium Development Goals (MDGs) were adopted in 2000 to provide a framework for the promotion and monitoring of poverty reduction and improvement of quality of life in developing

The Millennium Development Goals (MDGs) were adopted in 2000 to provide a framework for the promotion and monitoring of poverty reduction and improvement of quality of life in developing countries. Women are widely acknowledged to be instrumental in the achievement of all of them. As a cross-cutting tool, ICTs are expected to play a catalytic role as well. Thus, it is difficult to escape the conclusion that ICTs will impact only marginally on the MDGs unless they incorporate a strong gender dimension. More specifically, the gender equality (GE) and ICT implications for the MDGs can be summarized as follows:

MDG	GE Dimensions	GE and ICT Applications
Goal 1: Eradicate extreme poverty and hunger	Female-headed households are disproportionately poor; women tend to have less access to financial, technical and labour resources; women are critical agents for poverty reduction, and produce most of the food consumed locally in food-insecure areas.	ICTs can provide information on agriculture, weather, pricing and marketing to support women's food production and income-earning enterprises. ICTs can provide information to help women care for their families and improve their well-being.
Goal 2: Achieve universal primary education	Girls and women have lower levels of school enrolment; women make up 2/3 of the world's illiterate population.	ICTs can deliver literacy and education to girls and women where they live and work; they can open up new opportunities and provide flexible learning times.
Goal 3: Promote gender equality and empower women	Women are central agents of development in their families and societies; the MDGs cannot be achieved without the full mainstreaming of women and gender equality.	ICTs are important tools to promote gender equality and women's empowerment, and to help women achieve greater success in their income generating and domestic activities.
Goal 4: Reduce child mortality Goal 5: Improve maternal health	Women are responsible for nutrition of their families and subsistence food production in much of the world.	ICTs can provide improved information on nutrition and agriculture; facilitate health networks and information to health professionals, and; monitor health trends.
Goal 6: Combat HIV/AIDS, malaria and other diseases	Women make up the majority of HIV- infected persons in Sub-Saharan Africa; women and girls are more vulnerable to infection for sociological, physiological, economic and cultural reasons.	ICTs can provide information on prevention and treatment; facilitate health networks and information for health professionals, and; facilitate interaction with patients in rural areas.
Goal 7: Ensure environmental sustainability	Women are important environmental managers in their communities; they own much of the world's remaining traditional and indigenous knowledge.	ICTs can provide information on the environmental situation, weather, and sustainable agricultural practices; they can disseminate women's traditional knowledge and experience to promote sustainable development.
Goal 8: Develop global partnerships	ICTs can provide a vehicle to incorpor global partnerships for development. Th views; they also provide a way to reach live and work.	ate women's perspectives and knowledge into ney provide a venue for women to express their women and allow them to participate where they

Project rationale and structure

With the explosion of interest in Information Society issues, the need for reliable and comparable statistical information has become a priority for the international community. Naturally, this extends to ICTs and gender. WSIS explicitly recognized the importance of sex-disaggregated statistics and indicators, calling for the development of comparable statistical indicators that should incorporate a gender analysis. In addition, WSIS called for the development of gender-specific indicators on ICTs to assess the impacts of funded ICT projects on the lives of women and girls (WSIS Plan of Action, para. 28d).

However ICT measurements and comparative analyses in this area have been extremely scarce. The present volume quantifies Infostates, and thus the international digital divide, including detailed, policy-oriented analysis across a large number of countries and over time. However, no comparable systematic measurement on the gender aspect has been possible due to a scarcity of data – both in the scope of coverage and the degree of detail available.¹⁰³ The first part of this chapter represents an attempt to rectify this, to the extent possible at the present time. It relies on the extensive compilation of sex-disaggregated statistical data to offer a much-needed quantitative analysis of the gender digital divide. It provides a 'macro' view of its magnitude and evolution, while in parallel examining some of its key related aspects.

There is clear recognition that in order to address gender disparities in the context of the Information Society more than statistical data is needed. This provides the impetus for the second part of this chapter. The shortage of usable data notwithstanding, the gender digital divide has so many dimensions and nuances that large amounts of a different type of information are also needed, particularly touching on the context of individual circumstances across countries, social norms, histories, cultures, etcetera. Therefore, the second part of this chapter contains analysis of a qualitative nature, with in-depth information from field-work experiences, case studies, and anecdotal and contextual evidence. In so doing, it complements well the statistical analysis. Its contents are based on a comprehensive framework that defines the important elements of the main gender issues in ICT (Hafkin 2003). Taken in its totality, this chapter offers a more holistic view to the gender digital divide than has been possible until now.

Finally, the digital divide literature has dealt with two strands of research: one focussing on the international digital divide, which involves the gaps between *have* and *have-not* countries, and another concerned with divides within countries, regardless of their overall Infostates (Sciadas 2002). Within the latter, numerous and sizeable inequalities exist and have been identified. They include disparities by income, level of education, urban/rural split, ethno-cultural group, generation, disability and many more. Key among them is the issue of gender equality. The gender divide is, as all other divides are, directly linked to the overall Infostate of a nation, and its analysis should be dealt with in that context and not in isolation.

6.1 Statistical evidence and analysis of the gender digital divide

Comprehensive ICT data with a gender dimension across a large number of countries do not currently exist. There are however various pockets where some data can be found and this is where this project aims to add value. Such an exercise is labour-intensive and time consuming. It

¹⁰³ Some promising activities are underway. One of them stems from the partnership formed by a number of UN bodies, including regional commissions, the OECD, and national statistical agencies, which aims at closing the gaps in Information Society statistics. The partnerships' objectives include an agreement on a set of core ICT indicators, a construction of a database, as well as the offering of training for capacity-building in developing countries (UNCTAD 2004).

requires the tapping of various networks and substantial expertise to compile what is available and to sift through and apply basic quality controls. The first step in this process involves the collection of existing data from international and trans-national organizations, where data for multiple countries may have been collected. Once these sources have been exhausted, the second step is to tap into individual country holdings. A number of other difficulties exist, including the lack of a consistent time series for gender indicators (even among developed countries), the lack of common definitions and concepts, and the variety of sources (i.e. a mixture of public and private). Nevertheless, this effort represents the best that can be done today, and the collected data support the quantitative analysis that follows.

Data on access to and use of ICTs indicate that women's participation in the Information Society, particularly in the poor countries of the world, lags behind that of men, a cause for serious concern. Consistent with all that is known by now about the digital divide, it does not come as a surprise that a gender digital divide also exists. What is not known as well, though, is the order of magnitude of this divide, its evolution and its many nuances – all matters of importance for the design, implementation and evaluation of programs.

The size and the evolution of the gender divide refer largely to ICT access and penetration, which are the first and most basic requirements for their effective use. However, the issue of the gender divide is much broader. Even in countries where access is no longer much of an issue and penetration is high, inequalities in actual use can hamper women's development opportunities on both the economic and social fronts. So, although initially we begin to identify where and how big the ICT access and penetration gaps are, we can say little about women's equal and active participation in the Information Society just based on access. Access is a necessary but not sufficient condition to closing the gender digital divide. The issues of ICT literacy and skills are central to including and encouraging women to fully participate in, benefit from, and contribute to the Information Society.

6.1.1. Magnitude of the gender digital divide

In the process of providing quantitative evidence for the magnitude, evolution and several other characteristics, the gender divide will be situated in the context of the overall digital divide, as measured by Infostates. Gender gaps must be viewed in conjunction with the overall situation of a country, and cannot be meaningfully analyzed independently. Moreover, as research in recent years has made clear, it is important that we place in perspective the entire range of ICTs, from older ones including basic telephony, radio and television, to the cell phone and the Internet. All of the above matter in the individual country context.

To get a clearer assessment of gender inequalities than has been possible to date, we draw on diverse data, where available, to piece together a detailed picture of ICT access and use by sex. While developing countries are of particular interest here, the gender divide is very much pertinent in the developed world too. This reality will be reflected in the use of statistical evidence to assess the gender divide and to gauge where we are and where we may be headed.

The case of South Africa, a leader in its continent, demonstrates well that even today in parts of the world having access to a telephone 'somewhere' is as much access as many can hope for (Chart 6.1). Public telephones were the predominant means of access for nearly 40% of household heads

in 2001. Women head of households were more likely than men to rely on such access (42% vs. 36%), as their access from home was limited. Men were twice as likely as women to have both a telephone and a cell phone in their dwelling. They were also more likely to have a cell phone as their only telephone facility.¹⁰⁴ A slightly higher proportion of women than men had no access to a telephone (7% of women vs. 5% of men). However, this was down substantially from the 24% of women and 15% of men with no access in 1996. South Africa has made some progress in the ease of access to telephone facilities, although a gender divide clearly persists.





Additional evidence of the harsh reality in many countries comes from Ethiopia. Within the context of a country with one of the lowest Infostates both in Africa and internationally, gender gaps are evident even among more traditional media - let alone newer ICTs. The vast majority of people have no regular exposure to media, and women more so than men. About half as many women as men listen to the radio or watch television at least once a week, a proportion that drops to less than one-third for reading newspapers.¹⁰⁵ A meagre 0.5% of women read a newspaper, listen to the radio and watch television at least once a week (Table 6.1). The predicament of older women is even worse.

Table 6.1 Exposure to mass	media by se	x, Ethiopia, 2000
----------------------------	-------------	-------------------

	Reads a newspaper at least once a week	Watches television at least once a week	Listens to the radio at least once a week	All three media	No mass media	
Male	6.0	7.5	23.8	2.3	72.6	
Female	1.7	4.4	11.2	0.5	86.4	

Source: Central Statistical Authority of Ethiopia, Addis Ababa, Ethiopia Demographic and Health Survey 2000, May 2001

Many studies have found that generally divides are larger among new ICTs with low penetration, decreasing gradually as penetration increases. Recent data on mobile phone penetration in eight African countries provide some support to this, but there are exceptions which begin to illustrate the complexities involved and the paramount importance of country-specific contexts. Chart 6.2 displays the distribution of mobile phone users by sex. The biggest gender gap is observed in Ethiopia, which has the lowest overall penetration, followed by Uganda. The gender gap is less pronounced in Zambia, Namibia and Botswana, which have a much higher overall penetration, but increases again in Rwanda, Cameroon and South Africa, which has the highest overall penetration rate (in excess of 30%).

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Source: Statistics South Africa, Census 2001

¹⁰⁴ Home access via mobile networks was proportionally higher than through fixed networks, which is more and more the case in many developing countries.

¹⁰⁵ However, it is important to analyse such data within an understanding of what are necessary means of mass communication in societies with oral traditions, which have policy implications.



Note: unweighted data

Recent data from Turkey, a country with relatively low computer and Internet use, begin to demonstrate the gender gaps that accompany the introduction of newer ICTs (Chart 6.3). Women are less likely than men to use these technologies. In many countries such gaps become dramatic, putting women at a significant disadvantage. For instance, less than 10% of the Internet users in Guinea and Djibouti are women, less than 20% in Nepal, and less than one-quarter in India. While overall penetration in these countries is low, equally large gender gaps are observed in countries with higher Internet penetration: women account for less than 20% of the Internet users in Greece and just over one-quarter in Portugal.



Chart 6.3 Computer and Internet users by sex, Turkey, 2004

Source: State Institute of Statistics (Turkey), ICT Usage Survey on Household and Individuals 2004 Note: Survey reference period is April-June, 2004

The gender divide persists as we move to countries with more developed Infostates. In China, despite substantial growth in Internet usage in recent years, women account for 40% of the Internet subscribers (compared to 60% for men). Of similar proportions is the gender gap in mobile phones in Malaysia, which reaches 22 percentage points, with men representing 61% and women 39% of mobile subscribers. In the Czech Republic, women lagged behind men in personal computers and Internet access (ICTs with medium overall penetration), but also in the use of mobile phones (where penetration is much higher - with 72% of men having access in 2003 compared to 60% of women) (Chart 6.4).





Data for Taiwan, an economy with a high Infostate, offer additional evidence of the gender divide in conjunction with the continuous evolution of technologies (Table 6.2). While gender gaps exist in all listed categories, they become progressively larger with the sophistication of ICTs. By 2004, Internet usage in Taiwan was quite high, broadband lower (but still guite high by international standards), while wireless Internet and Internet usage over mobile phones were at relatively early stages. The ratio of women Internet users to men was 93%, but this percentage dropped to 70% for mobile Internet users.

Table 6.2	Selected	ICT	indicators	by	sex,	Taiwan,	2004
-----------	----------	-----	------------	----	------	---------	------

	Male	Female	female/male ratio
		%	
Internet users, age 12 and above	63.2	59.0	93.4
Broadband users, age 12 and above	52.1	45.8	87.8
Wireless Internet users	13.8	11.1	80.7
Mobile Internet users	6.7	4.7	70.3

Source: Taiwan Network Information Center, Internet Broadband Usage in Taiwan, A Summary Report of The July Survey of 2004, http://www.twnic.net.tw/file/broadbandsurvey0407.pdf Note: "Wireless Internet users" refers to access via wireless technologies and "Mobile Internet users refers" to access via mobile phones

Technologies in Households 2003 Note: Personal computer includes : desktop computer, portable computer and palmtop

Recent results from a study of six countries (Statistics Canada and OECD 2005) are indicative of the progress women have made in some areas and countries, but also of the persistent nature of the gender divide even among developed nations. Charts 6.5 and 6.6 show that the gender gaps in computer and Internet access from home were generally small, with the exceptions of Italy and Switzerland. In fact, in the U.S. the proportions of women with access to these technologies were slightly higher than for men. Italy had the most substantial gender gap in computer and Internet access from home, with 35% of women vs. 48% of men, and 27% vs. 39%, respectively. The differences between men and women for Internet access are consistently higher than for computer access – with the exception of Italy; these findings are again generally consistent with a gender gap that increases with newer technologies.





Sources: Statistics Canada and OECD, International Adult Literacy and Life Skills Survey 2005





Sources: Statistics Canada and OECD, International Adult Literacy and Life Skills Survey 2005

Similar results of moderate, yet persistent, gender gaps have come out of other countries with very high Infostates. In Australia women were not too far behind men, with 56% of women vs. 61% of men accessing the Internet in 2002. In Scandinavian countries too (Table 6.3), the gaps were generally small, but men's access was systematically higher than women's across countries and ICTs.

Compiling data on the proportion of female Internet users, together with overall Internet penetration rates, across a large number of developing and developed economies, makes it possible to take a more holistic look at the particular aspect of the gender digital divide associated with this new, powerful medium. These data are shown in Chart 6.7 by descending order of the proportion of female Internet users. They demonstrate that, with a few exceptions, the gender divide is large and widespread. They also show that generally the gender divide is more pronounced in developing economies – although there are exceptions.

More importantly, this dataset offers the opportunity to contrast the gender digital divide with the overall digital divide, places in proper perspective earlier findings, as well as tests some hypotheses with policy relevance. These data serve as the backbone for the discussion that immediately follows.

		LC33 LL	n ie is ni	30, 30	CLLCU	Juanu	IIAVIAII LU	ununco,	2000		
		Comp	uter	Mobile phone				Internet			
	Male	Female	female/ma	ale	Male	Female	female/mal	e	Male	Female	female/male
			ratio				ratio				ratio
		%				%				%	
Denmark	80	75	93.8	Denmark	84	77	91.7	Denmark	65	58	89.2
Finland	64	62	96.9	Finland	95	92	96.8	Finland	55	51	92.7
								Iceland*	75	72	96.0
Sweden	77	74	96.1	Sweden	92	87	94.6	Sweden	69	66	95.7
Norway*	78	73	93.6	Norway*	94	91	96.8	Norway*	64	57	89.1

Table 6.3 Home access to ICTs by sex, selected Scandinavian countries, 2002

Source: Statistics Norway, Nordic Information Society Statistics 2002 * 2001 data

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Source: ITU, World Telecommunication Indicators 2004 and selected national sources

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6.1.2 Relationship between the gender and the overall digital divide

Research on the digital divide, including Chapter 3 of this publication, has shown that diffusion and use of ICTs varies enormously worldwide, with generally higher penetration rates in developed than developing countries. There is also evidence that divides of all kinds, including gender, generally are larger among newer ICTs. In the case of the Internet, for example, it has been extensively documented that the stereotypical early users were young, educated, affluent males, living in urban centres. Only when Internet penetration reaches high levels does the profile of Internet users begin to resemble that of the population at large. The previous section established that the proportion of female ICT users also varies substantially by country. It is therefore worth investigating the relationship between the gender divide and the overall digital divide. In so doing, the analysis serves as a platform to cross-fertilize ongoing, broad-based research with specific research on gendered trends over the years.

If gender divides mirror the overall deployment and use of ICTs across economies, one would expect that countries with higher Infostates would have smaller gender gaps, and those with lower Infostates would have larger gender gaps. The policy implications of such a relationship, if it existed, would be significant. For instance, policies and actions undertaken to improve the diffusion and use of ICTs and help close the digital divide in general, would suffice to a large extent to close the gender divide too over time. This would run counter to voices that call for the specific targeting of the gender divide as an integral path to economic and social development.

A related question is whether the ICT evolution of developed economies and the evolution of their gender divides can be used as predictors for the future paths of developing economies. More detailed data, and of a time-series nature, would be required to take this on in subsequent research. But what follows addresses the former question with cross-sectional data, using the Internet as a case-study, both as a newer technology and because of the relative availability of data. The Internet penetration rates and the proportion of female Internet users from Chart 6.7 are re-arranged and plotted in descending order of Internet penetration in Chart 6.8 - without economy identifiers.



Chart 6.8 Relationship between Internet penetration and proportion of female Internet users



The following observations become immediately obvious:

- Gaps in Internet penetration across countries are very large the general issue of the digital divide
- The gender divide is clear: with a handful of exceptions, the proportion of female Internet users in the vast majority of countries is below the 50% line
- The trend line in the penetration of female Internet users is downward sloping; while this provides some support at a macro level that the gender divide moves in the same direction with the overall Internet penetration, clearly the relationship is very tenuous at best.

While the gender gap has recently vanished in a few countries with high Internet penetration, such as Canada and the U.S., this is not the case among other countries well-known for their high Infostates, such as Norway, Luxembourg, the U.K, the Netherlands, Germany and France. These countries behave differently, despite having overall penetration rates comparable to or even higher than those of the U.S. and Canada. Specifically, Norway has a penetration rate almost identical to Canada's, but women Internet users represent 43% compared to Canada's 51%. Moreover, the 40% female Internet users in the Netherlands was identical to that for Brazil, Mexico, Zimbabwe and Tunisia despite the fact that the overall penetration rate in the Netherlands approaches 60%, whereas those of Brazil and Mexico are less than 5%, and in Zimbabwe it is virtually non-existent. Italy's gender gap is not significantly smaller than Kyrgyzstan's despite the fact that the latter's Internet penetration rate is about one-tenth that of Italy's.

At the same time, we also see a number of countries with very low overall penetration that, within this context, do not seem to experience a gender divide. In the case of Mongolia, the Philippines and Thailand, female penetration exceeds male. The gender gap in Iran and South Africa is very small. On the other hand, several countries with low overall penetration rates have very high gender gaps; this is the case of Guinea (with less than 10% female), Djibouti, Yemen, Nepal and India. Still, the situation is not clear-cut between developing and developed countries either; Greece and Portugal are both fairly close to the bottom of Chart 6.7, whereas Mongolia and the Philippines are at the top.

What this statistical analysis establishes is that: a gender divide exists even in countries with high Infostates; in countries with high Infostates the gender divide tends to be generally smaller, but this is not always the case; in countries with low Infostates the gender divide can range substantially (from over 50% to less than 10% in the case of the Internet). The relationship between the gender divide and the overall digital divide is very tenuous and does not support the argument that the two move in tandem. Thus, the gender divide cannot be simplistically expected to improve as overall Infostates improve. Clearly, there are factors at play other than those associated with overall Infostate development. Even starting with these two dimensions alone - high/low Infostates and larger/smaller gender divides - distinct groups of countries can be delineated and examined in more detail in future research. This can become more complex if additional variables are brought in, such as income, regional characteristics, cultural influences, etc. As was shown in Chapter 4, for example, while there is a relationship between Infostates and per capita GDP, that too is subject to important exceptions - with high income countries having relatively low Infostates and vice versa. Moreover, the issue of individual ICTs in the context of development is very relevant too - as evidenced by headline stories on the leapfrogging to mobile networks, the greater importance of radio in many places, or the need to tailor ICTs to specific needs.

All in all, the importance of the specific country context in the gender divide is supported strongly by the preceding analysis. While it is not possible here to analyze each country individually, we use case studies and qualitative evidence to explain some of the findings. For example, evidence indicates that in countries with low Internet penetration rates, Internet usage is often confined to a very small, largely urban elite. Women tend to have fairly equal status with men in these circles, which can be quite global and cosmopolitan. Mongolia is one of the Asian countries with higher female tertiary level enrolment rates for women than men. That may influence the high percentage of women using the Internet. In the Philippines, the operative language is English, so content is accessible and women are very active in both politics and economic life. Iran has a high rate of female tertiary education and a well-connected (electronically and by other means) upper class. Thailand also has many women in tertiary level education and strong policies encouraging women in science and technology. Such qualitative issues will be dealt with more fully later in this chapter.

6.1.3 Location of use

An additional dimension of the gender divide is from where women access and use ICTs. Data from a number of EU countries and Turkey (Table 6.4) support some interesting observations. In this group of countries, the home was the prominent location of Internet access for both men and women. Access from work was not far behind, and indeed it was higher than home access in Latvia, Lithuania and Turkey. Access from school was considerably smaller among countries with high rates from home and work, whereas access from Internet cafés was very low.

		HOME	female/		WORK	female/	S	CHOOL	_ female/	INTER	NET C f	AFÉ emale/
			male			male			male			male
1	emale	male	ratio	female	male	ratio	female	male	ratio	female	male	ratio
		%			%			%			%	
Denmark	65	71	91.5	53	54	98.1	14	10	140.0	-	-	-
Sweden	68	71	95.8	34	40	85.0	12	11	109.1	-	-	-
Luxembourg	50	68	73.5	18	35	51.4	6	8	75.0	1	3	33.3
Iceland	64	66	97.0	39	44	88.6	14	11	127.3	-	-	-
Germany	48	57	84.2	15	21	71.4	8	9	88.9	2	3	66.7
United Kingdom	47	55	85.5	26	33	78.8	11	10	110.0	3	7	42.9
Finland	46	52	88.5	37	37	100.0	18	14	128.6	3	4	75.0
Austria	33	42	78.6	19	29	65.5	6	5	120.0	0	1	0.0
Estonia	31	33	93.9	20	21	95.2	14	10	140.0	5	5	100.0
Slovenia	24	28	85.7	20	20	100.0	8	8	100.0	-	-	-
Cyprus	18	27	66.7	13	15	86.7	5	6	83.3	1	5	20.0
Italy	17	26	65.4	11	18	61.1	4	4	100.0	-		-
Ireland	21	24	87.5	14	15	93.3	5	5	100.0	1	1	100.0
Portugal	14	20	70.0	13	16	81.3	8	7	114.3	-	-	-
Hungary	12	17	70.6	9	11	81.8	7	7	100.0	2	3	66.7
Poland	14	16	87.5	9	9	100.0	8	8	100.0	5	6	83.3
Greece	9	15	60.0	7	11	63.6	4	4	100.0	2	2	100.0
Latvia	9	13	69.2	18	16	112.5	7	6	116.7	4	6	66.7
Lithuania	10	12	83.3	13	12	108.3	12	11	109.1	-	-	-
Turkey	3	5	60.0	3	8	37.5	1	1	100.0	2	9	22.2

Tahle	64	Acces	to	Internet	from	varioue	locatione	hv	COV	colortod	countries	2004 *
TUDIC	U.T	AUUUJJ				various	locationa		JUA,	JUILUULU	Countrie ica,	

Source: Eurostat, NewCronos Database 2004

* Refers to access in the last 3 months

The gender divide was prominent for both home and work locations, but findings were subject to variations. Among countries with high Internet penetration, Luxembourg had the largest gender gap from home, coupled with an even larger gap from work - with women's rate at just over half of men's. This may be partially explained by the relatively low rate of female labour force participation - just 59.3% in 2001. Among other countries with severe gaps in home access (Turkey, Greece, Italy, Cyprus, Latvia, Portugal, Hungary),

only Turkey and Italy had a bigger gap from work. The gender gap improves slightly in Greece, more in Portugal and Hungary (where the female/male ratio improves by more than 10 points), and much more in Cyprus (where the female/male ratio improves by more than 20 points). The gap is reversed in Latvia and Lithuania, while Poland and Finland have gender parity.

A larger or equal proportion of females than males accessed the Internet from school in all countries, except for Cyprus, Germany and especially Luxembourg, which shows another big gap. Use rates were generally very small from Internet cafés in this particular group of countries, but with the exception of Ireland, Greece and Estonia, gender gaps appear to be very large. Relative to other locations, for example, Cyprus and Turkey have relatively high use rates among men. This is likely due to social and cultural practices with respect to women in public places. (These factors will be addressed in section 6.2).

A slightly different picture emerges from South Korea (Chart 6.9). Internet access is very high from home, where women's rate exceeds men's. Women are also ahead in schools and public places, locations with much lower usage.¹⁰⁶ Women lag behind men only with respect to the work and PC parlour locations.¹⁰⁷ This concurs with the relatively low proportion of women who are economically active in the country.



Chart 6.9 Primary place of Internet access by sex, South Korea, 2004

Source: Ministry of Information and Communication, National Internet Development Agency of Korea (NIDA), Survey on the Computer and Internet Usage 2004

This example points again to peculiarities from country to country, which relate not only to the available access options, but to labour force participation, government policies, socio-cultural norms and numerous other factors. Typically, the availability of access in locations other than the home have been perceived as equalizing forces for several aspects of the digital divide at large. While this is true in developed countries as well, in many developing countries alternative locations, especially public places, offer the main (if not the only) means of access. Generally, women have problems in access from such locations too – the more detailed discussion of which is deferred again to section 6.2.

6.1.4 Patterns of use

Documenting the extent to which women access and use ICTs is only a first step to understanding the gender digital divide. To take the analysis a step further, we ask whether women use new technologies differently than men. In so doing, we examine statistical evidence related to

¹⁰⁶ The South Korean government, through a special education program geared specifically to women, offered ICT training to a million housewives, unemployed women, and elementary school students between 2001 and 2003. The government then mounted a second program to train two million women (Lee 2003).

¹⁰⁷ PC parlours are a combination of Internet cafés and gaming centres. They are popular meeting places for socialization.

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the frequency, intensity and diversity of use, as well as the types and reasons of such use. Obviously, women do not behave as a monolithic group, and factors such as class, socioeconomic status, education and age will also affect use. Additionally, use depends on the various roles and multiple responsibilities women take on in their daily lives. For instance, shoppers may well be looking for bargains, while mothers may want to screen and monitor sites visited by their kids. Information at this level of detail is drawn from a large number of sources, and it is not possible to present a comprehensive statistical portrait. Nevertheless, the available data unveil some potentially important issues worthy of understanding in the context of the gender digital divide.

In addition to the gaps in access to and use of ICTs, gender gaps appear to extend to the frequency of use. Women fall short of men in accessing the Internet at least once a week in a large number of European countries (Chart 6.10). These gaps are not unlike those found in overall Internet access. Luxembourg, where less than half of the women accessed the Internet at least weekly, registers the largest gap, followed by Austria, the U.K., Germany and Italy. By contrast, such gaps are very small in the Baltic countries (Estonia, Latvia and Lithuania), while there is no difference between men and women in Finland.



Chart 6.10 Frequency of Internet access by sex, selected countries, 2004*

Source: Eurostat, NewCronos Database 2004 * accessing at least once a week

spend more time to accessing the Internet than women (Chart 6.11). Data from South Korea indicate that about 37% of women spent more than 10 hours per week, compared to 50% of men. In marked contrast, the proportions of women all other categories.



spending lesser amounts of Source: Ministry of Information and Communication, National Internet Development time exceeds that of men in Agency of Korea (NIDA), Survey on the Computer and Internet Usage 2004 *Average weekly use time



Chart 6.12 Diversity and intensity of Internet use by sex, selected OECD countries, 2003

Source: Statistics Canada and OECD, International Adult Literacy and Life Skills Survey 2005

Similar findings with respect to the gender gap emerge from data on a measure of the *use of computers for task-oriented purposes*. However, women ranked close to, or higher than, men in scores for a measure of *perceived usefulness and attitudes towards computers*. Perceived usefulness, of course, is not independent of overall use and familiarity. The more people use ICTs, the more useful they tend to consider them – even indispensable; non-users have less appreciation for their benefits.

Data from the same source also provide evidence for sizeable gaps among men and women in the use of various technologies and related activities across countries. The female/male use ratios for each were computed and plotted for all countries in Chart 6.13 (a ratio of less than one indicates lower usage by women). These results show variations by ICT or activity, but the differences between the countries studied are even greater. For instance, in Italy women's use of all ICTs was significantly lower than men's – with the gap being proportionately smaller in the use of cell phones (where women's use was lower in all countries). The situation was similar in Switzerland, with the exception of automated banking, where women's use was comparable to men's. With the exception of cell phones, though, Bermuda once again had a higher proportion of women than men using each type of ICT. Higher female/male ratios were also the case in the U.S. for the use of touch-tone transactions, fax machines and calculators, albeit proportionately lower than in Bermuda.

¹⁰⁸ This index is based on a variety of uses, including e-mail, chat groups, shopping, banking, music downloads, searches for various types of information, playing games and general browsing. The index on the use of computers for task-oriented purposes is based on writing or editing text, using spreadsheets for accounts or statistical analysis, creating graphics, designs, pictures or presentations, programming or writing computer code, keeping a schedule or calendar and using a CD-ROM or DVD. The index of perceived usefulness and attitude toward computers is based on respondents' self-assessment as to whether computers have made it possible/helped to: get more done in less time, obtain useful information more easily, learn new skills other than computer skills, communicate with people, and reach career goals. (For more details see Statistics Canada and OECD 2005).





Sources: Statistics Canada and OECD, International Adult Literacy and Life Skills Survey 2005

Additional data regarding detailed types of Internet use were compiled from independent national sources (Table 6.5). Gender gaps differ even across such a small sample of countries. Men tend to use the Internet more than women for most types of activities, such as searching for information, accessing news sites and playing games – although this appears to be less the case in South Korea than in the other countries. Women were much more likely than men to use the Internet to search for or use health and medical information or services. This is the case in Canada (with high Internet usage), Malta (with medium Internet usage) and the Czech Republic (low Internet usage).

	Can	iada (2 f	2000) emale/ male	Ko	orea (2 f	004) emale/		Malta (2002) female/ male	Czech F	lepubl	ic (2003) female/ male
	female	male	ratio	female	male	ratio	fema	ale ma	le ratio	female	male	ratio
		%			%			%			%	
Search for information on goods and services	70	79	88.6	72	75	96.0	54	1 76	5 71.1	54	55	98.2
Access online news sites	48	62	77.4	13	19	68.4	45	5 54	83.3	29	34	85.3
Search for/use health and medical information/service	52 es	41	126.8	-	-	-	38	3 25	5 152.0	12	5	240.0
Access information on gov't programs or services	37	44	84.1	-	-	-	32	2 44	72.7	11	13	84.6
Play games ⁽¹⁾	33	38	86.8	48	59	81.4	44	48	91.7	23	37	62.2
Use online chat services ⁽²⁾	28	32	87.5	17	14	121.4	37	7 34	108.8	18	28	64.3
Purchase goods or services	19	28	67.9	22	9	244.4	11	l 17	64.7	8	12	66.7
Electronic banking	19	26	73.1	8	8	100.0	6	6 13	46.2	10	14	71.4
E-mail	-	-	-	88	85	103.5	89	92	96.7	81	82	98.8
Leaming	-	-	-	16	11	145.5	51	52	98.1	3	3	100.0

Table 6.5 Access to Internet from various locations by sex, selected countries, 2004*

Sources: (Canada) Statistics Canada, General Social Survey, cycle 14 2000;

(South Korea) Ministry of Information and Communication, National Internet Development Agency of Korea, Survey on the Computer and Internet Usage, September 2004; (Malta) National Statistics Office, Survey on ICT Usage in Households in Malta 2002; (Czech Republic) Czech Statistical Office, Survey on the Usage of ICT in Households 2003

Notes: (1) Malta and Czech Republic included music with playing games.

(2) Czech Republic includes videoconferencing and ICQ.

Another important observation from this sample of countries is that e-mail use was large and fairly gender-equitable. The evidence on gender differences in e-commerce activities is mixed. In Canada, Malta and the Czech Republic more men than women purchased goods and services online. However, the situation was reversed in South Korea, where women out-numbered men by a substantial margin. Online shopping, with or without online payment, depends on people's overall usage and history of usage, which confers a degree of familiarity and increased comfort with the new medium. Even then, early purchases tend to be associated with small-ticket items. In the Czech Republic, the gender gap should be placed in the perspective that in 2003 only about 4.5 percent of the population aged 15 and over had ever purchased something over the Internet. Among Internet users only, men out-shopped women (15.8% vs. 10%). Regardless of sex, books, magazines or textbooks were purchased more often, followed by purchases of electronic equipment among men, whereas clothing and sports goods came second for women. When it comes to paying for goods purchased online, men and women in the Czech Republic use similar methods, with over half paying cash on delivery. Women were somewhat less likely to pay with a bank transfer (22% vs. 29% of men).

Reasons for using the Internet can also vary between women and men depending on various social, economic and demographic characteristics. For example, in the U.S. 29% of women with children said they used the Internet to play games online, and 40% used it to do research for school and homework-related projects (Jupiter Media Metrix 2002). In addition, 44% of women with children indicated that their Internet usage caused them to spend less time watching television. By comparison, women without children are even heavier users of the Internet and also tend to use it differently. They are more likely to make travel arrangements, conduct research for work and read the news online.

Despite the lack of comprehensive data on types of Internet use, some important issues for the gender digital divide have been raised through selective use of available data. In general, men tend to use ICTs more frequently, spend more time, and engage in more diverse uses than women. To understand why this is the case, it will be important to understand the extent to which women use ICTs less because of gendered social and cultural expectations (see section 6.2). It will also be important to factor in the different involvement of men and women in the conceptualization, design and implementation of ICT applications.

6.1.5 ICT literacy, education and skills

A significant question related to the gender digital divide is whether women have the education and training required to use ICTs effectively. How do they compare to men in this regard? One measure of this is the extent to which women have access to ICT education; at a more fundamental level, gender differences in literacy rates provide a sense of how truly "accessible" some ICTs are, particularly the Internet. Of the many possible programs and initiatives to bring about gender digital equality, clearly education and training rank very high as a priority. Here, we bring together information on literacy and education to put the gender digital divide into a clearer perspective.

Chart 6.14 sets the stage by showing the relationship between higher prose literacy¹⁰⁹ and computer use. Consistent with general research findings concerning the use of ICTs, women computer users consistently had higher prose levels than women who had never used a computer. Thus, use increases with literacy.

¹⁰⁹ Prose literacy is defined as the knowledge and skills needed to understand and use information from texts such as editorials, news stories, poems, and fiction (Statistics Canada and OECD 2005).





Source: Statistics Canada and OECD, International Adult Literacy and Life Skills Survey 2005

More detailed evidence on the influence of education is shown in Table 6.6. Clearly, the proportions of computer and Internet users in Turkey increase significantly among groups of people with progressively higher levels of education, regardless of sex. Low rates of usage among people with only primary school education increase noticeably among those with secondary and high school education and become significant among university graduates. Moreover, the gender divide tends to narrow at higher levels of education. Even within this context, however, the gender gap remains intact, with women having lower rates of usage at each and every level of education. This indicates that while education exerts a powerful influence on ICT usage, other factors are at work too, including those associated with the transition from school to the workplace.

	Total number of	С	omputer us	e		Internet us	e
	individuals	Total	Female	Male	Total	Female	Male
	.000		%			%	
Literate without a diploma	7,188	0.9	0.3	0.7	0.7	0.2	0.5
Primary school	21,135	2.2	0.4	1.8	1.3	0.2	1.1
Secondary school and vocational sch	ool						
at secondary school level	6,156	24.1	6.0	18.1	17.6	3.6	14.0
High school	8,992	37.8	11.7	26.2	29.8	8.3	21.6
University/Master/Doctorate	3,567	69.7	26.2	43.5	60.1	22.6	37.4

Table 6.6 Computer and Internet use by sex and level of education, Turkey, 2004

Source: State Institute of Statistics (Turkey), ICT Usage Survey on Household and Individuals 2004 Note: Survey reference period is April-June, 2004

Patterns of ICT use associated with tertiary education differ significantly from those associated with literacy without a diploma and low levels of education. Women's literacy rates are lower than men's in the majority of countries, but the countries with the largest gaps in literacy do not necessarily have the largest gender gap in tertiary education enrolments. For example, in Libya, where the percentage of literate women is 20 points below men, almost twice as many of the students enrolled in tertiary education are women. In Botswana, where a higher percentage of women than men are literate, women's enrolment in tertiary education is 80% of men's. Botswana is quite rich by sub-Saharan African standards, so the country's wealth may well account for the absence of a gender gap in literacy.

Since literacy rates reflect the total population – usually predominantly rural, poor, and more heavily female in most developing countries – they can be quite low, while at the same time the female representation in tertiary education can be high. However, the tertiary education "pool" is a very small pool in most countries. Those who do reach that level are usually from heavily urban and generally far wealthier regions than the population as a whole. It is often a question of class differences; so that the majority of the population with few resources dominate the low literacy rates, but for those who can afford higher education there tends to be little resistance to the idea of tertiary education for girls. Different factors come into play in determining who proceeds to tertiary education – among them class, race or ethnic group, employment opportunities, marriage, government policy and cultural attributes.

While it is not possible in this report to examine the specific relationship between the gender digital divide and literacy and education in every country, some examples are offered to illustrate cases where specific elements of the gender gap can be explained.

- South Africa: The country's Internet penetration rate was quite low in 2001, at less than 10%, yet of those using it almost half were women, up from 17% in 1997. Women's literacy rate was about 4 percentage points lower than men's, but their proportion of enrolment in tertiary education was higher than men's.
- Bulgaria: Again, the Internet penetration rate was low, at less than 10%, but here the percentage of female users was also low, at only about 10% of Internet users. Nevertheless, literacy rates for men and women are close to equal, and women's enrolment in tertiary education is slightly higher than men's. In this case, education does not adequately explain the gender digital divide. A recent study found that female economic participation rates have been falling over the last decade, and that state-run programs to facilitate women in acquiring qualifications and reintegrating into the labour market rarely include training related to technology.
- Mongolia: This is another country with a very low Internet penetration rate, at 2%. Nevertheless, it had the highest proportion of female Internet users among the countries for which data were obtained. Literacy rates for men and women are about equal and women's enrolment in tertiary education is much higher than men's (1.5 times). As discussed earlier, in this case the few Internet users found are among the educated elite, where gender gaps tend to be smaller.
- Yemen: The low Internet penetration rate and the small proportion of women Internet users (14%) can be attributed to a number of social and economic factors, including the high illiteracy rate among adult women (75% compared with 32.5% of men). In fact, illiteracy is one of the primary obstacles for not using the Internet among 27% of the non-users (Noman 2002). Moreover, most Internet use in Yemen is either at the desks of professional and administrative employees in relatively large offices, where few women are found, or in cybercafés, where cultural constraints make it very difficult for women to frequent.

While literacy and education are surely important for many types of ICT use, they belong to a very long list of determinants, including a host of general and country- or technology-specific factors. Education and training specifically related to ICTs provides an interesting linkage to ICT use. As shown in Table 6.7, more than one-quarter of individuals in the Czech Republic had some ICT training at some point, while about 10% did so in 2003. Women exceeded men, consistent with their higher use. Nearly two-thirds of women who had ever used a PC reported having taken training related to computer use, while this was the case for just over half the men. Formal ICT training is a very important, but not the only, way to obtain digital literacy necessary to function in an Information Society. Digital literacy, in turn, is a broad and evolving concept and belongs to the continuum that includes basic literacy.

Table 6.7 Computer training by sex, Czech Republic, 2003

	Individuals 15+	Individuals any traini c	who have ng course omputer us	ever taken related to se	Individuals training comp	who have course rela uter use in	taken any ated to 2003	
	.000	.000	%*	%**	.000	%*	%**	
Total 15+	8,659	2,358	27.2	59.1	852	9.8	21.3	
Males Females	4,178 4,480	1,077 1,282	25.8 28.6	53.2 65.1	402 449	9.6 10.0	19.9 22.8	

Source: Czech Statistical Office, Survey on the Usage of ICT in Households 2003

* % of individuals aged 15+

** % of individuals who have ever used a personal computer

Digital Literacy

Looking beyond formal education, in a group of EU and other countries, most with a fairly high Internet penetration, women score lower than men on a digital literacy score. This score combines four types of skills: communicating with others by e-mail or other online methods; obtaining or downloading and installing software on a computer; questioning the source of information on the Internet; and, searching for required information using search engines. Women in Ireland rank closest to men in digital literacy, but still fall short by 13 percentage points (Chart 6.15). These digital literacy scores range from 0 to 3, with Ireland falling in the mid range of country scores with a value of 1 for men and 0.9 for women. The highest levels of digital literacy for men and women are in Denmark and the U.S. at 1.7 for men and 1.2 and 1.3 for women, respectively.

Chart 6.15 Digital literacy, selected countries, 2003





Source: SIBIS Pocket Book 2002/03, GPS 2002 survey and GPS-NAS 2003 survey, http://www.sibis-eu.org

Gender Digital Divide in Francophone West Africa: A Harsh Reality

Pioneering fieldwork in measuring the gender digital divide was recently completed in six countries: Benin, Burkina Faso, Cameroon, Mali, Mauritania, and Senegal. The Gender and ICT Network (Régentic), sponsored by the Canadian International Development Research Centre (IDRC), undertook the project based on a survey of use of computers, the Internet and cell phones.

The methodology: A sample survey of approximately 6,750 individuals and 380 institutions was carried out during the fourth quarter of 2004. The individuals' sample was stratified to be representative of the population distribution by sex, age and place of residence. It covered only those areas that were served by ICTs, and was 63% urban, 18% semi-urban and 19% rural. Because of the emphasis on use, individuals with more education were overrepresented: 52% were at secondary level and 29% had reached higher levels. The survey collected data on 18 variables grouped under four main indicator headings – connectivity, skills, content and decision-making (for details see Régentic 2005: *http://www.famafrique.org/regentic/indifrect/fracturenumeriquedegenre.pdf*).

Key findings: The existence of an overall gender digital divide, as captured by a composite indicator (0.64), is demonstrated by the finding that women have 36% fewer ICT– related opportunities and benefits than men in the countries surveyed. However, the summary index masks some big disparities, both across indicators and countries.

2004	All	Benin	Burkina Faso	Cameroon	Mali	Mauritania	Senegal
Connectivity	0.88	0.84	0.89	0.94	0.94	0.88	0.81
Skills	0.70	0.65	0.67	0.97	0.64	0.63	0.73
Content	0.62	0.62	0.61	0.62	0.69	0.61	0.64
Decision-making	0.34	0.22	0.54	0.33	0.48	0.22	0.52
Gender digital divide	0.64	0.58	0.70	0.71	0.69	0.59	0.67

- Generally, the gender gap in connectivity is smaller than in skills and content. The largest gap was in decision-making, where women's chances to participate were one-third of men's. The major connectivity obstacles for women were related to place of access (safety and security issues), time constraints and technophobia.
- Women tend to use the Internet and cell phones more for personal and social use, and men for professional or work-related reasons.
- The gender gaps in connectivity and skills were lowest among young women educated at least to secondary school level, who were more likely to undergo training in computer use and work in a computer-related field. Nevertheless they were mainly working at entry level jobs and trained at elementary levels for secretarial or data-entry tasks, not in creating content or developing systems. Although young and educated women have become the majority of those using ICTs at work, the men win the positions that lead to advancement.
- Men frequently felt threatened by women's use of cell phones and the Internet; the new freedoms afforded to women were perceived as destabilizing to relationships. In many cases men monitored the cell phone and Internet use of their partners.
- Very little local content relevant to gender issues was available, but most women did not notice this gap, revealing the need for more critical thinking and awareness about relevant content.
- Very few people were aware of any connection between gender and ICTs, and the notion of gender equity in access to and use of ICTs was not commonly understood or accepted.

Recommendations include:

- To help close the gender digital divide, ICT policy needs to move beyond access, where the gender gap is not large, into skills, content and decision-making.
- Young women must be encouraged to undertake ICT training beyond elementary levels.
- Before gender-equitable ICT policy can be elaborated, tools to monitor and evaluate the differential impacts of ICTs on men and women need to be developed.
- Universal access strategies are necessary for adult women living in poor areas to obtain access to ICTs.

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6.1.6 Men and women digitally divided at the workplace

The diffusion and use of ICTs in every part of the economy have important implications for labour markets around the world, vis-à-vis knowledge-sharing, innovation, productivity and competitiveness. The gender gap captured by statistics on home access and use of ICTs is not a reliable predictor of gender discrepancies elsewhere. For instance, while in the U.S. women were slightly ahead of men in using the Internet at home, they lagged behind men in Internet use at work, with a 60-40 split in favour of men (Nielsen//NetRatings 2002). To begin to shed light on such gaps, it is important to look at labour force participation, employment status and occupation – at a minimum. Undoubtedly, the gender gap in the use of ICTs at the workplace is directly impacted by the presence of women in the labour market. Furthermore, within the workplace, the roles of men and women are different. In the U.S. nearly half of all men who used the Internet in the workplace are employed in professional, executive or managerial roles, compared to one-third of females.

The participation of men in the labour force exceeds that of women in every region of the world. The largest differentials are observed in the Middle East and North Africa, followed by South Asia and Latin America and the Caribbean. Many factors contribute to this phenomenon. For instance, the fact that in many sub-Saharan African countries the presence of women in the labour force is considerably higher than elsewhere may have much to do with the fact that many women are frequently the sole wage earners and heads of their households.

Rwanda has one of the highest female labour force participation rates, at 92.1%. The contribution of women is central to overcoming the country's challenges. In the 1994 genocide and civil war, 800,000 people were killed, essentially crippling the country's human resource capacity. There are few educated people to fill government jobs. Moreover, 42% of Rwandan women are widows, and at least 35% of households are headed by women. Nearly half of the total population is under 14 years old, and 60% is under 20 years old. This shift in demographics and the country's social structure has imposed a heavy burden on women and girls to support and care for their families and siblings. In turn, this means that time and funds for school and training are nearly impossible. Nevertheless, in the process of reconstruction, which encompasses Information Society initiatives, the active participation of women is paramount.

By contrast, the participation of women in the labour force is lower in Latin America – at least based on official figures. It ranges from only 25% of women in Belize to 73% in Uruguay (ILO 2004). The underrepresentation of women in the labour force is also particularly large in parts of Asia. Pakistan, for example has only 14% of women in the economically active population, compared to 70% of men.

Numerous factors influence labour force participation, including education and the degree of urbanization. Table 6.8 illustrates the situation in India.

Table 6.8Labour force participation rates by sex,level of education and area, India, 1999-2000

	Literate below secondary	Secondary & higher secondary	Graduates & above
		%	
Male			
urban	82.0	68.2	85.4
rural	86.4	74.7	89.8
Female			
urban	17.9	12.7	30.2
rural	36.6	19.5	41.0
female/male rat	io (%)		
urban	21.8	18.6	35.4
rural	42.4	26.1	45.7

Source: Central Statistical Organization of India, Ministry of Statistics and Programme Implementation, Selected Socio-economic Statistics: India 2002

Note: The labour force participation rates are for persons aged 15 years and above.

Differences between men and women are enormous, regardless of education or urban vs. rural living. Even when the gaps are relatively lower (graduates and below secondary education in rural areas, where farming and other agricultural activities provide the majority of jobs), women's participation is less than half that of men. However, the participation of women graduates is larger both in rural and urban areas.

In addition to labour force participation in general, the sector of engagement matters. In Cambodia, for instance, where there is practically no difference between the participation rates of women and men in the labour force, a substantial proportion of men compared to women are either paid employees or self-employed, while the proportion of women in unpaid family employment is twice that of men (Chart 6.16). Women are always more likely than men to be family workers.



Chart 6.16 Employment by sex and type, Cambodia, 2004

In Turkey, even within the regular employee category, men outnumber women in the usage of computers and the Internet by very large margins (Table 6.9). The gaps become even more pronounced among self-employed workers, where women's usage is miniscule. Even among students, who account for the bulk of usage of these technologies, the gender gaps are huge. For example, men's computer usage was double that of women's.

Table 6.9 Use c	of computers and	d the Internet b	y sex and	labour for	ce status,	Turkey,	2004
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Labour force status		Computer use			Internet use	
	Total	Female	Male	Total	Female	Male
			C,	%		
Regular employee	33.6	9.4	24.3	26.6	7.5	19.1
Self employed	11.2	0.9	10.2	8.5	0.9	7.7
Unpaid family worker	6.6	1.5	5.2	5.1	0.9	4.2
Housewife	2.6	2.6	-	1.2	1.2	-
Unemployed	22.5	6.9	15.6	20.7	5.9	14.8
Retired	4.3	2.0	2.3	2.7	1.3	1.4
Student	64.4	21.7	42.7	53.5	17.0	36.5
Other	3.3	-	3.3	2.7	-	2.7

Source: State Institute of Statistics (Turkey), ICT Usage Survey on Household and Individuals 2004 Note: Survey reference period is April-June, 2004

Type of occupation is another key factor, which has been found to be among the determinants that account for differences in ICT use. Not surprisingly, it also accounts for the lower use of ICTs by women. Women account for a lower proportion of professional, executive or managerial jobs, and

Source: National Institute of Statistics (NIS) of Cambodia, Inter-Censal Population Survey 2004

they are more likely to be occupied as service, sales or craft workers. In South Africa, for example, although women make up just over half of the total population and 41% of the employed population. they occupy only 15% of executive manager positions and a fraction of director positions. Chart 6.17 presents data from Malaysia to illustrate that women employed in professional jobs are more likely to use ICTs. In 2002, almost 60% of JARINGS's women Internet subscribers¹¹⁰ were employed in professional and administrative occupations (MIMOS 2003).



Chart 6.17 Female Internet subscribers by occupation, Malaysia, 2002

ICT employment

Further evidence of the difficulties encountered by women stems from their employment in industries of the ICT sector, both in developed and developing countries In Australia, women accounted for only 16% of ICT workers in 2003-04 (ABS 2005). In India, with its booming software sector for example, the participation of women in IT jobs was an estimated 21% of total IT workers in 2003 (650 thousand). However, this is higher than the 15% in 2001 (llavarasan 2004). In Japan, the proportion of men employed in the ICT sector was three time higher than that of women in 2002. The gaps were larger among the self-employed, whereas women have a much higher representation than men in family work (Chart 6.18).





¹¹⁰ The 2002 Internet Subscriber Study in Malaysia was conducted by MIMOS Berhard. JARING was Malaysia's first ISP, and in 2002 it had a total of half a million subscribers (covering about 2 million users).

Note: Data refer to JARING Internet subscribers only

Further examination reveals that the majority of ICT occupations for family or home workers are clerical or administrative in nature. In Japan most women are engaged in text and data entry, while the proportions of men in occupations related to engineering or systems design and programming are easily twice or three times those of women (Table 6.10).

Type of business	Male	Female
		%
Text entry	6.4	30.4
Engineering, Drafting, Design	38.2	15.6
Writer, Translation	14.5	11.0
Data entry	0.9	14.8
Systems design, Programming	20.9	6.5
Desk Top Publishing (editing), Computer typesetting	6.4	6.8
Website creation	3.6	3.0
Audio-typing	1.8	1.9
Research, Consulting	0.0	2.7
Computing, Information search service	0.9	1.1
Business document preparation, Document organization	0.0	0.4
Other	5.5	5.3

Table	6.10	Home	workers	bv	sex	and	type	of	business.	Japan.	2001
1 abio	0.10										

Source: Statistics Bureau of Japan, Ministry of Internal Affairs & Communications, IT Statistics for Japan 2003

An attempt by the International Telecommunication Union (ITU) to collect data on employment in the telecommunications industry (full-time staff)¹¹¹ revealed that, on average, among the reporting countries the proportion of women employees was short of one-third of total employment. To underscore once again the importance of the particular context of each individual country, significant variations were found. Women's employment ranged from a high of 65% in Panama to a low of 6.5% in Iran. An ITU report offered some pertinent perspective: *"In general, members of the Commonwealth of Independent States (CIS) tended to have the highest levels of female telecommunications staff while Gulf States tended to have the lowest. The CIS nations tend to have high levels of female literacy and education. At the same time, they have fairly old telephone networks which may require more operator intervention. Telephone operators tend to be women. In the case of Gulf States, traditional cultures have usually resulted in few women working" (Minges 2003, p. 2). As is the common thread in the many facets of the gender digital divide, a plethora of factors are at work.*

6.1.7 Comparisons of the gender divide with other digital divides

The gender digital divide is one of several manifestations of unequal ICT opportunities between groups of people, whether within or across countries. There are, however, other sociodemographic and economic characteristics of interest that introduce additional dimensions to the digital divide. Income, age, education, employment type, geographical location, family type, race, ethnicity and disabilities are all examples of characteristics that can produce sizeable inequalities among and within the populations groups. While each variable has been found to exert its own independent influence on the digital divide, they are often interrelated. For example, higher education may well lead to professional occupations associated with higher income and increased use of ICTs. Part of the gender digital divide may largely be due to the fact that ICTs are less available, less reliable and more expensive in rural areas, where people are less educated and poorer, and where women make up the majority of the population. This section will add perspective to the gender divide by placing it in the broader context of other ICT-related divides.

¹¹¹ About one-third of the countries reported. While this was the case for many developing countries, many developed countries were also unable to provide such figures.

As discussed earlier, the gender divide is lower among more educated women. It is also wellknown that income is one of the most important determinants of ICT adoption and use. A study from South Korea also demonstrates how various aspects of the gender digital divide improve with income. Indexes measuring ICT awareness, access, utilization and skills necessary for effective use were all lower at lower levels of income (Table 6.11).

Income	Awareness	Access	Utilization	Skill	Effect	Inequality
(million Wons)			inde	exes		
> 4	100.0	100.0	100.0	100.0	100.0	100.0
3-4	96.6	79.3	76.5	96.0	104.5	90.4
2-3	93.4	63.5	56.0	93.6	98.8	80.7
1-2	91.5	58.8	60.8	88.7	91.7	77.9
< 1	86.8	42.3	45.7	87.0	79.9	67.7

Table 6.11 Female digital divide by income, South Korea, 2004

Source: Republic of South Korea, 2004

Data in Chart 6.19 show clearly that along with sex, labour force status, age, and urban/rural locations give rise to divides. With respect to home Internet access, in the EU age proves more dividing than other variables, with big differences between the youngest and oldest groups. This is closely followed by labour force status, with paid employees much more likely to have Internet access from home than those without a professional activity or involved in manual work. The gender divide associated with labour force status was more pronounced than the difference between rural areas and metropolitan centres.



Chart 6.19 Internet access from home, EU, 2002

Additional evidence that, within the gender divide, age is a very influential dividing factor is contained in Chart 6.20. While even in Canada there was a gender divide in 2000, the generational gap was proportionately bigger than the gender gap. The main observation is that while 9 in 10 persons between the ages of 15 and 17 were online, this was the case for about 13% of individuals aged 60 and over. In general, the proportion of Internet users declines steeply with age. While a gender gap does not exist in younger ages, it becomes visible within older age groups (Silver 2001).

Source: European Commission, Information Society Statistics – Pocket Book 2003





Source: Statistics Canada, General Social Survey, cycle 14, 2000

Corroborating results can be seen from Malaysia where a gender gap was present even among the youth. In 2002, the overall male-to-female ratio among JARING Internet subscribers was more than 2, but it ranged from a low of 1.7 for those under 20 years of age to more than 3 for those over 41 years of age (Table 6.12). Clearly, the gender divide widens with age. At the same time, examined in conjunction with the distribution of female JARING subscribers, we see that while females aged 31-40 years were subject to a proportionately larger gender divide compared to younger age groups, they made up the second biggest subscriber group (Chart 6.21).

	subscribers by se	x anu a	aye, waaysia,	EUUE
Age (years)	Male %	Female	male/female ratio	
< 20 21-30 31-40 > 41	62.3 66.7 69.7 75.4	37.7 33.3 30.3 24.6	1.7 2.0 2.3 3.1	

Source: MIMOS Berhad of Malaysia, The 2002 Internet Subscriber Study Note: Data refer to JARING Internet dial-up subscribers only



Source: MIMOS Berhad of Malaysia, The 2002 Internet Subscriber Study Note: Data refer to JARING Internet subscribers only

Even in the use of mobile phones in Finland, the gaps by age are more pronounced than those associated with sex (Chart 6.22). Thus, while evidence presented in this work outlines a substantial and multi-dimensional gender digital divide, and while the issue is unquestionably an impediment to economic and social development, work in this area would benefit by placing it in the proper context of related dividing factors which intersect with sex. Age, in particular, is a de facto critical dimension of the gender digital divide.



Chart 6.22 Mobile phone users by sex and age, Finland, 2002

Source: Statistics Norway, Nordic Information Society Statistics 2002

Finally, we must also be cognizant of the continuous evolution of the very technologies that gave rise to the digital divide in the first place. ICTs and their applications do not stand still, feeding an ever-evolving digital divide. By implication, the gender divide too becomes a moving target. As one example, the issue of women falling behind in the use of the Internet and more basic ICTs in the U.S. a few short years ago has already been replaced by concerns that women seem to be at a disadvantage with regards to broadband use¹¹² (Chart 6.23).





Source: U.S. Department of Commerce. National Telecommunications and Information Administration. A Nation Online: Entering the Broadband Age, September 2004 Note: 3 years of age and older, October 2003

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¹¹² As discussed in Chapters 2 and 3, broadband is generally not available in most countries.

6.1.8 The evolving gender digital divide

As ICT diffusion expands, the various digital divides generally become smaller – to varying degrees and speeds, depending on the country and the specific divide in question. While a comprehensive analysis of the type performed in Chapter 3 for overall Infostates is not possible due to data limitations, there is enough, albeit scattered, evidence that the gender divide too is narrowing somewhat. Of course, as has been discussed earlier in this chapter, this refers to the access to and use of ICTs, which are only 'entrance' issues to the gender digital divide.

In many developed countries the gender gap is closing but, with a few exceptions, not disappearing. Recent U.S. data (2004) show that in October 2003 the Internet penetration rate of women (59.2%) exceeded that of men (58.2%). The gap had closed at least two years prior to that (September 2001), when penetration rates among women and men were both 55%. In Canada, where approximately 18% of individuals used the Internet in 1994, women lagged behind men by 8 percentage points (14% vs. 22%, respectively); by 2000, when Internet usage had jumped to 53%, the gap was smaller (6 percentage points or 50% of women, 56% of men) (Dryburgh 2001). By 2002 the gap had reversed.

According to the OECD (2004), a narrowing of the Internet gender gap is generally the case. There were some mixed signals, though, among the countries examined; in Sweden the gap appears stable in recent years even as Internet use continues to expand. These findings are corroborated by further data from the EU. In Australia the gender gap in Internet access also declined over the 1998-2002 reference period, but it did not disappear (Chart 6.24). By 2002, 61% of men and 56% of women accessed the Internet, compared with 35% and 28% in 1998, respectively.



Source: Australian Bureau of Statistics, Household Use of Source: Central St. Information Technology, 2003 Statistics 2004

The same direction in the gap between men and women was also experienced in Ireland. In 1998, when household computer penetration was still modest, a small difference existed, with 20% of men and 17% of women having access. By 2004, when penetration had more than doubled, the gender gap was nearly gone, with usage among men and women at 47% and 46%, respectively (Chart 6.25). The same pattern holds true for Internet use in the UK; in general, the gender digital divide is lessening (Chart 6.26).





Source: Office for National Statistics, National Omnibus Survey, National Statistics, http://www.statistics.gov.uk, Crown copyright material is reproduced with the permission of the Controller of HMSO

Note: Based on adults who have used the Internet in the 3 months prior to the interview.

Similar findings in the direction of the gender divide emerge in countries with lower Infostates. In Thailand, the proportion of women Internet users grew substantially over the 1999-2002 period. While just over one-third of all Internet users were women in 1999, the gender gap almost disappeared by 2000. Starting in 2001, the proportion of women Internet users exceeded that of men, and this became more evident in 2002 (Chart 6.27).





Source: National Electronics and Computer Technology Center (NECTEC), Thailand ICT Indicators, Moving Towards the Information Society, Series I, October 2003

By the beginning of 2004, the estimated number of Internet users in China was 79.5 million, an increase of 11.5 million or 16.9% over a 6-month period, and 34.5% over a 12-month period. The number of Internet users skyrocketed from the estimated 620,000 Internet users in October 1997. The gender divide was large in the late '90s, but closed gradually until women accounted for about 40% of Internet users early in 2002. However, since then, and despite the continuous booming of the Internet, the gender gap persists and the 20 percentage points separating women from men remain stable (Chart 6.28).





Source: China Internet Network Information Center (CNNIC), China's Internet Development and Usage Report 2004

A somewhat smaller, but rather persistent gender gap is also observed in South Korea, which has much higher Internet penetration. By June of 2004, male Internet users approached three-quarters of the population, and female users exceeded 60%. Between 2001 and 2004, the ratio of female/ male Internet users increased from 76% to 83%, but its evolution remains modest in recent years (Table 6.13).

Table 6.13 Internet use by sex, South Korea

	Male	le Female	
		%	
2001 2002 2003 2004	58.7 63.5 70.7 74.4	44.6 52.4 57.5 62.0	76.0 82.5 81.3 83.3

Source: Ministry of Information and Communication, National Internet Development Agency of South Korea, Survey on the Computer and Internet Usage, September 2004

Rapid closing of the gender gap took place in Mauritius over a two-year period, from 2000 to 2002. The proportion of female computer users increased substantially, and the proportion of female Internet users even more. In both cases, female users accounted for three-quarters of men in 2002 (Table 6.14).

Table 6.14	Computer	and	Internet	use	by	sex,	Mauritius
------------	----------	-----	----------	-----	----	------	-----------

	Compute	er users	Internet	users	
%	2000	2002	2000	2002	
Male Female	69 31	57 43	72 28	57 43	
ratio (female/male)	38	14	44	14	

Source: National Computer Board, Mauritius, ICT Penetration within the Mauritian Society, February 2003 While there can be some cautious optimism regarding the evolution of the gender digital divide for access, there appear to have been few gains and some troubling trends in women's experience of IT-related education and employment. In addition, the data show clearly that the relationship between literacy, education and access to and use of ICTs has to be viewed within the context of socioeconomic status as well as sex. We now turn to a qualitative approach to examine these complexities more closely.

6.2 The many dimensions of the gender digital divide

This section examines several aspects of the gender digital divide with three objectives in mind: first, to put in perspective the quantitative trends presented in the previous section, by probing deeper into the issues and factors behind the numbers; second, to provide policy makers, development agencies, educators and other stakeholders with a better understanding of the situation so that they may begin to take remedial action, including developing and implementing guidelines and strategies to lessen the gender divide and; third, to set the stage for the development of additional non-quantitative indicators to systematically measure the participation of women and girls in the Information Society.

The contents of this section are based on a comprehensive framework that defines important elements of gender issues in ICTs (Hafkin 2003a). It is also an attempt to answer the following questions:

- How do socio-cultural customs, infrastructural and access barriers restrict women from accessing and using ICTs?
- Do women have the education, training and skills required to function in the Information Society?
- How severe are gender disparities in ICT employment? Why do they occur?
- Are there gendered differences in access to and control over financial resources which affect participation in the Information Society?
- What are appropriate media and content for women and girls? Are they available? Do women and men have different communications patterns?
- What are the gendered patterns of risk to privacy and security brought about by the new ICTs?
- What is the extent of women's representation and participation in ICT policy and governance?
- What is the impact of ICTs on women and girls? Can ICTs contribute to gender equality and women's empowerment?

6.2.1 Social and cultural barriers to ICT infrastructure and access

Access to ICTs is inextricably linked to the availability of the necessary infrastructure, which is in turn linked to location. In much of Asia, Sub-Saharan Africa, and parts of the Caribbean, women make up the majority of the population in rural areas, as men migrate to the cities for work (UNIFEM 2000). In virtually all developing countries, telecommunications infrastructure, as well as electricity, is weaker and less available in rural and poor urban areas. In Africa in particular, reliable Internet connectivity is frequently available only within capital and major secondary cities, while the majority of women live outside these regions. The urban bias in the diffusion of ICTs, coupled with

DEFINITIONS

Active participation in the Information Society includes more than just access, whether to the Internet or other ICTs. Active and equal participation in the Information Society for women and men involves equality in ICT access, knowledge and use, regardless of ethno-cultural group, sex and class.

Equality in ICT access, knowledge and use: as measured by technology fluency; mastery of analytical skills, computer technology, information and communications concepts; ability to imagine innovative uses for technologies across a range of problems and subjects; and ability to find and use information and knowledge to improve one's life and expand one's choices (Huyer and Mitter 2003).

Gender equality (GE): equal status between men and women, so that women and men have equal conditions for realizing their full human rights and potential to contribute to national, political, economic, social and cultural development, and to benefit from the results. It involves the equal valuing by society of the similarities and differences between women and men, and the varying roles that they play (CIDA 1999).

The term sex refers to the biological differences between men and women, while gender refers to the sociallyconstructed roles and relations between men and women which shape their lives, experiences, divisions of labour, and access to resources.

the fact that most poor women in developing countries live in rural areas, make the placement of infrastructure a gender issue. Thus, simply by being the majority of the population in rural areas, women have fewer opportunities than men to access new technologies (Hafkin and Hambly 2002). Linked to location, but also to religious and socio-cultural attitudes, the mobility of women (both in the sense of access to transport and ability to leave the home) is also more limited than that of men.

For women, gendered roles and religious and socio-cultural customs can limit both their access to and use of ICTs, especially the Internet. Their multiple roles limit the time they have available to access and use ICTs. Three large North American surveys concluded that *"women's domestic responsibilities, particularly raising children, limit the use they make of the Internet"* (Kennedy, Wellman, Klement 2003). This is compounded in many developing countries where home access to ICTs is rare and women must travel to public access venues. In a series of interviews with telecentre managers throughout Africa, all said that domestic responsibilities, socio-cultural constraints and economic hurdles were key impediments to women's access (Johnson 2003). Women themselves frequently pointed to lack of time as a primary barrier to using telecentres. In addition, it is sometimes the case that public access centres are not open at times when women can visit them, or they may be open only in the evening when it is more difficult for women to visit them due to safety concerns (Hafkin and Taggart 2001).

A major cultural variable that affects women's ability to frequent information centres or cybercafés is the norm governing men's and women's interaction in public places. Information centres or cybercafés are often located in places that women may not be comfortable frequenting or that are culturally inappropriate for them to visit. This is the case not only in cultures such as that of Pakistan or Saudi Arabia that practice strict segregation of the sexes in public places, but elsewhere as well. Moreover, women who do use telecentres throughout Africa are frequently uncomfortable receiving one-on-one technical assistance from a man. Having to interact closely with men may put off many women from visiting the telecentres (Rathgeber 2002b). The amount of pornography on the Internet is also a major deterrent to female users, particularly for those who are dependent on public

WOMENS' CONSTRAINTS IN ACCESSING AND USING ICTs

Lack of time and infrastructure

- A series of national reports on the use of ICT for distance learning pointed out that electricity is not available in rural areas in many African countries, as well as Vanuatu and Belize. In Malawi, for example, 84% of the population lives in rural areas with no electricity, while 8% of homes in Kenya and 10% of the population in Tanzania have access to electricity (Green and Trevor-Deutsch 2002).
- Regional Reach provides rural populations in Kenya with information in local languages through community
 screening of videotapes focusing on current social problems. Female viewership is just 16% during the week, as
 a result of household chores and responsibilities (Green and Trevor-Deutsch 2002).
- Interviews with women in Asia who had taken distance education courses found that household responsibilities were a major factor to be taken into account when undertaking distance courses (Kanwar and Taplin 2001). These time constraints also mean that women are often unable to invest in developing the skills necessary to effectively use ICTs (Johnson 2003).

Social norms

- In Seelampur and Sitakund, India, where there are community ICT training centres, Muslim women are restricted in travel or use of public spaces and girls from the community are not allowed to travel unaccompanied outside the confines of the city centre (Slater and Tacchi 2004a). In another case, the nearest telecentre was too far for rural women farmers in South Africa to reach (Kiplang'at 2004).
- Kenyan women said they would encounter problems if computers are located in meeting places regarded as men's preserves, even in such seemingly innocuous locations as rural shopping centres, libraries and community centres. In Pakistan, if computers are located in study centres, there must be separate areas for girls and women (Green and Trevor-Deutsch 2002).
- In India and elsewhere, the Internet café manager is typically a young male who frequently surfs pornographic content, helping his friends to do the same; the café serves as their hangout (Gurumurthy 2004).

Education and employment

- An ICT survey of 1,800 people in Ghana, Botswana and Uganda (McKemey et al. 2003) found that the most important indicator of any kind of communication use was not related to sex but to the level of education. The higher the education, the higher the rate of use.
- A report of gendered patterns of ICT for distance learning in Malaysia suggested that "women may be handicapped by their lower employment status." In many regions, home or office access to and use of the Internet is less likely for women, as more men occupy the academic, management or technical positions that provide free access (Green and Trevor-Deutsch 2002). Similar trends exist in Europe; a European Union report found that the Internet requires literacy and that its content is geared towards the better educated. Thus, "higher Internet use seems to remain clearly and consistently related to higher educational and occupational status" (CEC 2005).

Cultural constraints

- In Peru, a project to contribute to rural development by increasing the productive capacity of small farmers found that joint-sex meetings and training courses constrained women's participation. Women reported that their greatest difficulty was not the level or the specialization of the training courses, but men's attitudes towards their participation. Already shy and apprehensive, they were mocked by the men when they used computers. The project team realized that the project was better served by implementing separate training for men and women (Hafkin 2002b).
- In Burundi, when national news comes on the radio, women report that their husbands take it to the pub. When he returns, they have to listen to the programs of interest to him. Even if he is away, the women can't use the radio because the husbands are afraid they may break it and drain the batteries (Beardon *et al.* 2004).
- In Bangladesh, 71% of men and 44% of women had access to a radio (Beardon et al. 2004); "Men own all the technology" reports from Kenya and Zambia said (Green and Trevor-Deutsch 2002).

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access. The tendency of young men in Internet public access points to view pornography deters many young women from frequenting such places.

Class and education levels can keep women away from public ICT access. Girls make up twothirds of children in the developing world without access to basic education. Particularly in India, the poorest often fear that ICTs and ICT centres are not for people like them for reasons of caste, illiteracy and gender power relations. They often assume that these centres are only for educated people. In Darjeeling, for instance, illiterate people frequently asked if the centres were only open to the literate (Slater and Tacchi 2004a).

The confluence of culture and computers can also constrain women from accessing and using ICTs when the traditional cultures view female use of computers negatively or if the use of computers by women is seen to be a burden to current (and potential) families. This is the situation for young Muslim women in Seelampur, India who were rejected as candidates for arranged marriages on the grounds that because they are computer-literate they will not adjust in the marital family. Instances have also come to light about greater dowry demands for computer literate daughters (Maindiratta and Maindiratta 2004).

Gendered patterns of technology use: Many gender differences emerge in the use of ICTs, as was discussed in the preceding quantitative section. Generally women's use is lower than men's. There are, however, many nuances, such as the type of ICT and the type of usage, as well as differences between developed and developing countries, regions, cultures and more.

African men use telecentres more often than women. Studies of ICT facilities usage in Kenya, Uganda, Senegal and Mali have shown that women represent a small percentage of ICT users (Thioune and Séne 2001; DOT-COM Alliance 2005). In Uganda women represented 29% of telecentre users, 35% in Mozambique, 23% in Mali and 20% in Accra (Johnson 2003). The one exception where women constituted the majority of telecentre users was in Gasaleka, near the Botswana border in one of South Africa's poorest provinces. Established by the *Universal Service Agency* in 1998 and with a specific gender emphasis, women represent 60% of the users there. The centre is run by a woman, and women are particularly attracted by the training opportunities (Benjamin 2001). Even in the few instances where women's rate of use is higher than men's, there is more than meets the eye. For instance, there are discrepancies between ICT use and ownership (see Insert below). Some accommodations have been made in various parts of the world to ensure gender equity in public access and use of ICTs, including adaptation of schedules to better suit women's needs and availability of women support staff and trainers (Hafkin and Taggart 2001).

With respect to the type of ICTs, in a number of telecentres in Africa it was found that women did not use computer-based facilities to the same extent as men, but rather concentrated on telephone, fax and copiers (Rathgeber 2002b). In a study of the type of media preferred in rural India, both men and women ranked radio as the preferred medium, while the Internet ranked eleventh (after such choices as oral communications, telephones, letters, and dance/drama) – although if the education variable is added, the differences tend to diminish (Beardon *et al.* 2004). At the same time, women in developing countries are less likely to own radios and to have access to them at times of their choosing, even when there are radios in the household.

Many sources attest to the feeling of discomfort with computers that poor women in developing countries experience. In Senegal, Uganda and Kenya women expressed attitudes that computers

WOMEN AND CELL PHONES

Recent studies from Tanzania and South Africa show a very high percentage of women among both owners and users of mobile phones. In South Africa, significantly more women than men are both owners and users of mobile phones (in a sample that had broad representation by age, income, education levels and sex). Women made up 57% of the respondents who owned a mobile phone and 60% of the users (but not owners). In Tanzania, a poorer country where the ownership of communications media is generally in male hands, the percentage of women mobile phone owners is lower than in South Africa but still very high (48.4%), while women respondents predominated among the users but not owners (52.7%) (Samuel, Shah and Hadingham 2005).

Country	Category	% Male	% Female
South Africa	Owners	39.1	56.8
	Users	40.0	60.0
Tanzania	Owners	50.5	48.4
	Users	47.3	52.7

A study of the use of ICTs by women entrepreneurs in four southern African countries found that women were losing out in expanding their business networks by relying on cell phones, rather than the Internet that could broaden their contacts. By using telephones (fixed and mobile) in communicating with customers and suppliers, they limited their contacts to formal family networks, which limited their potential for growth (UNIFEM 2003).

were not for them (Thioune 2003, Thioune and Séne 2001). In Asia and Africa the attitude is widely held that technology is a man's domain. In Malaysia, numerous women affirmed this phenomenon, saying that they preferred their husbands or sons to find the information they need from the Internet. Women in Tonga also reported that the tendency there to direct women into non-technical professions means that women feel fear and embarrassment when dealing with ICTs (Green and Trevor-Deutsch 2002). This is also the case in so-called developed countries.

Women attending ICT training in Nigeria at the Fantsuam Foundation "will only use ICT facilities if they meet immediate needs for them and their families" (Comfort et al. 2003). For example, women may use ICTs to transmit urgent messages to distant family members, to collect remittances from family members overseas, to obtain health information on vaccinations and preventative measures for epidemics, to search for job opportunities in the cities, to check dates for student national exams, market prices of grains and availability of fertilizers at affordable prices, to check weather forecasts, and make wedding and funeral announcements (Comfort et al. 2003).

Among women users of the Internet at telecentres in Senegal, there were large variations in the use of applications between rural and urban women. In urban areas, women users preferred Internet navigation over e-mail and word processing, while in rural areas 'surfing' was not the preference of any of the women, probably due to the language and education variables (urban women users were likely to be better educated, younger and French speaking) (Thioune 2003).

The question has been raised as to whether socio-cultural norms may induce both technophobia and a disinterest in technology by women. In terms of social attitudes about technology, women themselves sometimes subscribe to the attitude that technology is something for men, with respect to both use and utility. This opinion is not exclusive to developing countries. Lower levels of women

ICTs FOR DEVELOPMENT

Designed for women...

In order to combat gender-biased attitudes towards technology, a number of changes have taken place with respect to public access points for women. In Ghana and South Africa, telecentres run by NGOs allocated special times for women to provide more comfortable access to technology (Fontaine and Foote 1999). South Africa has also been in the lead in making gender-specific changes in the design and implementation of telecentres to make them more accessible and attractive to women, especially through its *Universal Service Agency* (Johnson 2003). In Nigeria, the *Bayanloco Community Learning Centre* introduced women-only weeks and times and discounted telecentre services for women (APC 2003). The telecentre in Timbuktu, Mali (where the centre coordinator is a woman) tried to attract more women users by putting photos of women on the front page of outreach and marketing material. In Lesotho, telecentre managers are frequently women, and content has been developed to preserve their cultural heritage (Johnson 2003).

- In Mozambique, all-women training sessions (*Skills for Women*) were instituted at two telecentres in an effort to attract more women users. Once the training program was launched, there were no dropouts, and women became regular users and trained others (Gaster 2003). In Seelampur, India, where the mobility of women is highly restricted, the ICT centre was set up in the women's section in the *madrasa* house of prayer and learning. A special entrance was set up for women, making it more comfortable for girls and women to come and go (Maindiratta and Maindiratta 2004).
- As a result of a gender assessment of WorldLinks projects in Africa, special actions were introduced to encourage women and girls to participate in the program. These included awareness sessions on gender and development and relieving girls from some domestic chores (Green and Trevor-Deutsch 2002).
- The development of curricula for women has also increased ICT access for women. Among the most extensive training modules developed is the AMARC Internet Training Module for women (AMARC 2001). Others include: Arab Women Connect (*http://www.arabwomenconnect.org*) and Women's Electronic Network Training (WENT), jointly managed by the Association for Progressive Communications-Women's Networking Support Programme (APCWNSP), and the Asian-Pacific Women's Information Network Centre (APWINC) on behalf of the Asia Women's Resource Exchange (AWORC) (*http://www.aworc.org*).

...and changing culture

- In Medak, India women members of the Self Employed Women's Association (SEWA) trained in videography have entered caste households hitherto a restricted zone as professionals documenting cultural practices. Such interventions can bring changes in self-perception and community perception of poor *dalit* women's worth (Gurumurthy and Sarkar 2003).
- The Women Farmers Advanced Network (WOFAN) observed that women depended on men for the interpretation of the Koran on reproductive rights because most of them were illiterate. They have now learned to read the Koran, as well interpret it, and have produced radio broadcasts presenting women's rights in health, livelihood, governance's capacity building and functional literacy (Zulu 2005b).
- Young women using an ICT Learning Centre in Seelampur who were unhappy with the decision to close down the Centre for Ramadan approached the authorities to request that the centre remained open, but close at an earlier time. "Only a few months ago such a dialogue between the Maulana and the girls would have been unthinkable" (Sharma and Maindiratta 2005).
- Girls in the WorldLinks project managed to escape cultural constraints in Mauritania when they used the Internet to gain information on subjects considered taboo for girls, such as reproductive health (Gadio 2001).

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in ICT education and the ICT workforce are attributed in part to the lack of interest of girls and women in a profession that is considered "geeky" and boring (Royal 2005). Proponents of genderbiased social constructions of technology argue that personal computers are made in socially constructed and cultural ways without women in mind. Their position is that until computers are designed by women and for women, women will not be able to fully appropriate the technology in a way that they can use it for their empowerment (Daly 2003).

Using ICTs to change culture: Another interesting question related to the social and cultural constraints facing women is whether they can use ICTs to change culture. Women's NGOs have been among the leading users of ICTs worldwide in the campaign for women's rights, many of which involve cultural issues, such as female genital mutilation. Advocacy for women's rights through ICTs has been well documented (see especially Harcourt 1999, Friedman 2004, and Asian Women's Resource Exchange 2001).

In addition, a number of examples exist whereby women have used ICTs to confront cultural taboos and challenge cultural prescriptions at the local and personal level. They no longer need to limit themselves to the controlled information and social spaces given by their society and families. "We get our freedom from the Internet since in our society girls have limited freedom of movement. We are not allowed to go wherever we want. The Internet . . . takes us out to other people, places and other realities. No one controls where we go with Internet. It is for us a way of escaping from our closed society. It is vital to us; it gives us liberty" (Gadio 2001).

One of the most interesting efforts to make the use of ICTs easier, safer and more equitable in developing countries involved the International Development Research Centre's (IDRC) model telecentre that incorporates features conducive to women's participation. Rather than through narrative, the model was presented in a drawing that is reproduced below.



Several features of this telecentre stand out as particularly important for women. The centre is not seen as a technology place, but rather as a community place, integrated into the community's daily needs and activities. The physical setting seems to be easily accessible to women. Childcare is not an issue, as children and groups of all ages are welcome (Fontaine 2002).

6.2.2 Education and skills

Women and girls are poorly placed to benefit from the Information Society because they have less access to scientific and technical education specifically, and to education in general. They have less access to skills training and development, which will enable them to gain employment in the ICT sector of ICT occupations and, when they do, they generally work in lower level positions, with less pay. Paradoxically, the new technologies also offer many opportunities for women and girls to gain the education and technical skills required to participate equally in the Information Economy.

Taken together, global education rates for girls at the primary level and literacy levels for women remain lower than those for boys and men. In fact, two out of three of the 110 million children in the world who do not attend school are girls – and there are 42 million fewer girls than boys in primary school. Women also make up two-thirds of the world's 875 million illiterate adults. Factors affecting the lower enrolment of girls include an increased investment in boys' education at the expense of girls, who are kept at home to help with domestic chores (Akintola 2004), as well as early marriage and motherhood – in Nepal, for example, 40% of girls are married before age 15 (UNESCO 2003).

It is expected that as more children graduate from primary school, attendance at secondary levels will increase. This is borne out to a certain extent by existing figures which show that enrolment of girls at the secondary level has increased in all developing regions since 1990, although discrepancies continue to exist in some countries, especially those with very low female enrolments in primary grades (UNESCO 2003). At the tertiary level, women have seen increasing levels of enrolment, reaching 46.8% globally. However, there are wide regional variations in participation: for example, in OECD member countries and Central and Eastern Europe, gross enrolment rates are at 45%, while in the great majority of developing countries, the percentage is less than 30% (UNESCO 2003).

The representation of women and girls in science and technology-related courses is less positive. Girls at the secondary level tend not to enrol in scientific and technical subjects. Analysis of tertiary-level enrolments in science, engineering and technology subjects provides further evidence of a gender gap. While the participation of women in biological and life sciences has increased and continues to do so in many regions, female representation in science such as physics and engineering is persistently low around the world (National Science Foundation 2003; European Commission 2003). The numbers for computer sciences are especially concerning. In the U.S. and Canada, for example, female participation in the ICT sector has been declining.

Barriers to female participation in science and technology education fall roughly into three categories: socio-cultural barriers; qualification barriers; and institutional barriers.

Socio-cultural barriers: These can be many and diverse:

- Lack of family commitment, as parents tend to be less inclined to invest in their daughters' education. The cost of education is a major barrier when women do not have independent control of their resources.
- Attitudes about what is considered appropriate for girls and women can also affect parents' encouragement, or lack thereof, for girls' choices of subject or discipline. The perceived economic climate may also affect parents' choices, while teacher's attitudes towards girls in the classroom can often echo or affirm these socio-cultural messages (Margolis and Fisher 2001). In many cultures male partners tend to be unsupportive of women's higher education, particularly in nontraditional spheres that are considered to be unsuitable for women.
- Girls and women often experience discomfort or disinterest in scientific and technological subjects. For example, a narrowly focused technology curriculum, while appealing to boys, can alienate girls, who tend to be more interested in understanding how the technology fits into a larger social, historical, environmental or work context.
- Social class is also a factor in women's access to higher and technical education. Women in higher social classes are more likely to have family support for continuing their education, as well as access to the necessary resources (Gajjala 2002, Evans 1995).

SOCIO-CULTURAL BARRIERS TO FEMALE EDUCATION

- In a study in Mali almost one-third of households surveyed said that the reason they differentiated between girls and boys in education decisions was because boys were more intelligent (UNESCO 2003).
- In Togo, a lack of employment for women added to the low numbers of jobs for those with advanced education discourages investments in female education (UNESCO 2003). Some reasons given by women and men in Nigeria for the low participation of women in ICT were that ICT and related careers were unsuitable for the female personality, too strenuous for women, and limited their chances for marriage (Ajayi and Ahbor 1996).
- A Commonwealth of Learning study of women distance learning students found that many had to overcome initial resistance from husbands and parents (Kanwar and Taplin 2001). A study of the ICT sector in India revealed that women were expected to make sacrifices in their careers for their families and their husbands, while men were not (Gajjala 2002).

Socio-cultural barriers specific to ICTs include the perceived masculine nature of the technology and the dominance of male interests, approaches and understanding of technology. This can lead to a perception that technology is more "suited" to the male than the female. Many studies show that girls are alienated early on by the intensely masculine nature of technology, including masculine language and images. They reject computer games as violent, redundant, and tedious; they also reject the non-social, technical obsession they see in their fellow male students (AAUW 2000). As a result, girls are less comfortable with computers. Perceptions of "geeks" not only deter women, but skew perceptions of which behaviours characterize successful computer scientists.

Qualification barriers: Aside from the situation that participation rates for women in tertiary level Science and Technology are low, those women who do reach tertiary level and higher in S&T experience a range of additional barriers:

- Lack of formal math and science education or experience in computer programming skills are often perceived as a barrier for continuing education in S&T and ICT, both by admissions departments and by students and teachers themselves. Evidence suggests that lack of previous training in these subjects is less of a barrier than expected.
- Women often take breaks in their professional careers for personal and family reasons (including child bearing). It can also be difficult for them to move up in the educational system after breaks, or to return to school to upgrade their skills.

Institutional barriers: These include the lack of female teachers and role models, and the assumptions of teachers mentioned above; inflexible admission, selection, and entry requirements which do not take into account women's varying educational backgrounds, approaches, and abilities; work conditions which do not take into account women's life responsibilities; and heavy attendance requirements for practical skills and laboratory work which are more difficult for women to meet in view of their family responsibilities. Women also do not participate as fully in workplace networks (Huyer 2003, 2004).

Strategies to encourage women's participation in scientific and technical education: There is a substantial body of research on strategies and approaches to increasing the participation and success rate of women and girls in scientific and technical education, including changes in curricula to reflect a gender-neutral, or gender-inclusive, image of scientists and the practice of science; science education that emphasizes hands-on activities and application to everyday life, society and the environment; female role models and mentors, and; conscious efforts by teachers to ensure that girls and boys are treated as equals in the classroom (Huyer 2004). In developed countries some general strategies have proven to be effective in encouraging the continued participation of girls and women in education, such as scholarships based on merit, culturally appropriate facilities, female teachers, alternative schools with flexible schedules, and vocational training. Further strategies would include bridging programs that allow re-entry for women already qualified in technical subjects, conversion programs that provide older women and school dropouts access to technical education, and community-based programs built around issues of direct relevance to the lives of women.¹¹³ The use of ICT to promote access for women and girls to education at all levels is a promising area.

Use of ICTs in formal education: Emerging evidence indicates that the use of ICTs in the educational environment can both increase women's access to education and help them feel more comfortable with technology-related courses. For example, ICTs can be used for distance

¹¹³ Steps taken at the Carnegie Mellon School of Computer Science increased its entrance rate for women from 7% to 40%, and the retention rate for young women increased to equal that of young men. The admissions policy was altered to give equal preference to both highly and less-experienced students. The quality of teaching was improved by putting better, more experienced, and more senior teachers into the earlier courses. A unit on diversity with emphasis on gender equality was integrated into the training of teaching assistants. In addition, several courses were initiated which placed technology in a realworld context. At the same time peer tutoring and promotion of networking among women staff and students were implemented (Margolis and Fisher 2001).

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and in-class education, for both children and adults. Radios, video and audio cassettes are used both to augment and, in some cases, substitute for a teacher (Perraton and Creed 2001). In general, girls benefit equally with boys in this setting. The introduction of computers in classrooms, while potentially equally beneficial, carries with it the range of gendered perceptions around and approaches to technology. Little research has been done on the gendered patterns of use and effect of computers in classrooms in developing countries, but existing data indicate that girls and boys will not benefit equally from computer use, nor have equal access to classroom computers, unless specific steps to ensure equal participation by girls are taken.

Distance education through ICTs provides real opportunities for women and girls to overcome many educational obstacles. The flexibility of access and study times and the potential to reach women in rural areas make this a very positive educational approach. It is often difficult for women to travel to attend school for reasons of time, cost of transportation, safety, and perceptions of the appropriateness of traveling on their own.

While distance learning can take place through a variety of technologies – radio, video, TV, etc. – e-learning is generally understood as computer- and Internet-mediated learning. Studies indicate that women benefit from and take advantage of distance and e-learning. In general, female students worked more cooperatively as a group and needed less time and assistance in learning computer skills and completing education-related tasks over the Internet.

Various surveys of open and distance learning (ODL) are emerging on the situation in certain countries in Sub-Saharan Africa, Asia, the Caribbean and the South Pacific. The Commonwealth of Learning found that although there is an assumption that women are relatively well-represented in ODL, they are not equitably represented in all countries, and there is significant variation in their representation in ODL between and within regions (Green and Trevor-Deutsch 2002). There appears to be more parity in enrolments in Asia, with the exception of India. In the Caribbean, the situation is very different: "At all levels and in all countries the participation rate of females in education outstrips that of men, and where data is available, this includes the use of ICT" (Green and Trevor-Deutsch 2002).

Non-formal education and skills: Given women's low literacy levels and the lesser likelihood that they will have the skills to use ICTs effectively, non-formal education in ICTs is a vital means for them to acquire such skills. Many programs have emerged around the world which use non-formal methods to bring ICT skills to women, whether to use the technologies effectively or to use the technologies for other purposes, such as to become literate, to gain employment, to generate income, or to improve skills and communication. Non-formal literacy instruction for women in several countries has profited from the use of ICTs. ICT tools can be used in non-formal education settings to link computer skills training with a wide variety of livelihoods for women.

ICTs AND GENDER IN FORMAL EDUCATION

- A study found that computers introduced into classrooms in North America were dominated by boys who spent more time using them during lessons and during free time (Volman and van Eck 2002). Similarly, a study on the use of computers in schools in Africa found that boys dominated the use of computers, and that a high student-to-computer ratio and first-come-first-served computer policies put girls at a disadvantage. In Uganda, where computers were set up in a separate lab, girls used computers less than boys because it was considered unsuitable for them to run. The boys arrived first at the computers and were unwilling to limit their time to allow the girls to use them (Gadio 2001).
- Another study found that socio-cultural factors affecting girls' ICT access included their domestic chores and early curfews at boarding schools, as well as lack of confidence in using computers. When girls had access to computers, they tended to use them more for academic research and communication with friends and family, increasing their reasoning and communication skills. They also used the Internet to obtain information on issues such as reproduction and sexuality, information not available from their families or communities. Boys tended to use the computers for sports and music and received little academic benefit. When girls did have equal access to computers, their self-confidence improved. One participant in Senegal said: "We are no longer dependent on boys. We feel capable of solving our problems with great autonomy" (Gadio 2001).
- Interviews with women in Asia demonstrated that women use distance education to increase income-generation, find a career that would enable them to support their families and send their children to the university, improve performance in their current work, increase self-confidence, and learn new skills. Most had to overcome strong opposition from family members, which often dissipated when the benefits to the family as a whole became evident (Kanwar and Taplin 2001).
- In Kenya, men greatly outnumber women in the ODL programs for which data were available. Men tended to be represented in agricultural extension programs, programs for health field workers, cooperative extension officers and teachers. Women were present more in adult literacy and traditional birth attendants' health programs.
- At the University of Zambia, females made up 17% of distance learners between 1994 and 1998, and 17% of students at the Africa Virtual University campus at Kenyatta University. Women make up about one-third of the student population in Zimbabwe's Open University, 23% of students in the Faculty of Science of the African Virtual University and, in 2000, 36% of students at Uganda Polytechnic.
- In Malaysia, the Institute for Distance Education at Universiti Putra Malaysia had a female enrolment of 46%, while at Pakistan's Allama Iqbal Open University (AIOU) 43% of students are women. At the Indira Gandhi National Open University (IGNOU), 28.4% of students were women in 1998.
- The South Pacific appears to experience gender parity in ODL programming: at the University of the South Pacific, the largest ODL provider in region, 48% of students were women in 2000. Data varied on campuses in various countries: in Solomon Islands, the female participation was 25.5%, in Vanuatu it was 35%, and in Tuvalu and Kiribati 60%.
- In Jamaica and St. Kitts and Nevis, more women than men used computer-based literacy programs, a trend that follows educational trends in the region in general. In the Caribbean, more boys than girls drop out of school, for a variety of socio-cultural reasons including lack of male role models, lack of male teachers, and violence. (Huyer 2004).
- Among developed countries, the percentage of women in ODL programming also varies, although women are in the majority in several countries. In North America, for instance, female participation in distance courses ranges from 61%-78% (Thompson 1998, Commonwealth of Learning 1999, Kanwar and Taplin 2001, Green and Trevor-Deutsch 2002). Female participation is lower in Europe.

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ICTs AND GENDER IN NON-FORMAL EDUCATION

- The largest non-formal ICT skills education program worldwide geared specifically to women was that of the South Korean government, which trained a million housewives, unemployed women, and elementary school students between 2001 and 2003. The government is now mounting a second program to train two million women. The program also encompassed e-business classes for women beginning in 2003 (Lee 2003).
- In Estonia, more than 73,000 women who had never used the Internet were trained in computer skills, comprising 71% of those trained in a free-of-charge, low-cost program financed by four companies (Look@World Foundation 2003).
- In ICT-assisted literacy classes in Zambia and India, a majority of the students were women, most from socioeconomically disadvantaged communities with no or very limited previous exposure to ICTs. In India, the women were eager to learn to use computers because they associated them with income-earning opportunities. They continued to use computers beyond the courses. In Zambia, this economic motivation was not present, and almost none of the women have continued to use computers outside of the course (Farrell 2004).
- In the Caribbean, Networked Intelligence for Development organized a workshop in collaboration with the Jamaica Organic Agriculture Movement (JOAM) for women engaged in organic farming. The workshop taught them how to use the Internet in order to access and exchange information about organic farming methods, to promote their business, and to market their products. These examples indicate that the impact of literacy and computer use was greater for learners who could link literacy and computer use with their livelihood activities (Tandon 2004).
- In Afghanistan, the United Nations Development Program (UNDP), in conjunction with the Women's Affairs Ministry, has opened computer training centres targeting women in order to teach basic accounting and word processing skills to government and NGO employees (Abirafeh 2003).
- In Malaysia, Mothers4Mothers (http://www.mom4mom.com) trains women to use ICTs to build communication communities and networking opportunities for homemakers, home workers and teleworkers, including advice on becoming "homepreneurs" (Green 2004).
- A challenging situation has been targetted in India, where low literacy rates, traditional gender roles, lack of marketable skills, and lower educational levels make it difficult for women to find employment, (especially skilled or technical jobs). *Datamation Consultants Pvt. Ltd*, a 3000-employee software development firm, set up a train-and-hire program whereby partner NGOs offer free or low-cost six-to-eight month ICT training courses conducted in local languages to marginalized groups of women. Upon completion, successful women candidates are awarded full-time jobs at the firm. Datamation's organizational philosophy is to *"empower the weakest of the weak using ICT"*, especially women and the disabled (Datamation 2005).
- In northern India, Rural Litigation and Entitlement Kendra (RLEK) trains tribal nomads in using wireless communication. In a highly patriarchal setting, the project chose to train an equal number of men and women after a gender analysis showed that women were often the only residents of the tented camps. "Men folks are moving all the time and therefore there is need to train women also because they are left behind in the houses and in case of emergency they will need the wireless" (Nainwal 2003).
- In Thailand, the Computer and Internet Learning Centre at Nangrong based at a house owned by one of the local village women, serves as a learning centre where the community learns about technology and applies it to their daily lives. It is also a source of information. Emphasis is on management skills for community leaders, accounting skills and how to manage income and expenses to help increase income and reduce debt from unnecessary expenses. The female project leader became a role model to encourage other women to participate (NECTEC 2003b).

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6.2.3 Employment and occupation

The rate of girls' and women's education in science and technology has been improving over the last decade. However, evidence of the last 10-15 years indicates that despite these improvements, the increased numbers of girls and women at lower levels of the system do not necessarily translate into increased numbers in higher levels of research and private sector employment. Worldwide, it appears that women scientists do not transfer their scientific qualifications into scientific occupations to the same degree as men. Data and research in both the academic institutions and industry indicate that the representation of women consistently decreases as one moves up in the system. Women's rate of temporary and shorter-term work is greater than that of men's, and women are paid significantly less than men¹¹⁴ (Glover and Fielding 1999, European Union 2003, Glover 2001). These trends are reflected and in certain cases are exacerbated in the IT sector.

For those women who do enter the scientific and technical professions, two kinds of segregation exist: horizontal and vertical.

- Horizontal segregation constitutes segregation by discipline or sector. Existing data show that most women scientists work in the biological and health sciences, with low representation in the "hard" science disciplines such as physics and engineering. This is true in most countries. Another kind of horizontal segregation concerns the marginalisation of women into less desirable scientific disciplines or sectors. There is evidence that women enter scientific fields in greater numbers when men do not choose to enter these fields, i.e. for reasons of prestige or remuneration. More research is needed on how this pattern might relate to the low participation of women in the ICT sector.
- Vertical segregation relates to the issues of retention and advancement. Data from the U.K. (supported by data from the U.S.) show that women with high-level scientific qualifications tend to leave the labour market in their late '20s and early '30s, during their prime child-bearing years.¹¹⁵ As a result, women's scientific careers tend to be less stable and characterized by shorter-term and temporary work rather than continuously-held positions. A U.S. study found that women's rate of exit from science is higher than that of other professions, and twice that of men. In many OECD countries, women scientists and engineers working in the industrial sector are under-represented and more likely to leave technical occupations, as well as the labour force, than women working in other sectors (Glover 2001, Preston 1994, European Union 2003).

Men are also more likely to be found in senior and management positions. The main activity for men with scientific qualifications is management, while for women it tends to be teaching and nonprofessional activities not requiring a university degree, i.e. technicians. In ICT industries, in particular, the numbers of women are low and even lower in senior management positions (Salkever

¹¹⁴ This trend is illustrated by a study of women faculty in the School of Science at the Massachusetts Institute of Technology (MIT) in 1994. It found that of the 209 tenured faculty members in the School, 15 were women – 8% (compared to 194 men). This figure of 8% had not changed in the previous 10 and possibly 20 years, despite major increases in enrolments of women in undergraduate science courses, indicating that attrition of women through the system was ongoing and unchanging (MIT 1999).

¹¹⁵ Forty-four percent of men in scientific professions are employed for at least 10 years at a stretch, while only 13% of women are employed for the same period, and three-quarters of male employment periods last at least five years compared to one-third for females.

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2004)¹¹⁶. Women in the South African ICT industries overwhelmingly felt (85%) that there continues to be a gender bias in the field, while 59% felt that sexism is an area of concern in their workplace. Nearly half (49%) have been asked to perform tasks not required from male colleagues at the same level (van der Werwe and Stander 2002). In Australia, a survey of successful strategies of women in ICT professions also focussed on organizational factors as most significant in women's adaptation to the workplace: "Women think that their difficulties rest more on the adaptation to a male organizational culture than women's technological aptitudes" (Pringle et al. 2000).

The lower level of retention of women in science careers and the resulting lower number of women in senior positions can be partially attributed to the lower age of women in science, but a wider range of factors also apply to produce this glass ceiling. These include work-life balance, child-bearing and –rearing, gendered patterns and approaches to productivity, and attitudes towards the performance of women in the S&T academic or industry workplace.

Work-life balance: In the U.S., professional women work roughly 15 hours/week more at home than their husbands and sleep 20 minutes less per night. Those with children sleep 40 minutes less per night than their husbands (Schiebinger 1999). Men are more likely to spend extra time on the job, and more likely to work on weekends than women (Rathgeber 2002a). Campion and Shrum found that women scientists in East Africa who participated in their study were perceived as the primary caregivers at home (2004). In China, women working in IT, although earning higher than average salaries, experience role conflicts, as they average only 2 hours a day in personal/ family time while other working women average 5 hours (Survey of Chinese Women in Information Technology 2004). In general, it is well recognized that it is more onerous for women to reconcile work and home life.

The ICT sector is characterized by an intense "workaholic" culture, which frequently involves late nights, working weekends, and ad hoc meetings. Women often have to choose between having children and a family life or career advancement (Salkever 2004). Since women remain primarily responsible for children and family, it is more difficult for them to work extended hours in evenings or weekends or take business trips (Hill 2005). A study in the U.S. found that women in technology love the creative freedom, opportunities for growth and relative lack of barriers to advancement in the field. Nevertheless, many consider that the hours and level of commitment required in many ICT jobs do not promote a healthy balance between work and personal life (Melymuka 2004).

Returning to the workforce after leaving for child-rearing poses another set of difficulties. Many women attempting to return to the private sector find that their skills need updating, especially if they have been away for more than 1-2 years. Additionally, if unemployment rates are high, candidates with no break in employment experience are generally considered more desirable than those who have been out of the workforce (Salkever 2004).

Work Culture: A work culture that is unfriendly and more demanding of women may also be a factor which restricts their success in the technology workplace. As well as dealing with a "workaholic" culture, women in the ICT sector may have to contend with perceptions of "who" is a computer scientist. The quality of the work of those who do not fit the "geek" stereotype can as a result go unrecognised and it is more difficult for them to be taken seriously in the field (Margolis and Fisher 2001). Other factors to consider in the work culture include:

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¹¹⁶ In fact, in the U.S., the percentage of women in the ICT workforce overall is decreasing. In 1996, women made up 41% of IT workers, but by 2002 that figure had dropped to 35%, and according to some the rate of decrease is continuing (Hill 2005, Melymuka 2004).

- Age: women tend to be younger than their male colleagues, since women's entry into science, engineering and technology fields is a relatively recent phenomenon. This is true in developed as well as developing countries.
- Position: even after controlling for factors affecting promotion, including experience, women are less likely to be in senior ranks. They receive less credit for experience than men do either due to family responsibilities, workforce interruptions, or gender bias.
- Performance: women's contributions tend not to be as readily recognized as those of men (National Science Foundation 2003, Rathgeber 2002a, van der Merwe and Stander 2002, Ilavarasan 2004, Vendramin et al. 2003, Huyer 2004).

Non-professional employment in the ICT sector: The rise of ICT-related employment, created partly as a result of trade in services such as data processing, call centre work and cybercafés, can be seen in some respects as an opportunity for women – similar to that experienced in the rise in women's manufacturing work in the export sector. It may represent new and better-paying employment opportunities for women in developing countries, although women tend to be overrepresented in lower-paid, lower-skilled and lower-level positions (in both developed and developing countries) (Mitter 2003, Barry 2005).

Telework and flexi-time: The term "telework" usually implies home-based work or telecommuting. In certain situations it can enhance the participation of women in e-commerce and employment, as it allows certain flexibility both in timing and location of work. There has been a wealth of empirical research by scholars on the potential of telework to allow women to combine the demands of domestic duties with those of a career. In developed countries telework can be a boon, allowing women to combine child-care duties with their professional lives, or allowing them to live outside of urban centres.

Research in this area so far has taken place predominantly in developed countries. One exception concerns two research projects in India and Malaysia, by Mitter (2000, 2002) in collaboration with local research teams, to explore the potential and spread of teleworking in developing countries. The incidence of home-based telework in Asia is extremely low, even in centres of commercial activity such as Mumbai and Kuala Lumpur (1% and 0.35 % respectively). In institution-based teleworking it is easier to monitor and supervise employees, while for the workers themselves home-based teleworking involves skills in self-management and time management.

Concerns about teleworking in developing countries include the risk that home-based work will deprive women of the status and security they have as working women and of dignity at work, as well as pose feelings of isolation and additional costs for technical equipment and support. Some concerns are relevant to both developed and developing countries, such as difficulty balancing home and work environments, and the use of home workers as a way for businesses to avoid labour laws, paying benefits or social insurance (Angelina 2004, Mitter 2003).

ICTs and women's entrepreneurship: In North America, many women in the ICT sector choose to set up their own businesses, providing them with more flexibility and independence. ICTs can also provide a base for women's enterprises in developing countries. However, access to credit and other resources are a problem for women everywhere. While women led 28% of all U.S. businesses in 2002, employing more than 10 million workers and generating \$1.5 trillion in sales, female entrepreneurs historically have received a disproportionately low share of available venture capital, as little as 4%-9% ("New Report" 2004).

However, ICTs have a role to play in supporting women's small-scale enterprises, and evidence exists that when women do have equitable and affordable access to ICTs, they use them effectively to support income-generation. ICTs can act as a basis for enterprises such as call centres and cyber kiosks¹¹⁷, but they can also support other income-generating activities through improved communications, business management and training.

ICTs AND WOMEN'S ENTREPRENEURSHIP

- The Inter-City Marketing Network for women micro-entrepreneurs was initiated by FOOD in India in April 2001 when it was noticed that there was often a production surplus in some areas, and a shortage in others. In addition, many women from low-income families made food and household products at home, but were not always effective at marketing these items, so that the products were often sold at relatively low prices to middlemen. The network aims to link women micro-entrepreneurs from different urban areas to exchange goods and to enable them to develop new markets for their products. The groups trade over 100 basic products including soap, cooking oil, washing powder, rice, pickles, spices and candles. Communication is maintained through mobile phones, which are used for receiving and placing orders for goods with other groups in the network and for comparing prices across the region. Each group is responsible for choosing its own mobile network providers, tariffs etc. In the space of one year this project has grown to link 300 women's groups across Tamil Nadu (Batchelor and Sugden 2003).
- Hipknit is an e-commerce project initiated by the Society for Health Environment and Women's Development (SHEWD) that markets online a wide range of custom-designed wool clothing handknitted in Nepal. Participants learn profitable handicraft skills as well as business skills, and part of the profits are reinvested in other community projects in health, environmental awareness, and education (CIDA 2004).
- At the Datamation ICT Centre in Seelampur, India, women use Paint Brush and other creative tools such as Adobe Illustrator, Photoshop and Corel to design and visualise their tailoring, embroidery, paintings and other traditional craft and designs. For example, young women bring embroidery designs and patterns to the centre and computerize them using scanners and digital cameras (CIDA 2004).
- SEWA-India, is a member-based organization of poor women working in the informal sector. Twothirds of the members live in rural areas and are home-based workers, vendors, manual labourers, service providers, and producers. SEWA's ICT unit has been exploring the use of ICTs as a tool to increase the efficiency of rural micro-level enterprise activities to secure poor women's livelihood. It provides its members with access to information, trains them with communication tools and customized software, provides technical training on repairing tools, generates job opportunities and even provides child and health care (Patel 2003).

6.2.4 Financial barriers and universal access

It has been well documented that many women cannot afford to pay at the same levels as men for access to information. Female earnings in general are less than those of males, while many women earn no cash income at all. In developed and developing countries alike, much of women's work is unpaid. In developing countries, women tend to lack access to other economic resources as well, such as land and labour force. Moreover, not only do women have less disposable

¹¹⁷ IDRC has found that women make excellent managers of telecentres and cyber kiosks, and several examples exist of women-run cyber-kiosks.

income than men in general, they have more family responsibilities and are more likely than men to spend their earnings on food, clothes and other basic needs (UNFPA 1999).

To exacerbate this situation, the costs of communication in developing countries, notably on the African continent, are daunting. In many African countries, the price of a dial-up connection generally runs at about US\$25-\$40 per month, roughly the same as a (much faster) connection in North America. However, as a percentage of annual per capita income, the difference is dramatic. Even at the low figure of US\$25/month, such a connection amounts to 300% of annual per capita income in LDCs such as Ethiopia, whereas in the U.S. it represents less than 1%. In other words, the cost of an Internet connection can be 300 times higher in parts of Africa than in the U.S. As women have less access to cash in such countries, they are particularly heavily hit by those prices. They are also affected by policy decisions that make illegal communications applications that would lower prices. For example, the prohibition of low-cost telephone using Voice over Internet Protocol (VoIP) in many countries affects women's access to long-distance communications.

High costs pertain not only to connectivity but to ICT equipment. In addition, as was discussed in Chapter 5, taxes are levied that make prices so high relative to people's incomes that they have been the subject of protests in some countries.¹¹⁸ Women's perception of usefulness of ICTs is similar to that of men, as discussed in section 6.1, and this extends to their willingness to pay. One study found no discernible differences between men and women in their willingness to pay for phone use in Ghana, Botswana and Uganda (Scott, McKemey and Batchelor 2004). However, affordability is a major issue.

ICTs NOT AFFORDABLE TO WOMEN

- In a survey of access to ICTs by South African rural women farmers, Kiplang'at (2004) found that 37.8% of women were unable to use ICT for economic reasons: the cost of ICT equipment and access were the major barriers to their use.
- A Commonwealth of Learning study in Zambia reported that "women are generally not engaged in their own economic activities and very few women have money. In many cases, their husbands bar them from making money. Since they need consent from their husbands to obtain a loan, they may have no access to lending institutions" (Green and Trevor-Deutsch 2002).
- Even though Uganda has exempted computers from taxation, the types of ICTs that are most useful to women, such as radios, are not exempt. A community radio station, 101.7 MAMA FM, set up by the Uganda Media Women's Association (UMWA) to reach poor women, was subject to taxes exceeding its total budget (see http://www.wougnet.org).

Gender dimensions of universal access policies: Although the standard mechanism for reaching underserved populations in developed countries has been through universal service, the challenge of doing so in poor countries has led to universal access policies (providing access to the community rather than the individual, at affordable prices). New technologies have made these solutions more promising, and many developing countries are investing in such policies. Expansion of public telephones and ICT access points (e.g. in post offices) are examples of these solutions. They are particularly promising for poor women in underserved areas (Jorge 2002b).

¹¹⁸ In March 2005, women were prominent in a protest of mobile phone users over the costs of cell phones in Bangladesh. Users demonstrated in the capital Dhaka to demand that operating companies reduce their call charges. The protesters say the charges they face are more expensive than those of other operators in other countries of the South Asia region (BBC 2005).

The shift from universal service to universal access underlines that one solution for augmenting women's access, especially in the rural areas of developing countries, may be that of shared community access. Community access strategies can address two of the greatest obstacles that women face with respect to ICTs – the lack of access and the cost of access. Any solution, particularly in rural areas or areas with no infrastructure at all (traditionally believed to be unattractive for private investment due to high costs and low demand potential), will need to be stimulated by regional and national policies that promote and facilitate the development and deployment of ICT in these areas (Jorge 2002b, Marcelle 2000, AIS-GWG 1999).

Telecentres have become the fashionable solution, but even these projects do not guarantee affordability. Most telecentres are implemented as business ventures, charging for services based on their costs, which, among other things, reflect high communications tariffs, expensive equipment, and salaries. While sustainability, and even increasing profitability, are possible in many areas, the main challenge lies in the ability of advocates to influence the process and policy makers to establish policies that will improve access for underserved groups and lead to project success. Initiatives such as discounted tariffs for telecentre and community access points and/or special subsidies to fund projects until demand is large enough to ensure sustainability are potential options (Hafkin and Jorge 2003).

Universal access policies can also include Telecommunications Development Funds (TDF), which are established and administered by telecommunications regulators to finance the expansion of ICTs in underserved and rural areas. TDFs are among the most interesting and potentially effective mechanisms to make ICT more affordable for women through financing of projects in telecentres, phone shops, public telephones and libraries. TDFs have been successfully developed and implemented in many Latin American countries (e.g. Peru and Chile), and several countries in Africa and Asia are currently working towards developing their own (e.g. Zambia, Uganda, Nigeria, Sri Lanka). It has been suggested that gender advocates get involved in TDF discussions, placing emphasis on gender-focussed issues – such as the proportion of funding allocated to women, women owners and managers, and assuring the participation of women in ICT training (Jorge 2002b).¹¹⁹

Several additional pro-poor ICT policies have been suggested that would potentially ease the financial burden of ICTs on women, particularly those in female-headed households in developing countries. They include: pro-competition provisions for ICT infrastructure, including the last mile; pro-poor license obligations for service providers and operators; creating space for local initiatives and policies; enabling community radio, and the application of cost-effective and locally adaptable tools such as Free and Open Source Software (FOSS) (Gerster and Zimmermann 2005). However, the institution of these policy provisions would not be sufficient by themselves without incorporating an awareness of gender equity issues in each of them. Many instances exist of countries which have included such policy provisions without a concomitant positive effect on gender equity (Jorge 2005).

Open-source software: Women's advocacy organizations, particularly those in support of the use of ICTs for advocacy of women's rights, are actively supporting FOSS as a tool useful to women.

¹¹⁹ In South Africa a number of telecentres have been established with particular attention to the needs of women users, with funds from the national TDF. The Fund has a policy that at least 50% of telecentre managers and owners should be women or women's organizations (Jorge 2000).

The attraction of FOSS¹²⁰ is that it makes affordable software possible. The Civil Society Working Group (CSWG), of which the NGO Gender Strategies Group was a member, made FOSS part of its WSIS platform: *"We need to encourage local, low-cost and open source solutions and South-South exchanges that prevent the growth of monopolies in the ICT sector"* (CSWG 2003).

6.2.5 Media and content

In addition to the lack of electricity and ICT infrastructure, low levels of literacy, lack of computer skills, lack of knowledge of the languages that predominate on the Internet, little free time, little discretionary cash income and numerous other socio-cultural impediments, the lack of appropriate and useful content is an important barrier for women's equal access to and use of ICTs. To reach women with the information and knowledge they need, ICT systems should incorporate a mix of technologies which are appropriate to the local infrastructure, socio-economic situation, and levels of education and literacy. Initiatives to develop locally-relevant content, which is useful to varying groups in the community and available in local languages, are in short supply but necessary in order for ICTs to live up to their potential.

For these reasons, radio remains a critically important ICT. Gerster and Zimmermann (2005) make the point that the choice of appropriate media should be determined by level of country development: "In an area with low income, significant illiteracy and lack of knowledge of major international languages, community radio – particularly community radio linked to Internet – makes more sense for women than Internet over computers. This is particularly so in Africa, which, while it lags behind Asia in number of phone lines and Internet users, has a high number of radios. Average for the region is 238/1000, while it is only 145 for Asia; and half the countries in Africa have more than 200 radios per 1000 users".

Community radio has become a significant medium throughout the world. Radio has high popularity with women in rural Africa, where 93.4% of women listen in. Even among those who do not own a set, 69.2% listen (Makunike-Sibanda 2001). The possibilities for using radio in ways that reach women, particularly poor women in developing countries, range from simple community radio, to community radio using rural-friendly power sources, to two-way communication combining radio and new ICTs (which also provides training for women users and supports associations of women communicators). The combination of community radio linked to the Internet is one example of using "blended media" to increase women's access to ICTs (a combination of two or more media, e.g. Internet and radio, video and Internet radio). This approach has been used in several projects aimed at women in rural areas of developing countries.

Culturally and linguistically-appropriate content: According to the Association for Progressive Communication (APC), content of interest to women either is not local, relevant or available in indigenous languages (APC 2005b). The dominance of English language content on the Internet, often from countries of the North, is a major concern raised by women and women's organizations. Ninety percent of Internet content is in 12 major languages.

A study on the use of ICTs by indigenous women in Bolivia found that more information should be made available in the Aymara language in order for women to benefit (Rodriguez 2001). Another study found that women do not use computers in telecentres because they don't find the content

¹²⁰ Globally the organization that supports FOSS for women is LinuxChix, "a community for women who like Linux". In addition to the U.S., there are chapters in Africa, Australia, Canada, throughout Europe and Brazil. In 2004, the first LinuxChix chapter in Africa came into existence. The aim of the African chapter is to help build critical mass of Linux skills among African women and to advocate for the use of FOSS for the many community development challenges being faced by Africans, especially African women (LinuxChix 2004).

WOMEN AND RADIO

- In Suva, Fiji, Femtalk 89.2, a women's community radio initiative of femLINKpacific (Media Initiatives for Women), uses a mobile 'suitcase' radio to broadcast to women and their communities in semi-urban and rural Fiji (FemLINKpacific 2005).
- A rural radio project focusing on development information in West Africa that has been successful in incorporating gender issues is the Benin MicroFinance and Marketing Project (PROMIC). FM radio is used to broadcast price and market information in local languages to women farmers, 90% of whom are illiterate and the main earners of family income (Tounessi 2000, http://www.ifad.org/ngo/doc/#benin).
- In Zimbabwe, some 52 women's radio listening clubs are active in the Development Through Radio (DTR) project, which is aimed at giving rural women access to radio through participation in the production of programs based on their development needs and priorities. The DTR project involves two-way communication and not simply broadcasts. In the project, the women record their views and questions on development issues in Bemba; tapes are then sent to a producer in Lusaka who records responses from relevant officials and edits the discussion and the responses into weekly broadcasts (Mufune 2001). In another DTR project for women farmers in northern Nigeria, women received a badly needed electric power transformer from government authorities as a result of a request sent by radio (Garba 2004).
- DTR's use of radio-Internet convergence has spread to Sierra Leone, where the target audience is women war victims. The women's listening clubs define and develop their own agenda and radio programs. The programs are digitized, archived and incorporate the use of video with radio (Development Gateway 2003).
- Women's community radio is supported by the Women's International Network of AMARC-WIN, an assembly of women communicators working to ensure women's right to communicate through and within the community radio movement. It is particularly active in francophone Africa (*http://win.amarc.org*).
- In Bankilare, an area of nomads 240 km west of the capital of Niamey, Niger, solar-powered WorldSpace satellite receivers and Baygen Freeplay windup/solar powered FM radios deliver program content from the WorldSpace Afristar satellite. The Africa Learning Channel and the Francophonie Channel are rebroadcast on FM community radio stations. Women represent a significant proportion of the local content committee, which determines what programs will be broadcast, and represent a large proportion of the users (Benamrane 2000, Hijab 2001).
- In the Deccan Development Society in South India, socially disadvantaged women use radio and video to document, archive and disseminate traditional farming practices, and reach policy makers (Pavrala 2000).

they need (Rathgeber 2002b). Researchers also found that rural women in South Africa didn't use telecentres, although they were actively seeking agricultural information, because they couldn't or didn't find relevant content (Kiplang'at 2004).

Several sources have underlined the importance for women of locally produced and relevant content, to call attention to their own knowledge and knowledge production, to develop Internet spaces that they feel comfortable with and which are useful to them, to distribute knowledge to others, and to develop a cyber-culture and knowledge system that is not dominated by a small number of large corporate entities (NGO Gender Strategies Working Group 2003).

Women's advocacy groups have called attention to barriers that language and literacy issues pose to women's access to ICTs, as well as the recognition that lack of multicultural content alienates many users and limits the usefulness of these new technologies for women. They identified this as a critical issue for gender equity at WSIS: *"Language barriers to information access require the development of applications like multilingual tools and databases, interfaces for non-Latin alphabets, graphic interfaces for illiterate women and automatic translation software. Likewise, the principle and value of adequate multi-cultural content in digital media calls for the production of local content by women for women to build their own knowledge, and encourage racial diversity in the representation of women" (NGO Gender Strategies Working Group 2003).*

A key question to ask in this regard is what kind of content women want. User needs' studies provide some evidence of that from developing countries. For example, in Uganda, women expressed the need for content relating to credit, agriculture, health (particularly HIV, ante-natal and reproductive health), education opportunities for girls, cooking, women's rights and dowry, children, and property rights. Girls wanted information on educational opportunities, as well as reproductive health and HIV/AIDS, women's rights, and job opportunities (Beardon et al. 2004).

Information available in inappropriate form is also a major problem. A recent study by the International Institute for Communication and Development found that despite the proliferation of agricultural information systems directed at the improvement of African agriculture, there is little information in such systems that would be accessible or of use to African women farmers because it is scattered, too abstract, or in a format directed at researchers rather than grassroots users such as small farmers. Coverage of local issues is also low so that these systems are more relevant to the North than the South (Besemer, Addison and Ferguson 2003).

In the last five years or so, awareness of the dearth of content for women in developing countries has led to a substantial number of projects and initiatives to correct this situation (see Insert next page).

6.2.6 Privacy and security

Undoubtedly, besides their benefits, ICTs bring new security threats and opportunities for greatly increased invasion of privacy. New video and computer-based technologies have increased the capability for: undetected surveillance, such as spy software which allows remote tracking of keystrokes made on a computer; eavesdropping on wireless transmissions via mobile phones; e-mail tampering, such as intercepting or redirecting e-mail; hidden GPS tracking devices and many more.

The new technologies pose the threat of abuse of the privacy of both men and women. However, harassment, pornography and other illegal activities, including the use of the Internet to facilitate trafficking of women and girls, are serious concerns. Examples of these issues are discussed next.

Harassment or cyber stalking: Cyber stalking is an outgrowth of traditional forms of stalking, in that it incorporates persistent behaviours that instil apprehension and fear (Ogilvie 2002). Some even argue that cyber stalking is more prevalent than other forms of stalking, since the Internet in effect promotes this behaviour through lower costs (free e-mail and chat room access), and the ability to contact a large number of potential victims almost immediately, with no geographical limitations. There are three main forms of cyberstalking:

CONTENT MADE FOR WOMEN

- Village Knowledge Centres in Pondicherry, India, run by the Swaminathan Foundation, are information shops run by women volunteers to give information on markets, healthcare and agriculture-related information, and to teach computer skills (Balaji et al. 2004).
- Women's Information Resource Electronic Service (WIRES) targets women entrepreneurs in smallscale business in Uganda addressing their need for information repackaged in simple, ready-to-use formats, in local languages. Through WIRES, women can access ICTs for information on markets, prices, credit and trade services (*http://www.ceewauwires.org*).
- Through video production and using the Internet the Nutzij project, run by a collective of young Mayan women in Guatemala, helps women develop skills to preserve their community's cultural heritage on video, and market the content to the world via the Internet (NUTZIJ 1998).
- The aim of the Online Learning Centre for Women (OLC) in Seoul, South Korea, is to develop content for women ICT trainers utilizing the workspaces of the OLC system. This initiative is the first step towards developing gender-sensitive ICT content and enhancing the development of women and ICT communities in the region (OLC 2002).
- Khwezi FM in KwaZulu-Natal is a community radio station which promotes content directed particularly at women who make up 60% of the staff and most of the listeners. Among its programs, Mothers Desk deals with issues on children's health, HIV/AIDS, and outreach programs (Promoting community radio content in Africa 2002).
- The CD-ROM 'Rural Women earning money' produced by the International Women's Tribune Centre in English and Luanda for illiterate or newly literate women farmers in the Nakaseke region of rural Uganda uses local language and incorporates a strong visual component to reach women with limited literacy (IWTC 2001).
- The Farmwise project in the Zomba district, Malawi, uses a database, an online input calculator, and email to help women farmers improve their agricultural production (Nyirenda 2004).
- Feminist International Radio Endeavor (FIRE) (http://www.fire.or.cr and http://www.radiofeminista.net/ indexeng.htm), based in Costa Rica, is women's Internet radio that supports community media with content on women's rights.
- A pilot project using ICT in literacy was set up by the Commonwealth of Learning in Kabwe, Zambia. Literacy training materials were interwoven with women's topics such as health, nutrition and childcare, so that the number of women learners far outnumbers that of men, a rarity in Africa where there are far more men in distance education than women (Green and Trevor-Deutsch 2002).
- E-mail stalking consists of the use of e-mail in a way that is threatening, obscene, or incites hatred. It can also take the form of spamming (sending viruses or high volumes of electronic junk mail). For example, a North American university student harassed five female students, sending over 100 messages which included death threats, graphic sexual descriptions and references to their daily activities (Grabosky 2000 and Ogilvie 2002). Anonymizers and anonymous re-mailers, which hide the e-mailer's identity, provide protection for stalkers together with incentives to begin or continue the stalking.

- Internet stalking is more public, in that web sites and chat rooms are used to threaten and slander targets, as well as to publish intended actions against the target. A particularly gruesome example in the U.S. involved a young man who was looking for a woman who he believed had humiliated him in high school. He maintained a web site for nearly two years, describing the young woman, providing updates on her, and outlining his plans to kill her. He obtained her social security number, licence-plate number and place of employment via Internet people finder services. Eventually, he drove to the woman's place of work and shot her as she got into her car (Romei 1999).
- Computer stalking is conducted through security holes in operating systems, which are used to assume control over the computer of the target through a direct computer-to-computer connection over the Internet. The perpetrator can track the web sites visited by the target, track key strokes, and even view the computer desktop (Ogilvie 2002).

According to a group entitled *Working to Halt Online Abuse* (WHO@, *http://www.haltabuse.org*), which collects self-reported data on online harassment, cumulative statistics for the period 2000-2004 indicate that women made up 78% of the targets overall, while men represented only 20%.

Pornography: Research on the effects of the Internet on pornography indicates that:

- It has increased the reach and number of pornographic images exponentially. New ICTs have contributed to the massive increase of the porn industry, which is estimated at US \$46 billion per year (not including the \$11 billion escort services industry). Text, images, and audio and video files can be sent from anywhere to everywhere quickly and at a relatively low cost. In the U.S. alone, the industry has been estimated at \$12 billion. Of this, child pornography generates \$3 billion (Internet Filter Review 2005).
- It allows more interactivity between customer and client. Live transmission of video images allows live online strip and sex shows. This can be interactive, as the buyers are able to direct the women's actions or "order" the service or person they prefer. On the other hand, the availability of web cams and cheap video equipment allows women sex workers to manage their own businesses and avoid exposure to violence, incarceration or sexually-transmitted diseases (Lynn 2005).
- It allows new forms of interaction among customers who can network and exchange information more easily and, if desired, anonymously. Chat rooms, newsgroups, and e-mail are used to share information about where to buy sex services, post pornographic pictures and videos, and broadcast live sex shows. Some sites and newsgroups provide sex travel advice and reviews.
- It provides new types of products, such as sex tours, live strip/sex shows, a range of styles and subjects of pornographic images and movies (even computer-generated images), mail order bride services, and recruitment of unsuspecting women for these purposes (see the section on trafficking below).
- The anonymity and ability to cross national borders provided by the Internet allows the industry to violate sexual exploitation and violence laws. Servers located in countries with fewer restrictions have a global reach and can serve countries with more restrictive legal environments.

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The Internet has increased extreme pornographic material, including increased child pornography and violence. The proliferation of pornography on the Internet has increased the demand for "new" materials, leading to the growing presence of more violent, rougher and degrading images (Amis 2001).

While the enormous increase in the distribution of pornography as a result of the Internet is wellknown and documented, a newer area of concern is the distribution and use of images of women without their consent, taken either with or without their knowledge. These pictures are used in videogames and distributed on the web or cell phones. The spread of cell phone cameras is increasing this activity.

Trafficking of women and children: ICTs also contribute to an increase in sex trafficking in various ways:

- They facilitate connections between suppliers and clients, including direct propositions through chat rooms to people living, working and studying abroad. Perpetrators can disguise their identities to make connections with targets, a common strategy with pedophiles.
- They provide increased advertising opportunities to live and work abroad. Targets are promised help with travel, living and visa arrangements, while related financial transactions are faster and easier through electronic transfers.
- They aid in the recruitment of those targeted for trafficking. For instance, they "identify" particular women to be sent to clients, who view the pictures on a website before a particular woman or girl is brought over.
- Other approaches include mail order brides and prostitution tours. Mail order agencies now prefer to use the Internet as their primary market location over more traditional media, as they can easily update the information and target their prime market: men from Western countries.

Measures taken to address and combat these abuses of ICTs include advocacy and networking, as well as national legislation restricting trafficking and sexual violence (see Insert below). Such approaches, however, can encounter opposition when legislation passed to restrict cyber crime and criminal activities online is perceived to threaten human rights.

MEASURES AGAINST ILLICIT ACTIVITIES

- National anti-trafficking and anti-slavery laws are currently in place in France, a frequent destination for women trafficked for prostitution and domestic servitude.
- The U.K., as a primary destination for women trafficked from Eastern Europe, as well as from Southeast Asia and West Africa, supports cooperation between policy and prosecutors nationally and internationally. The Nationality, Immigration and Asylum Act includes punishment for trafficking.
- The Council of Europe's Convention on Cybercrime attempts to set international standards for policing of electronic networks. Although it does not deal with trafficking, one of its areas of focus is child pornography and exploitation.
- The government of Brazil asks hotels to discourage child prostitution on their premises.
- The governments of the Gambia and the Netherlands have set up a police unit to track Dutch pedophiles in the Gambia.
- The government of Thailand works with NGOs to develop and implement anti-trafficking strategies (Chawki and Wahab 2005).

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On the other hand, ICTs can also help women bypass traffickers by providing direct information on employment abroad, such as visa requirements, access to legitimate job announcements, and by allowing them to make direct contact with potential employers. They can be used as tools to find people who have disappeared, allowing rapid exchange of information among groups. Website and e-mail lists provide resources, information and support for targets of security abuses, and also monitor and expose activities of perpetrators and stalkers. While many developing countries are grappling with the basic access and ICT infrastructure issues, many countries in the North are now defining the basic rights framework for Internet use and governance.

6.2.7 ICT policy and governance

ICT policy is not gender neutral: Given gender-based constraints and differential access to resources and attitudes about appropriate gender roles and behaviours, ICT policy will not be gender neutral, but will in fact exacerbate existing gendered socio-economic inequalities in a society – unless both gender and social implications are taken into account. Doing this does not require a large investment of resources, but rather a shifting of perspective. A long-term perspective on communications regulation which takes into account the larger societal goals of connectivity, education, information, consumer protection and resolving market failures will be more conducive to achieving the goals of ICT policy and regulation, and to incorporating social considerations, including women's needs and concerns (Huyer and Sikoska 2003).

At the international level, the Geneva WSIS Declaration and Plan of Action (2003) contain several references to women and gender equality, including the commitment to ensure that the information *"enables women's empowerment and their full participation on the basis of equality in all spheres of society and in all decision-making processes"* and to *"mainstream a gender equality perspective and use ICT as a tool to that end"* (para. 12 of the Declaration). The Plan of Action contains references to women and gender concerns in its paragraphs on ICTs for education and training, fostering entrepreneurship, promoting health, employment and telework, media, and ICT indicators.

Frameworks and strategic plans on national ICT policies are generally devoid of women-focussed issues or pay lip-service to women's concerns. The strategic framework for ICT development in India, Malaysia, and the Philippines is silent on gender issues and considerations (although India has some programs to encourage women to use ICT in different sectors) (Ramilo and Villaneuva 2001). Analysis of the current projects and policies on ICTs and digital inclusion in Brazil shows that in none of them is gender equality addressed as a main issue (Selaimen 2005). The ICT Policy for China addresses women and ICT as part of the overall development of women. The ICT policy in Tanzania mentions *gender, women* and *equitable* five times in total, mostly in relation to discussions on the notion of *human capital* for a well-educated and learning society, but every ministry is required to have a women's desk (Etta 2004). Among ICT policies in African countries available for review, those of Botswana, Malawi and Madagascar contain no references to women or gender equality.

There is some positive movement, though. A plan adopted in 2002 by the Ministers of Communications of the Pacific Island Forum states that *"Everyone will have equal opportunity access to ICT without barriers and with special regard to women, the disadvantaged, the disabled, under represented minorities, and those in rural and remote communities"* (cited in Green and Trevor-Deutsch 2002). Indonesia has mainstreamed ICTs in its overall development plan for women, but only the Republic of Korea has a plan and a budget for this, and has pursued it vigorously. Preliminary work has been done to date in assessing the degree of gender equity analysis in national ICT policies in developing countries. Recent studies have looked at the treatment of gender issues in ICT policies and their follow-up in some African countries; the results are mixed at best (see Insert).

WOMEN IN AFRICAN NATIONAL ICT POLICIES

- In Mozambique, when its ICT policy was approved in December 2000, there was much hope that this would become a best practice on gender equity. It contained an entire chapter on gender and youth, covering a wide variety of policy areas from decision-making to training, e-commerce, applications and content development. However, the strategy for implementation, adopted in July 2002, has proved disappointing. It contains no references to women using or producing ICTs. The only reference to women, along with children, is as victims of pornography, abuse, and violence on the Internet. Significantly, no women's organizations were mentioned as participating in the national Consultative Forum (Mozambique 2002, Hafkin 2002a).
- In Senegal, telecom policy formulation has focused almost exclusively on the performance of the operator and the structure of the sector. The Telecommunications Regulation Agency is directed by a Regulatory Board with 30 employees, of which only three are women (Mottin-Sylla 2002). Women's NGOs and other stakeholders concerned about gender issues are active in Senegal, but have not been able to influence the development of the national ICT policy.
- South Africa's 1999 Telecommunications Act established the Universal Service Agency and provided the policy and legislative frameworks to redress the gender imbalance, among other issues. During the consultative process leading up to the Act, the White Paper on communications (1996) stated that "besides referring to those who were disadvantaged by the apartheid system in the past, the term 'disadvantaged'' also applies to those South Africans who have been historically disadvantaged through discrimination on the grounds of gender and/or disability". It also stressed the need to ensure gender equality in issues such as licensing, procurement and training. Additionally, the national research and development strategy includes a chapter on human capacity building in S&T, generally, with many references to the importance of gender equality. However, implementation has fallen short on gender impact. A major reason for the shortfall is that current policy does not address issues of affordability, because technical features of the network are presumed to be gender-neutral with respect to costs, and because insufficient attention has been given to seeking innovative ways of addressing women's information needs. Gender has not been mainstreamed into the activities of regulators and operators. A relatively small percentage of women will benefit from the policy through their inclusion in the ownership and control of new companies, or from increased employment or promotion opportunities in the telecommunications sector (Gillwald 1999).
- Uganda's National Information and Communication Technology Policy Framework (2002) includes references to the need for a policy to stimulate industrial growth, commerce, infrastructure and linkage of rural and urban communities "as well as uplifting of disadvantaged groups, while taking care of gender balance" and making available communications at affordable costs "which match the ability of their users to pay, so as to reduce gender and spatial disparities in information access." In addition it states that one of its policy objectives is to ensure gender mainstreaming in ICTs for development and associated strategies (Uganda 2002).
- In Zambia, the first draft of the National Information and Communication Policy (November 2003), lists several references to gender and youth. Its guiding principles include mainstreaming youth and gender into the policy formulation, review, and implementation.
- In Ghana, the ICT for Accelerated Development Policy (2003) includes several references to women and gender equality, with an overall goal "to accelerate the development of women and eliminate gender inequalities in education, employment, decision making through the deployment and exploitation of ICT by building capacities and providing opportunities for girls and women". Bridging the gender inequality gap in social, economic and political development is listed as a strategic focus, while objectives and priorities include: increasing women's access to ICTs by ensuring gender balance in training; promoting women's rights to expression and communication through ICT; and the development of a reporting mechanism to monitor progress.
- The ICT Policy and Strategy in Benin includes the objective of making Benin an information literate society made up of men and women capable of being active in and benefiting from the information society. Actions include increasing women's capacities to use ICTs, promoting ICTs among women's organizations, and using ICTs to develop an information system which promotes women and women's concerns.

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6.2.8 The impact of ICTs on gender equality

Obviously, impacts can be both positive and negative. Some argue that while ICTs can be important tools for promoting gender equity and empowering women, they have also been appropriated by those seeking to profit from the exploitation of women. Daly (2003) notes that relatively few applications of the technology will be planned to achieve gender goals, but indirectly ICTs may have profound effects on gender roles, gender equity, and the empowerment of women. What seems relatively clear, however, is that gender issues have to receive frontline attention if ICTs are to promote women's equality.

In any event, there are plenty of examples that indicate the potential for ICTs to promote increased self-esteem, social status and increased confidence in women. The number and frequency of such accounts and their clear gendered nature indicate that ICTs enable women to overcome isolation and move towards increased opportunities. However, there is little rigorous analysis of the role of ICTs in women's empowerment to date. Similar findings of the effects on technology use by women in developing countries have been more credibly documented in the case of agricultural technologies. When introduced in a participatory manner that recognizes the situations, interests, concerns and access to resources of women, agricultural technology can contribute to women's empowerment in dealing with traders and their husbands, increase their freedom of movement, freedom from physical violence, and political knowledge and awareness specifically related to the adoption of the technology itself (Meinzen-Dick et al 2003). There is a need for more systematic and rigorous work on measuring ICT impacts on women, at various levels and contexts. The issues of self-esteem, social status and women's empowerment are elaborated below.

Self-esteem: In six case studies of multi-donor ICT projects, women participants emerged from each project with enhanced self-esteem (Hafkin 2002b). In a self-evaluation of users at the Sitakund ICT centre, in India, none of the men mentioned any increase in self-confidence, while every women user identified this as an outcome. One of the users of the centre attested: *"But among these changes the most significant change in me has been that I previously used to feel some kind of fear to get out of the house alone, and I used to feel diffidence after coming to the centre. But now there is not a bit of that previous fear in me" (Slater and Tacchi 2004b).*

An evaluation of the WorldLinks program in Africa showed that while 70% of boys saw no impact on their self-esteem from the program, 95% of the girls said that they gained confidence and self-esteem from it (Gadio 2001). Women in ICT projects in Afghanistan reiterated the benefits of a reduced sense of isolation and increase in self-esteem and empowerment (World Bank 2005). In Bolivia, indigenous Aymara women using ICT found that the use of computers *"strengthens considerably the self-esteem"* and sense of self-worth of women (Rodriguez 2001).

Social status: Association with technology also seems to convey increased social status to women in their communities. Poor Bangladeshi women experienced an enhancement of their social status by virtue of their privileged access to a means of communications in the Grameen Village Pay Phones program (Aminuzzaman 2002). In Seelampur, India, women who had learned computer skills were seen as worldly, as sources of information and as having mastered a sophisticated technical device. They gained a position in decision-making in their family that they did not have before (Slater and Tacchi 2004a). At Nabanna, another ICT centre in India, women reported that they had gained respect in their local communities as a result of their ICT skills. Not only were they able to use a computer but also they were recognized as valuable sources of information (Ghose and Ghosh Ray 2004). Local women reporters on rural radio programs also reported higher social status as a result of their association with the medium (Joshi 2005).

ICT IMPACTS ON WOMEN

- The classic case cited is that of the Grameen Bank Village Pay Phones, where women operators were netting about US\$700 per year, more than twice the annual per capita income in Bangladesh (Richardson, Ramirez and Haq 2000). Another example of direct links between women, ICTs and income generation is that of e-Seva (e-services) of West Godavari District, Andhra Pradesh, India where 80 web-enabled rural information kiosks have been established at mandal (subdistrict) level, run and managed by women from self-help groups. The centres are becoming self-sustaining and the women operators are earning between 6,000 and 15,000 rupees per month (GKP 2003).
- In the Farmwise project in Malawi, improved access to information resulted in increased productivity of women farmers. The project leaders claim that, as a result of the database information project, the women's productivity more than doubled to the point of producing about 10–15 bags of maize each (Nyirenda 2004).
- After accessing and using information made available to them in the Manage project of the National Institute of Agricultural Extension Management in Hyderabad, Andra Pradesh, women began to put pressure on bureaucrats to serve them properly and in a timely fashion (*http:// www.sustainableicts.org*).
- The pilot phase of the Women Information and Communications Technology (WICT) project aimed to use modern ICTs to empower poor urban women in Nairobi by enabling them to communicate to policy makers. The women acquired a video camera and negotiated to supply one of the leading broadcasting stations in the country with TV news items and video clips. Material covering several incidences of unrest in the settlement were provided to the media, and subsequently used as news items. This has raised their profile in the community and their own self-esteem.
- Online communities in Saudi Arabia have enabled men and women to communicate in new ways. While they remain physically segregated when communicating with each other online, their interaction allows them to overcome culturally-imposed separation of the sexes to a certain extent (AI-Saggaf and Williamson 2004) raising interesting questions about the potential for new modes of communication between men and women in such societies. Interestingly, positive results of this online communication included greater open-mindedness for both women and men, who became more aware of the personal characteristics of individuals within their society and less inhibited about the opposite sex. Online communication in Saudi Arabia *"is disrupting long-established traditions, enabling the mixing of members of both sexes, and making people aware of different ways of living"* (AI-Saggaf 2004)."
- At a computer education centre in India, young women were given the opportunity to physically and socially enter into a mixed public space, to move freely around their community, to express themselves to men and other authority figures, to voice criticism, suggestions, to gossip and have fun, and express themselves through cultural forms such as singing, public debates (held at the centre), using pictures and words (on the computer). Each of these steps in the Sitakund culture is a direct challenge to traditional roles and norms (Slater and Tacchi 2004a).
- In Iran, blogs have provided an opportunity for women to talk about taboo subjects in their society, such as the role of women, sexuality and other social issues (Hermida 2002).

According to a project leader in the M.S. Swaminathan Research Foundation's Village Knowledge Centre in Pondicherry "The women in the Pondicherry knowledge centre villages have acquired some status and standing in the community. Men - farmers, landless laborers, traders - come and ask them for information and they provide the answers. They have set up self-help groups and micro-enterprises. They have taken part in discussions held at our Foundation and answered questions posed by many overseas delegates. Only a few years ago they would not have ventured out of their village unaccompanied by their husbands or in-laws" (UNITes 2003).

Empowerment: Examples that ICTs are boosting women's ability to take action, locally and globally continue to accumulate. Women volunteers and women users of the centres now see themselves connected to the world outside of their village. *"They are no longer the ordinary village women whose horizon does not extend beyond their village. They are on their way to becoming global citizens"* (UNITes 2003). In Latin America the Internet has become a powerful tool for NGO activism in gender equity. The 'new utility' expands the efficacy and reach of advocacy petitions and action campaigns (Friedman 2004). A concrete aspect of the impact of ICTs on women is the creation of a global civil society, led by the women's movement. *"It is arguably the women's movement which has been at the forefront of this development, first with the evolution of a formidably organised, coherent and effective caucus around the Beijing and Cairo conferences, and more recently with a series of initiatives carving out international spaces on the internet and using this to take forward a global movement" (Panos Institute 2001).*

Conclusions

Ironically, the digital divide affects those who stand to benefit the most from the new opportunities afforded by ICTs. This is certainly true in the case of women, as has been examined in the preceding sections, with serious implications for the roles they are called to play in overall development efforts. While some progress has been made in recent years - at least in raising the issue - much remains to be done in order to understand better *why* gender gaps exist and *why* they matter, as well as to initiate actions as to *how* best to close the gender digital gaps and *how* this links to more general disadvantages facing women. To this end, proper quantification and analysis become critical. Such efforts, however, continue to be hindered by a dearth of adequate and reliable statistical information; much like the digital divide, a statistical divide exists where the need is greatest – in developing nations. While efforts are underway to address the situation, it may be years before satisfactory progress is achieved. In the meantime, the best alternative is to compile all that exists, despite its incompleteness and heterogeneity, and combine it with contextual knowledge as a means to deepen our understanding, support much-needed policies, and monitor progress. This is where this project aspires to contribute.

The first part of this report represents a first attempt to compile and integrate available data from both international and national sources. We are cognizant of the fact that we have only begun to address a few of the key questions – what is the magnitude of the gender digital divide, where is it found, what may affect it, how does it compare to other divides, and how it is evolving over time. We are also aware that the statistical evidence is still scant; but at least we are beginning to substantiate claims that were until now left to rhetoric, and to outline an approach to guide future research.