Charting Digital Divides:

Comparing Socioeconomic, Gender, Life Stage, and

Rural-Urban Internet Access and Use in Eight Countries

Wenhong Chen and Barry Wellman
NetLab
Centre for Urban and Community Studies
University of Toronto
wellman/wenchen @ chass.utoronto.ca
www.chass.utoronto.ca/~wellman

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* This expanded version contains descriptions of three additional countries – U.K., Italy, Mexico – and an expanded set of conclusion.

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Charting Digital Divides

The Multifaceted and Persistent Digital Divide

The chapters in *Transforming Enterprise* often assume ubiquity: that almost all of those who are truly modern and transforming will be connected. They portray a world system transformed by the Internet and other new information and communication media, from relations among people within organizations to relations between large economic sectors. They see computer-supported communication and knowledge to be crucial for the innovation and dissemination of products and services. Indeed, the very foundation of this book rests on the belief that the informed use of the Internet is already widely available and growing swiftly.

In short, the authors assume that the digital divide – the numbers of people who are not connected to the Internet – is small, shrinking, and becoming irrelevant. However, it is not. The digital divide is here for some time to come. It is large, multifaceted, and in some ways, it is not shrinking. Moreover, the divide is socially patterned, so that there are systematic variations in the kinds of people who are on and off the Internet. These patterns vary between nations and over time. Country A's divide does not necessarily resemble Country B's, and last year's divide often does not necessarily resemble this year's. There is no one digital divide; there are many divides. Indeed, it is more accurate to use the plural – digital divide*s* – because the digital divide is multifaceted and varies within and between countries, both developed and developing.

To be sure, the Internet has grown rapidly in the last decade, so much so that many people in the developed world assume that almost everyone is connected to it. Although there are no reliable data on the size of the world's online population, educated estimates show that use of the Internet has diffused at an unprecedented speed. The number of Internet users around the globe has surged from 900,000 in 1993 (ACNielsen, 2001), 25 million in 1995 (Pew, 1995), 83 million in 1999 (Intelli-Quest, 1999 as cited by DiMaggio et al., 2001), 513 million in 2001, to more than 600 million by the end of 2002 (NUA, 2003). More recently, other new media, such as web-enabled mobile phones, have further fostered computer-mediated technology (Ito, 2004).

Yet, widespread diffusion does not equal ubiquity, even within developed countries. In this chapter, we demonstrate the uneven diffusion of the Internet is still persistent. The first digital divide appeared at the very start of the Internet. Early users were disproportionately affluent, male, white, better educated, and from developed countries, especially the United States.

Rather than shrinking with expanding Internet use, the global digital divide between developed countries and developing nations continues to be huge. Affluent residents of economically developed countries sometimes forget what a small percentage of the world's

population is online. After all, the majority of their country-mates are on the Internet, as are the economically advanced segments of developing countries.

Yet, only 10 percent of the world's population was on the Internet in 2002, and 88 percent of these Internet users resided in industrialized countries (World Economic Forum, 2002). Within countries, the uneven diffusion of the Internet appears along familiar lines of social inequality such as socioeconomic status, gender, age, geographic location, and ethnicity. Moreover, having access to computers and the Internet and possessing the ability to use them effectively are two different issues (Warschauer, 2003). While marketers, media, and governments often report only the number of people who have access to the Internet, the digital divide is not a binary yes /no question of having access to the Internet. The question is not whether people have ever glanced at a monitor or put their hands on a keyboard, but the extent to which they regularly use a computer and the Internet for meaningful purposes.

Although the digital divide has been a continuing buzzword in public discourse and international agendas, analyses have largely been confined to the boundaries of national states. Moreover, research on Internet diffusion has followed the evolution of the Internet itself. With the Internet born and raised in the U.S., most research has been American. With Internet use increasing in other developed countries, research about their situations has been on the rise. Accordingly, most studies have taken place in OECD countries, especially, the U.S., Canada, Japan and Western European countries. Even though there is a deeper and wider global digital divide, little research has been paid attention to how Internet access and use fit into everyday life in developing countries.

The Technological and Social Aspects of the Divide

The digital divide has both technological and social aspects. Table 1 shows an integrative framework developed to scrutinize Internet access and use within and between countries. We examine the digital divide from four perspectives:

> Table 1 about here <

1. *Technological Access.* "The Internet is not a single innovation but is a cluster of related technologies that must be present together to support adoption decision by end users" (Wolcott et al., 2001, p.5). Around the world, people, groups, and countries use different levels and combinations of technologies (e.g. hardware, software, and bandwidth) to access computers and the Internet. These differences can affect the efficiency, volume, and diversity of Internet use in important ways (DiMaggio and Hargittai, 2001). Being able to hook up to the Internet via a 56K dial-up modem is markedly different from accessing the Internet via high-speed broadband connections such as telephone-based DSL or cable modems.

2. *Technological Literacy.* Having access to the Internet and having the ability to use the Internet effectively are two distinct aspects of the digital divide. Using a computer and the Internet is more complicated than changing channels on a television or dialing a telephone. Meaningful and productive Internet use require computer, social, and

cognitive skills for such things as seeking information, developing community networks, accumulating social capital, or participating in political activities (Hargittai, 2003)

3. *Social Access.* Economic, organizational, and cultural factors affect equal access to the Internet.

   a. Income is the most important factor that affects Internet diffusion. The International Telecommunications Union estimates that within countries, inequalities in Internet access and use are likely to be twice as high as inequality in income (ITU, 2003a). Among OECD countries, the income divide varies from country to country, ranging from a gap of more than 60 percentage points in the U.K. to less than 20 percentage points in Denmark (OECD, 2002).

   b. Barriers to Internet access begin with the lack of awareness and interest. For instance, in Japan, 47 percent of non-users found that high cost and 36 percent felt that uneasiness or lack of trust with the Internet deterred them from using it. However, 73 percent of non-users said they had "no interest" or felt the Internet was "incomprehensible" (Digital Opportunity Site, 2001). Research in the U.S. and Canada indicates that the elderly, women, and non-whites are less aware of the Internet than youth, men and whites (Reddick and Boucher, 2002; Katz and Rice, 2002).

   c. Language, content, and location barriers become salient after access to the Internet becomes available. What users bring with them online has a profound impact on what they can gain from the Internet. The diffusion of computers and the Internet is contingent on their affordability, user-friendliness, and relevance in people's everyday lives.

   d. Inequality in Internet access is not solely contingent on individuals' capabilities, resources, and attitudes. Interpersonal and institutional contexts that foster Internet use also are important. For example, informal training through social support plays a crucial role in equipping people with the necessary computer and navigation skills to use the Internet.

4. *Social Use.* The digital divide is a social as well as a technological divide. Ultimately, the digital divide is a matter of who uses the Internet, for what purposes, under what circumstances, and how this use affects socioeconomic cohesion, inclusion, alienation, and prosperity. Interpersonal emailing and web searching for information are the two most widely used Internet activities worldwide, that people carry out on the Internet. Other important uses include civic organizing, and accessing online services such as online banking, job searching, and interacting with public authorities (OECD, 2002). However, users in developing countries tend to consume rather than to produce information on the Internet. This is because of the higher cost of Internet access, censorship, the lack of Internet culture in organizations, and the small percentage of peers online (Bazar and Boalch, 1997).

To our knowledge, this chapter is the first to systematically compare and synthesize research on the digital divide over time and in a global range of developed and developing countries. The time span we cover is from the advent of the commercialized Internet in the early 1990s to 2002. We examine eight countries: the United States, the United Kingdom, Germany, Italy, Japan, the Republic of Korea, China, and Mexico. We first present a framework of Internet diffusion and its social impact on people and societies in the global context. Using this framework, we then describe trends and patterns of access and use of computers and the Internet in each country.

The eight countries we examine were selected for several reasons. First, they make up a majority of the world's Internet population. Together, they account for about 68 percent of all Internet users in the world in 2002. Second, the eight countries present diverse patterns of Internet access and use. For example, as the birthplace of the Internet, the U.S. has been the leader in both computers and Internet use. As recently as 1997, 54 percent of the world's Internet users were American-based. Even through the Internet has been spreading quickly outside the U.S., users in America still accounted for 29 percent of world online populations in 2002 (Nielsen/NetRatings, 2003a).

To demonstrate alternative patterns of Internet diffusion, we include in our analysis developed European countries (the United Kingdom, Germany, and Italy) and East Asian countries (Japan and South Korea), where wireless computing and mobile phones have proliferated more than in North America. Furthermore, "Germany (35.6 million), the United Kingdom (29 million) and Italy (22.7 million) have the largest number of people outside the U.S. with Internet access via a home PC" (Nielsen/NetRatings, 2003b). We also include two developing nations – China and Mexico – to broaden understanding of how the developing world is both increasing Internet use and is being left behind. China is the world's most populous country, with rapidly expanding populations of computer and Internet users. With 58 million Internet users in 2002, China had the world's second largest online population after the U.S. Meanwhile, Mexico is the most populous Spanish-speaking country in the world and is experiencing a rapid growth of computer and Internet use.

We caution that these data are necessarily rough approximations. Getting a perspective on the Internet is like tracking a perpetually moving and mutating target. The lack of internationally comparable data has led researchers studying the global diffusion of the Internet to rely on statistics gathered country-by-country that often employ different measurements (for detailed accounts see Jordan, 2001, Norris, 2001). Meaningful comparison and knowledge accumulation are hindered by the lack of measurement comparability of data from different countries.

1. *The definition of the online population* often differs from country to country. While some countries focus on adult users, other countries include children and teenagers in the online population.

2. There is a lack of a *standard definition of who is an Internet user*. The frequency of Internet use and length of Internet experience are two important criteria for defining

who are Internet users. Again, different studies in different countries use different measures. Some generously embrace everyone who has ever accessed the Internet as a user while some more strictly count as users only those who use the Internet at least once a week. Similarly, the definition of "heavy users" varies widely between studies and nations.

3. To make things more complicated, some studies use households, and not individuals, as *the units of analysis*. In addition to hindering comparability, this masks how individual members within the household use the Internet.

To increase reliability and comparability, we primarily draw data from national representative surveys conducted by government agencies, scholarly researchers, and policy reports issued by international organizations such as the ITU (International Telecommunication Union), UNDP (The United Nations Development Programme), and OECD (Organization for Economic Co-operation and Development; see Table 2). In each country, we review the trend of Internet diffusion, and the extent of the digital divide in terms of socioeconomic status, gender, life stage, ethnicity, geographic location, place of accessing the Internet, and the social use of the Internet.

> Table 2 about here <

Internet Access and Use in Eight Countries

United States

The "Falling through the Net" series by the National Telecommunications and Information Administration (NTIA, 1995, 1998, 2000, 2002) provides a long-term view of how computers and the Internet have entered the everyday lives of Americans (15 years and older) between 1995 and 2002. In addition, the UCLA Internet Report Year Three provides recent data on the Internet access and use of Americans (12 years of age and over; UCLA, 2003). Furthermore, the Pew Internet and American Life surveys offer more fine-grained understanding of how Americans (18 years and older) use Internet-connected computers and the impact of these technologies on their lives.

In 2002, 169 million Americans were online, accounting for about 60 percent of the country's total population and 29 percent of the world's Internet population (Nielsen/NetRatings, 2003a). The online population is becoming more like the general population as many Americans have moved from becoming newcomers ("newbies") to the Internet and then veterans. However, the steady growth of Internet users has lost its momentum since late 2001, with the penetration rate hovering at above 60 percent. One possible reason might be that Internet dropouts offset newcomers to cyberspace (Lenhart et al., 2003). With the majority of the population online, the population of potential dropouts now exceeds the population of potential new adopters.

The digital divide is narrowing in the U.S., in terms of gender, age and geographic location. However, the sociodemographic divide is still wide. The April 2003 Pew report shows that younger, well-to-do, white, well-educated, urban and suburban Americans are still more likely to be on the Internet than older, less well-off, black and Hispanic, less educated, and rural Americans. Moreover, Internet users are more socially connected than non-users, have a stronger sense of efficacy (perceived control over one's life), and consume more media (including newspapers, TV, and mobile phone usage, etc.) than non-users (Lenhart, et al., 2003; Hampton and Wellman, 2003).

Internet Access

- *Socioeconomic Status:* Income has been the most important factor determining Internet access. For example, more than 60 percent of Americans with a household income of $35,000 or higher were online in 2000, whereas only 42 percent of those with a household income of less than $15,000 were online (NITA, 2000). In 2002, the share of American Internet users with a household income of less than $30,000 (18 percent) continued to be lower than its share in the general American population (28 percent). Moreover, those with a high school education or less made up merely five percent of the American online population but one quarter of non-users (Lenhart et al., 2003).

- *Gender:* The gender divide has been decreasing in the U.S. Although just 34 percent of American women were using the Internet by the end of 1998, 44 percent of them had become Internet users by August 2000 (ITU, 2003b). In 2002, 73 percent of American men and 69 percent American women were Internet users (UCLA, 2003).

- *Life Stage*: The "gray gap" remains. Younger Americans have the highest level of Internet access and use. More than 80 percent of Americans aged between 12 and 35 were using the Internet. By contrast, only 34 percent of Americans over 65 were online in 2002 (UCLA, 2003).

- *Ethnicity:* The racial/ethnic digital divide is pronounced in the U.S. Although 63 percent of Asian-Americans and 55 percent of white Americans were online in 2000, only 30 percent of blacks and 28 percent of Hispanic-Americans were online then (Fong et al., 2001). In 2003, only 8 percent of African-Americans were online despite being 11 percent of the population. The divide was much narrower for Hispanic-Americans: 9 percent were online, despite being 10 percent of the American population (Lenhart et al., 2003).

- *Geographic Location*: The geographic divide persists to some extent. Americans living in rural areas (42 percent) and central cities (44 percent) had substantially lower levels of Internet access than suburbanites (55 percent) in 2000, regardless of their socioeconomic statuses (Fong, et al., 2001). In 2002, 63 percent of suburbanites were using the Internet as compared to less than half of rural inhabitants (Lenhart et al., 2003).

When the digital divide occurs at the intersection of class, race/ethnicity, gender, and geographic location, it can come in mutually reinforcing ways. For example, the average

Internet penetration rate among high income Americans (annual household income of $75,000 or higher) reached 78 percent in 2000. Yet, within this affluent group, there was a 31-percentage point gap in Internet access in 2000 between those with a college education (82 percent) and those with less than a high school education (51 percent; NITA, 2000). Race/ethnicity further complicates the picture. Even at the same income levels, African-Americans are less likely than other racial/ethnic groups to be connected to the Internet (Lenhart et al., 2003). Although Asian-Americans as a racial/ethnic group have had a high Internet penetration rate, there has been a wide gender gap among Asian-Americans (58 percent male vs. 42 percent female users; Spooner, 2001).

Internet Use

American Internet users spent an average of 11 hours online every week in 2002. About 60 percent of American users used the Internet from home, up from one-fifth in 1995. Sixty-one percent of users considered the Internet as an important source of information (UCLA, 2003).

The Internet has become an important tool at many American workplaces, where emailing has become common. In 2002, sixty-two percent of all American employees had Internet access at work and 98 percent of those with such access used email on the job. About two-thirds of American workers with Internet access reported that email was the most effective way of arranging meetings, making appointments, and editing or reviewing documents (Fallows, 2002).

There are gender, age, and ethnic gaps in Internet use as well as in access. The ways in which Americans communicate online are associated with gendered styles of maintaining relationships offline (Boneva, et al., 2001, Kennedy, Wellman, and Klement, 2004). Women are more enthusiastic in emailing family members and friends than men, reflecting women's domestic role as the ones responsible for keeping contact with family and friends (Horrigan and Rainie, 2002). Furthermore, teenagers spend more time on the Internet than adults (Kraut, et, al., 1998).

Asian-Americans have been the heaviest Internet users of any racial/ethnic group and have the longest experience. They have been more likely than users in other ethnic groups to use the Internet for work-related reasons or school research (Spooner, 2002). By contrast, , African-American Internet users have spent less time on the Internet, initiated fewer sessions, and browsed fewer web pages (Nielsen/NetRatings, 2003b).

Language is a barrier that becomes salient after basic Internet access becomes available as people feel more comfortable surfing websites in their first language. For instance, Hispanic-American Internet users have been more likely to spend their online time in Spanish than in English (Greenspan, 2002).

United Kingdom

The British online population has grown quickly since the mid 1990s, from 3.4 million adults in 1996, 5.4 million in 1997, 9.4 million in 1998, 17.7 million in 1999, to 18.5 million in 2000 (Foley, 2000), 19 million in 2001 and 22 million in 2002 (U.K. Online Annual Report, 2002). In 2001 alone, the home computer penetration rate increased by 11 percent. Forty-five percent of British households were connected to the Internet in 2002, increasing from 38 percent in 2001. Forty-seven percent of British adults use the Internet regularly (defined as having used the Internet within the month prior to the survey).

Our review of the United Kingdom draws primarily from the U.K. Online Annual Report 2002 issued by the Office of the e-Envoy (part of the British Prime Minister's "Delivery and Reform" team based in the Cabinet Office, for details see http://www.e-envoy.gov.uk/Home/Homepage/fs/en), supplemented by academic research.

The British use a range of technologies to have access to the Internet, such as personal computers (PCs), digital TVs, mobile phones, and game consoles. Although the U.K. has the highest digital TV penetration rate in the world, the PC remains the dominant method of Internet connection. In October 2002, 99 percent of all users went online via computer, 11 percent via mobile phone, and 7 percent via digital TV (Office for National Statistics, 2002).

Internet Access

- *Socioeconomic Status:* Income is an important dimension of the digital divide in the U.K. As the Internet diffusion among high-incomers is reaching saturation, the income divide has been growing since 1998. The gap in Internet access between the highest and the lowest income groups has swelled from 29 percentage points in 1999, to 42 percentage points in 2000, 64 in 2001, and 69 percentage points in 2002 (U.K. Online Annual Report, 2002).

- *Gender:* The gender divide has been narrowing in the U.K. Sixty-one percent of British men and 55 percent of British women had access to the Internet in 2002 (U.K. Online Annual Report, 2002).

- *Life Stage:* While 89 percent of those aged between 16 and 24 were connected to the Internet in 2002, only 14 percent of people aged 65 or older were Internet users (U.K. Online Annual Report, 2002).

- *Geographic Location:* The more affluent parts of the U.K. – London, and the East and the South East of England – are the country's most wired regions. More than half of all households are connected to the Internet in these regions (U.K. Online Annual Report, 2002).

Internet Use

- *The Place of Internet Access and Use:* Internet access at public places such as schools, cybercafés, and public libraries play an important role in bridging the digital divide in the U.K. By 2002, 99 percent of all British schools were connected to the Internet. About 10 percent of all Internet users went online exclusively from public places. Furthermore, the share of users who access the Internet exclusively from public places has been increasing alongside the overall growth of the online population. (U.K. Online Annual Report, 2002).

- Besides emailing and finding information, the British use the Internet for online shopping (25 percent), downloading software (17 percent), and playing games (11 percent) (U.K. Online Annual Report, 2002).

- On average, British households with Internet access spent 9 hours online per week in 2002. There is a positive relationship between the length of Internet experience and the sophistication of Internet use. For instance, adult users with Internet experience of at least three years were three times more likely to shop online than those with less than one year of Internet experience (U.K. Online Annual Report, 2002). This probably reflects the experience and skills of early Internet adopters.

Germany

We use data from the ARD/ZDF-Online annual surveys from 1999 to 2002. ARD and ZDF are the country's major public television broadcasters and have conducted nationally representative surveys since 1997, targeting German Internet users aged 14 or older.

The Internet penetration rate has risen generally since the mid 1990s in Germany. Among the German population aged 14 and older, 7 percent used the Internet in 1997, 10 percent in 1998, and 18 percent in 1999 (van Eimeren et al., 2002). Unlike North America, there was a substantial gap in Germany between computer ownership and Internet use as late as 1999 when 45 percent of households in Germany owned a computer, but only about one-quarter of these households (11 percent of all households) were connected to the Internet (ITU, 2002a; Welling and Kubicek, 2000). Internet diffusion has accelerated since then. Twenty-nine percent of the German population was wired in 2000, 39 percent in 2001, and 44 percent in 2002 (van Eimeren et al., 2002).

The Internet is widely accessed in German public places. About 98 percent of schools in Germany were connected to the Internet in 2001, a dramatic increase from 15 percent in 1998. By 2000, all of the 1270 public libraries were connected and provided Internet access to the public. The number of college students majoring in computer science during 2001 (27,000) was more than twice as high as in 1997 (German Federal Government, 2001). The personal computer is the primary means of going online in Germany. For example, less than one percent of Internet users went online via Web TVs or PDAs (van Eimeren et al., 2002).

Internet Access

- *Socioeconomic Status:* German Internet users in the mid 90s were predominately male, young, employed, well-off, and well-educated. Early Internet adopters often have higher income and better education. Education is the deepest fault line of the digital divide in Germany. In 2000, 86 percent of Germans with a college or higher degree had Internet access, while only 8 percent of those with high school qualifications were online. Furthermore, the percentage of better-educated Internet users has been increasing faster than that of high school graduates. On average, users with a postsecondary education adopt the Internet 19 months earlier than those with high school or grammar school education (van Eimeren et al., 2001, 2002).

- *Gender:* There is a sizeable gender divide in Germany, with men are more likely to be Internet users. Moreover, even though more women have been gaining access to the Internet, the gender divide widened from 7 percentage points in 1997 (10 percent of men vs. 3 percent of women were online) to 18 percentage points in 2001(48 percent of men vs. 30 percent of women online). The growing gender divide was the result of significantly higher Internet diffusion among German men. In 2002, 53 percent of men and 36 percent of women were using the Internet, a continuing gap of 17 percentage points. Thus, the gender divide does not seem to be narrowing (van Eimeren et al., 2002).

- *Life Stage*: The rate of Internet access declines sharply with older age. In 1997, 73 percent of all Internet users in Germany were younger than 40. Even though the percentage of such younger adult Internet users dropped to 65 percent in 2002, the age divide has remained large. For example, only 5 percent of people aged 60 years or older accessed the Internet in 2002 (van Eimeren et al., 2002).

- *Geographic Location:* On average, users from the more developed former West Germany have five months more experience with the Internet than those living in the former East Germany (van Eimeren et al., 2002).

Internet Use

- For the great majority of Germans, the Internet is primarily a means of communicating and seeking information. In 2002, 81 percent of German Internet users sent and received emails, and 55 percent searched for information on the Web. In addition, 32 percent of wired Germans used the Internet for online banking, 23 percent for chatting and newsgroups, 15 percent for online games, and 13 percent for online auctions (van Eimeren et al., 2002).

- *Place of Internet Access and Use:* In the mid and late 1990s, Germans were more likely to use the Internet outside of their homes rather than from their homes. Even in early 2000, the number of Internet users who had access from outside of their homes was almost twice as high as those accessing the Internet from inside of their homes. However, more German users have gained home access since then. In 2002, 50 percent of Internet users accessed the Internet exclusively from home, while 34 percent had access at both home and at work (van Eimeren et al., 2002).

- *Length of Internet Experience:* The average German Internet user has been online for three years (van Eimeren et al., 2002).

Italy

There is little publicly published research about Internet access and use in Italy, especially that written in English. We have gleaned data on Italy from reports by international organizations such as the OECD or the World Economic Forum and have complemented them with academic publications.

Only five percent of Italian households had Internet access in 1998. The low Internet penetration rate is associated with low PC ownership. Yet, the situation is changing. Italians have been rapidly adopting PCs and the Internet since the late 1990s. In 2000, 31 percent of Italian households owned a PC, of which 60 percent were connected to the Internet. The Internet penetration rate increased by one-third in one year: from 14 percent (1999) to 21 percent (2000). It more than doubled in two years, reaching 33 percent (19 million) in 2001 (SMAU, 2001). Yet, Italy still has relatively low rates of PC and Internet penetration compared to other western European nations (OECD, 2002; World Economic Forum, 2002).

By contrast, mobile phones are very popular in Italy. Sixty-five percent of Italians (43 million) were subscribers of mobile phone services in 2000, well above the European average of 58 percent (ITU, 2001). The upward trend has continued towards ubiquitous mobile phone access.

Cultural idiosyncrasy is a possible reason for low Internet use and high mobile phone use. "Italy is a country in which personal relationships form the cornerstone of life and its daily transactions. The Internet is a global communication network for both individuals and business, where the personal loses its priority…the anonymity of the Internet would render them almost powerless and be counter to their culture" (Leo and Gabriele, 2000). However, no systematic evidence has been produced to assess this assertion.

There are other possible explanations. A Bank of Italy survey in 2000 suggested that lack of computer skills has slowed Internet diffusion. About half of young Italians between the ages of 14 and 30 claimed that they do not know how to use a computer. Even among Italians with a university degree, 25 percent reported that they did not know how to use a computer, while 40 percent did not use computers at work (Frey, 2002). In addition, less than one third of Italians understood English, the predominant language of the Web (Leo and Gabriele, 2000).

Internet Access

- *Socioeconomic Status:* The Bank of Italy survey in 2000 suggested that there was a deep socioeconomic digital divide. In 2000, 62 percent of households with a university-educated family head had a computer, and 59 percent of the Italian households used the Internet (Frey, 2002). However, PC ownership and Internet penetration rates are dramatically lower for those with less education. Only seven percent of those households whose family heads

had "primary level" education owned a computer, while only four percent of these less-educated family heads used the Internet in the past year (Frey, 2002). In 2001, 63 percent of all users had a secondary education or higher, while about one third of Italian Internet users were students (SMAU, 2001). Of course, while these data are reported in terms of education, different levels of educational are associated with differences in income, wealth, employment status, and occupational level.

- *Gender:* Italian women made up 37 percent of all Internet users in the country in 1999, a higher percentage than the European average (Leo and Gabriele, 2000). Yet, the gender gap increased in 2001 as the share of female users declined to 32 percent. The gender gap varies with the place of Internet access. Although male users are dominant both at home and at public places, the share of female Internet users is 10 percentage points higher in public places than at home (SMAU, 2001).

- *Life Stage*: The rates for ownership of PC and Internet access among older Italians was substantially lower than for younger Italians. For instance, in 2000, about 5 percent of Italian households with a family head older than 65 owned a PC and 3 percent had Internet access. By contrast, about 40 percent of households with a family head aged between 31 and 50 had a computer and about 30 percent of such middle-aged households had used the Internet in 2000 (Frey, 2002).

- *Geographic Location*: There is a gap in Internet access between the more developed and affluent northern part of the country and the south. Northern Italy leads the south by 16 percentage points, both in PC ownership and Internet access (Frey, 2002). According to Fortunati and Manganeli (2002), Internet access was more widespread in north-central Italy where about one quarter of the people used the Internet at least several times a year.

Internet Use

In 1999, 91 percent of Italian Internet users used the Internet for information seeking, and 72 percent used it for email (Leo and Gabriele, 2000).

Italians primarily use the Internet from home. The percentage of home access increased slightly from 61 percent in 1999 to 68 percent in 2001, while the share of public access decreased from 27 percent to 21 percent during the same period (SMAU, 2001). The symmetry of this shift suggests that as people become more involved with the Internet (and prices decrease), there is a move from public use to private, domestic use.

Japan

The percentage of Japanese households owning PCs increased 2.6 times in six years, from 1996 to 2002. About 22 percent of Japanese households owned a PC in 1996, 29 percent in 1997, 33 percent in 1998, 38 percent in 1999, 51 percent in 2000, and 58 percent in 2001 (MPHPT, 2002).

However, as in Italy and Mexico, there has been a gap between PC access and Internet access. The diffusion of the Internet, especially the PC-based Internet, started relatively late in Japan. For instance, while 40 percent of American households were online in 1999, only 12 percent of Japanese households were online that year (Dewey Ballantine and Cyberworks Japan, 2001). The number of Internet users (6 years and older) was 12 million in 1997, 17 million in 1998, 27 million in 1999, 47 million in 2000, 56 million in 2001, and 69.4 million in 2002 (MPHPT, 2002, 2003).

The high rate of mobile phone use in Japan may explain the gap between the high rate of PC use and the relatively low rate of PC-based Internet use. Japan is a world leader in the use of mobile phones to access the Internet (Miyata, et al., 2004). In 1996, 25 percent of Japanese households had a mobile phone. The percentage tripled in four years, increasing to 46 percent in 1997, 58 percent in 1998, and 64 percent in 1999. It reached 75 percent in 2000 and remained at this level in 2001(MPHPT, 2002). When NTT DoCoMo launched its mobile Internet service in February 1999, the number of subscribers skyrocketed from zero to 20 million in just 18 months (Dewey Ballantine and Cyberworks Japan, 2001). The ownership of Internet-capable mobile phones among Japanese households jumped from 9 percent in 1999, to 27 percent in 2000, and reached 30 percent in 2001 (MPHPT, 2002).

Among Japanese who are 12 years or older and connected to the Internet, 85 percent access the Internet through PCs, 63 percent through mobile phones, and 5 percent through other technologies (World Internet Project Japan, 2002). Although the share of users accessing the Internet via PCs remained the same from 2000 to 2001, the share of users accessing the Internet through mobile phones soared during this same period. In 2002, 83 percent of Japanese mobile phone users (62 million people) were mobile Internet subscribers (MPHPT, 2003).

Internet Access

- *Socioeconomic Status:* The higher the household income, the greater the likelihood of Japanese residents accessing the Internet through PCs or mobile phones. In 2001, about 50 percent households with an income of 8 million yen (approximately US $70,000) or higher had access to the Internet, while about one quarter of those households with an income under 2 million yen (approximately US $17,500) were connected, indicating an income gap of 25 percent points. However, the income divide shrank rapidly to less than 20 percentage points in 2002 (MPHPT, 2003). In all income groups, the PC-based digital divide was bigger than the gap in mobile Internet use. Internet use is also positively associated with education, although the educational divide has narrowed slightly over the years. For instance, the gap between university graduates and college graduates was diminishing in 2002. Yet, Japanese with high school or lower education continue to have much less Internet access (World Internet Project Japan, 2002).

- *Gender:* Overall, 68 percent of Japanese men and 56 percent of Japanese women were Internet users in 2002. There was a slight decrease in the gender gap of Internet access between 2001 and 2002 (MPHPT, 2003). Although men are ahead of women in terms of access to both PC-based and mobile Internet, the gender gap for mobile Internet users is

slightly smaller the gap for PC Internet users (FY 2001 White Paper on Telecommunications in Japan, cited by Digital Opportunity Site, 2001). The gender gap is reversed among young Japanese aged between 19 and 24. There are more female users than male users, because many young women are using mobile phones to access the Internet (World Internet Project Japan, 2002).

- *Life Stage*: Japan has a sizeable generational divide in Internet use. Young Japanese in their twenties were 30 times more likely than people in their seventies to be connected to the Internet in 2001. Japanese in their twenties had the highest rate of Internet access in 2001: about 80 percent had access to the Internet with 48 percent through PCs and 53 percent via mobile phones. By contrast, only 15 percent of people in their sixties were using the Internet, with the majority accessing the Internet exclusively via PCs. At the other end of the age spectrum, the mobile Internet was embraced by 53 percent of Japanese teenagers, while only 30 percent of them accessed the Internet through PCs (World Internet Project Japan, 2002).

- *Geographic Location:* In Japan, the percentage of home access via PCs declines with the size of the city. Major cities have higher Internet penetration rates than smaller cities, followed by towns and villages. However, the digital divide in terms of city size dropped 2 percentage points between 2001 and 2002 (MPHPT, 2003). The proliferation of mobile Internet use may also be shrinking the city-size divide. For example, in 2000, residents in smaller cities were slightly more likely to access the Internet via mobile phones than those in major cities (17.3 percent and 16.8 percent, respectively) (FY 2001 White Paper on Telecommunications in Japan, cited by Digital Opportunity Site, 2001).

Internet Use

A random sample survey in Yamanashi prefecture in 2002 found that the use of PC-based and mobile Internet varied by age and gender (Miyata et al., 2004). Compared to users connecting to the Internet via personal computers, those who connect via mobile phones tend to come from a different group with different sociodemographic profiles. PC-based Internet users are more likely to be male, older and better educated, while mobile Internet users are more likely to be female, younger and less educated (World Internet Project Japan, 2002).

By 2002, 77 percent of all Japanese Internet users were accessing the Internet through mobile phones, either as their only access point or as complements to PC-based access. Mobile Internet use is not so very mobile. People most use their mobile phones from home to access the Internet: 63 percent, with an average of 88 minutes per week. The amount of email exchanged by mobile phone (26 emails per week) is 6 times higher than by PC. Mobile Internet is not only used for emailing but also for accessing websites, including search sites, weather forecasts, and "transportation/travel course/maps" (World Internet Project Japan, 2002; see also Ito and Daisuke, 2003; Ito, 2004; Miyata, et al., 2004).

Japanese differ in the ways in which they use the PCs and mobile phones to exchange email and surf the web. Twenty-nine percent of Japanese users email through PC-based

Internet. The use of email through PC-based Internet is the highest among those with at least a university education. However, the average number of emails sent on PC-based Internet is less than 4 per week. The most frequent email correspondents are "friends who seldom meet" (37 percent), or coworkers (16 percent). By contrast to PC-based Internet, email through mobile Internet was most frequently exchanged among "friends who one often meets" or family members. Hence, the World Internet Project Japan (2002) has concluded that "email is not a replacement of face-to-face communication, but has a strong supplementary role to communication" (p.50; see also Miyata, et al, 2004).

Korea

From 1998 to 1999 the number of Internet users in Korea (defined as users over 7 years old using the Internet at least once a month) increased threefold, jumping from 3 million to 11 million. By 2001, 57 percent of Koreans over 7 years old (24 million) were online (Soe, 2002). The number of Internet users continued to grow to 26 million by June 2002, nearly 9 times greater than five years ago. There were also 27 million mobile Internet subscribers in Korea in June 2002, although many of them presumably also had PC-based access.

The penetration rate of PCs has been increasing markedly since the mid 1990s, from 21 percent in 1994 to 52 percent in 1999. Two thirds of Korean households owned a PC in 2000 and four-fifths in 2001 (Park, 2001).

It is not just use that has skyrocketed. Korea recently became the world leader in broadband Internet access, with 14 broadband subscribers per 100 inhabitants in June 2001 (Yun et al., 2002). While only 14,000 Korean households had a broadband connection in 1998, 8.7 million of them were enjoying broadband connections by 2002 (National Computerization Agency, 2002).

Nevertheless, the lack of computer skills has been a barrier to Internet diffusion in Korea. According to the National Statistical Office in Korea, 60 percent of all Koreans were computer illiterate in 1997. Another national survey in 2000 reported that 46 percent Koreans lacked the necessary computer skills to surf the web. In particular, a disproportionate share of women, older people, people with low education, and blue-collar workers had insufficient or no computer skills (Park, 2001). The high rate of current Internet use suggests that this skills gap has markedly lessened in recent years. This implies that computer skills can be taught quickly and informally.

Internet Access

- *Socioeconomic Status:* Despite the proliferation of Internet use, the income divide in Korea has been widening since 1999. While 70 percent of Koreans with a monthly income higher than 2.5 million won (approximately US $2,000) were connected in 2001, only 37 percent of those with a monthly income less than 1.5 million won (approximately US $1,250) were connected. Moreover, there has been a growing educational divide in Internet access and use. The divide between those with a college degree or higher and those with a high school

degree has grown from 28 percentage points in 1999 to 40 percentage points in 2001. The gap between college graduates and upper middle school graduates increased even more during the same period, from 37 to 65 percentage points (Soe, 2002).

- *Gender:* Korean men are more likely than women to use the Internet. While half of Korean men had already been online by the end of 2000, only 39 percent of women were online at that time. Korean women have been making progress, as more than half of them were connected to the Internet by the end of 2002. However, as more Korean men have also been going online, the gender gap has lingered at 12 to 14 percentage points since 2000 (National Computerization Agency, 2002).

- *Life Stage*: There is a clear and growing age divide between younger and older Koreans because young Koreans have embraced the Internet at a high rate. The already-large divide between the age group of 7 to 19 and the age group of over 50 has been widening rapidly: from 40 percentage points in 1999, to 70 in 2000, and 84 in 2001 (Soe, 2002).

- *Geographic Location:* Internet diffusion is uneven among different regions. The capital city of Seoul, the most wired area in the country, has an Internet penetration rate that is at least 10 percentage points higher than any other region in Korea. However, the gap between metropolitan and non-metropolitan areas has narrowed as the government has fostered broadband connectivity in most of the country (Soe, 2002).

Internet Use

- *Place of Internet Access and Use:* Home is the primary place where Koreans access the Internet, followed by workplaces, cybercafés and schools. Internet cafés are popular access points. Cafés are more attractive than schools to young Koreans under 30 because they are places where many users sit side-by-side playing online games at high speeds (Soe, 2002).

- The most frequent activities Koreans carry out online are information seeking, emailing, gaming, browsing newspapers and magazines, shopping, and making reservations. Young Koreans, aged 7 to 19, use the Internet for playing games more than for any other purpose. By contrast, users over 50 years old are more likely to use the Internet for online banking, or browsing newspapers and magazines (Soe, 2002).

- The expansion of broadband connections has profoundly affected the pattern of Internet use in Korea. Koreans are the heaviest Internet users worldwide, spending more than twice as much time online as American users (Yun et al., 2002). Korean time spent online is correlated with education, gender and age. In 2001, well-educated Korean Internet users (with a college degree or higher) spent 5 more hours per week than those with an elementary school education or less. Men spent 3 hours more per week than women on the Web. Moreover, users in their twenties are the heaviest users of the Internet, spending an average of 16 hours per week on the Internet. Yet, once online, older Koreans aged 60 or older also spent a considerable amount of time (9 hours per week) on the Internet (National Statistical Office, 2002).

- The high penetration of broadband connections enabled 71 percent of Korean users to enjoy streaming audio and 54 percent to play online games in 2001 (Yun et al., 2002). The National Computerization Agency recently reported that half of Korean Internet users "are actively involved in cyber community activities, proving the existence of a newly formed networked culture" (2002, p.6).

China

China Internet Network Information Center (CNNIC) has conducted semi-annual surveys on Chinese computer and Internet users since 1997. Our review is primarily based on the CNNIC's semi-annual report published in January of 2003 that defines Internet users as Chinese citizens who use the Internet an average of at least one hour per week. Survey respondents included both adults and those below 18 years old (CNNIC, 2003).

China is a relatively late starter in the Internet race but has been catching up quickly. Because of the large population of China, the low penetration rate of less than 5 percent provides both a great many users and much room for growth. There has been a dramatic increase in Internet users, from 620,000 in 1997, to 22.5 million in 2001, and about 60 million in 2003 (CNNIC, 2003). The number of Internet-connected computers has increased from about 0.3 million in 1997 to 12 million in 2002. China's Internet population probably ranks second in the world and is growing rapidly. "It's going to be the largest Internet market in the world," says Safa Rashtchy, analyst at US Bancorp (quoted in Waters, 2003, p. 17). However, another analyst warns, "a lot of people are wondering if it's a bubble" (Dickie, 2003, p. 18).

Internet Access

- *Socioeconomic Status:* Chinese Internet users are much better educated than the general population. In 2003, 57 percent of Internet users have at least a college level education, while an additional 31 percent of users have a high school degree. The digital divide in terms of education is striking as 14 percent of the Chinese population aged 15 and above have a high school degree, while less than 5 percent have an education of college or higher (China National Statistics Bureau, 2002). Forty-four percent of Internet users have a monthly income of less than 1000 Yuan (about US $125) and an additional 17 percent have no income. Yet, income has an impact on the Chinese digital divide, although its significance is distorted by the 28 percent of Chinese Internet users who are (often lower-income) students going online at universities and schools.

- *Gender:* There is somewhat of a gender gap in China, although the percentage of female users has steadily climbed from 13 percent in 1997 to 41 percent in 2003. The predominance of male users is also reflected in the gendered diffusion rate in the general population: 5.3 percent of the male population is online, as compared to 3.9 percent of the female population. However, the digital divide in terms of gender has closed rapidly. The online gender gap has decreased from a highly male ratio of 7:1 in 1997 to 1.6:1 in 2002.

- *Life Stage*: Younger Chinese form the majority of Internet users in the country. In 2003, people aged 50 or older made up only 3.7 percent of all Internet users, while about two-thirds of users were younger than 35. However, the age divide is narrowing, as young Chinese under 35 years old accounted for an even higher percentage of all Internet users, about four-fifths, just one year prior in 2002.

- *Geographic Location:* As a result of the different levels of socioeconomic development between the richer east coast region and the poorer hinterland, the regional distribution of Internet access is uneven. The regional divide continues to be large, but is shrinking. The share of Internet users from the more developed areas of Beijing, Shanghai, and the province of Guangdong decreased from 30 percent in 2002 to 23 percent in 2003 (CNNIC, 2003). There is an enormous divide between urban and rural areas. Peasants, accounting for approximately 80 percent of the Chinese population, make up only 1 percent of all Internet users in the country (CNNIC, 2002).

Internet Use

- On average, Chinese users spend about 10 hours a week on the Web in 2003, although many users do not go online every day. Chinese use the Internet for a variety of activities, including seeking information (53 percent of users), entertainment (25 percent), romance/friendship (7 percent), and study/research (5 percent). The most used online services are email (93 percent), search engines (68 percent), chat (45 percent), downloading and uploading documents (45 percent), and newsgroups (21 percent). Eighty-one percent of the information browsed on the web is in the Chinese language. Most Chinese Internet users report that the Internet plays a positive role in their everyday lives: Seventy-three percent of users feel that the Internet is helpful or very helpful for study, 67 percent for work, and 61 percent in daily life.

- *Place of Internet Access and Use:* Chinese Internet users are more likely to access the Internet from public places than are users from developed countries. A sizeable minority of users goes online at public places: 20 percent from schools and 19 percent from cybercafés. In addition, 63 percent of Chinese Internet users access the Internet from home while 43 percent access it from work (CNNIC, 2003). We caution that there is some double counting in these statistics for people accessing the Internet in more than one place.

Mexico

From a global perspective, Latin America has had low rates of computer and Internet penetration. For example, Finland, with a population of about 5 million, has more Internet hosts than all Latin American countries together (World Economic Forum, 2002).

Unlike developed countries, a much higher percentage of the population has a computer than has Internet access. For example, at the start of the Internet era in 1994, although nearly 5 percent of the Mexican population owned a PC (Gallegos, et al., 2001), only 0.04 percent of the population accessed the Internet. Since then, Mexicans have adopted the Internet rapidly. The

penetration rate reached the 1 percent mark in 1998 (Thomasson et al., 2002, Scheel, 2002) and increased to 2.6 percent in 1999 (Schulz, 2002). It continued to grow to 2.8 percent (2.7 million) in 2000 and 3.7 percent (3.6 million) in 2001. The number of Internet users reached 4.7 million in 2002 (Servicios de Telecomunicaciones, 2003).

Mexico has lagged behind the Internet diffusion of other OECD countries. There were only 5 hosts per 1000 inhabitants in Mexico in 2001, in contrast to the OECD average of 101 hosts per 1000 inhabitants (OECD, 2002). Even compared to other major Latin American countries, the Internet penetration rate in Mexico was lower in 2001 than the rates for Chile (20 percent), Argentina (8 percent), and Brazil (5 percent) (E-Marketer, 2002).

The low Internet penetration rate has been attributed to widespread poverty and the underdevelopment of the telecommunications infrastructure. Mexico has the lowest penetration of telephone lines (12 percent of households in 2000) among countries at about the same level of development.

Mobile telephony has grown faster than the Internet in Mexico, reaching more than 13 million subscribers in 2001 (Scheel, 2002). Mexico has the second highest penetration of Web-enabled mobile phones (10 percent) after Chile among all Latin American countries (NUA, 2001a). Yet, mobile phones provide slow Internet access, especially for businesses.

Internet Access

- *Socioeconomic Status:* Although "there is no reliable quantitative data on the distribution of Internet access within Mexico" (Schulz, 2002, p. 13), there is reason to believe that current Internet users tend to be elites. For instance, in 1997, 90 percent of all Latin American users were from the upper-middle class with high socioeconomic status, while 80 percent of users were fluent in English (Rodríguez-Alvez, 1999). Furthermore, Telmex, the largest telecommunications provider in the country, charged a monthly connection fee of US $120 in 1997/1998 (Rodríguez-Alvez, 1999). Although rates have dropped substantially since then, most Mexicans still cannot afford current costs. In addition, even if technological access were available, almost 9 percent of Mexican adults (older than 15) would not use the Internet due to the lack of basic literacy (Schulz, 2002).

- *Gender:* There is not much of a gender divide. Forty-two percent of Internet users in Mexico were women in 2002.

- *Life Stage:* There is a significant age divide. Younger Mexicans make up the majority of Internet users in the country. In 2001, 67 percent of wired Mexicans were younger than 35 (NUA, 2001b).

- *Ethnicity and Language:* Although no data on the Internet diffusion among different ethnic groups has been identified, the "definite racial hierarchy," with white Mexicans at the top and the indigenous people at the bottom (Rodríguez-Alvez, 1999), suggests that there may be an ethnic divide.

- *Geographic Location:* There is a substantial geographical divide. This starts with the infrastructure: The distribution of telephone lines in Mexico is uneven, ranging from 3.5 lines per 100 inhabitants in Chiapas to 33 lines in the Mexico City Federal District in 2000 (Villar and Casanueva, 2002). Although there is much mobile telephone use in Mexico, connections are too expensive and slow for widespread Internet access. As the majority of Mexican users rely on fixed telephone lines and modems to connect to the Internet, access is uneven among regions. There is a large digital divide between urban city dwellers and rural peasants. Mexico City "continues to monopolize Mexico's economic, political, cultural, and financial essence" (Gallegos et al., 2001). Consequently, Mexican Internet users are concentrated in three population centers: the center (Mexico City and metropolitan cities like Toluca, Puebla, and Pachua), the Guadalajara area, and Monterrey (Scheel, 2002).

Internet Use

There is little systematic information on how Mexican users use the Internet. As is the situation in much of Latin America, personal use of the Internet in Mexico lags behind organizational use because institutions are more likely to afford the cost of telephone lines and computers (Smith, 1998). Accordingly, "of the 45% household that had at least one member with exposure to the Internet, roughly half of them learned to use it at school, a quarter at work, some 7% at home, leaving about 18% for all other sites" (INGEI, 2002, cited by Schulz, 2002, p.17).

Conclusions and Implications

The Multifaceted Nature of the Digital Divide

Fundamentally, the digital divide is about the gap between individuals and societies that have the resources to participate in the information era and those that do not. This digital divide remains real worldwide. While we caution once again that the lack of standardized measurements and definitions weakens the precision and comparability of all statistics, our international comparative study clearly suggests that the uneven diffusion and use of the Internet are shaped by – and are shaping – social inequalities.

Digital divides occur at the intersection of international and intranational socioeconomic, technological and linguistic differences. Telecommunications policies, infrastructures, and education are prerequisites for marginalized communities to participate in the information age. High costs, English language dominance, the lack of relevant content, and the lack of technological support are barriers for disadvantaged communities using computers and the Internet. For instance, while about one-half of the world's Internet users are native English speakers, about three-quarters of all websites are in English (World Economic Forum, 2002).

The diffusion of Internet use in developed countries may be slowing and even stalling. Currently, Internet penetration rates are not climbing in several of the developed countries with the most penetration. Compared to the explosive growth of Internet access and use in the past decade, this is a new phenomenon. It is too soon to tell if this is a true leveling-off of the penetration rate or a short-term fluctuation as Internet use continues its climb to triumphant ubiquity.

The digital divide between first-movers and latecomers among developed countries is narrowing. Countries such as Germany, Korea and Japan have caught up to the level of Internet connectivity in the U.S. (see Table 3, column 2 and 4). In some ways, the Internet is expanding in developed countries in similar ways to its expansion in the U.S., although with a time lag (Bazar and Boalch, 1997). For example, the demographic profile of users in developed countries looks roughly similar to that of American Internet users a half-decade earlier: young, well-educated men.

> Table 3 about here <

The nature of the digital divide varies between countries. Although all sorts of digital divides are narrowing in the United States, this is not true for other developed (or developing) countries. Different sorts of social structures, demographics, political policies, and technological dynamics influence the use and the impact of the Internet in different countries. For instance, Japan is leading the development of mobile Internet, and Korea is the world leader of broadband connections. Although most countries lag behind the U.S. in PC-based Internet use, they are quickly adopting mobile phones.

The digital divide remains substantial between developed and developing countries. The digital divide reflects the broader context of international social and economic relations: a center-periphery order marked by American predominance. There are large disparities of Internet access between affluent nations at the core of the Internet-based global network and poor countries at the periphery that lack the skills, resources, and infrastructure to log on the information era. For instance, Italy has the lowest rate of Internet penetration among the developed countries reviewed in the study. Yet, it is seven times as high as China's and nine times as high as Mexico's. The average Internet penetration rate in developed countries was 30 percent in 2001, ten times as high as that in the developing nations (ITU, 2003b, International Labor Office, 2001). The penetration rate is higher now, with many developed countries in the 60-70 percent range.

The digital divide can widen even as the number and percentage of Internet users increases. The widening of the divide can happen when the newcomers to the Internet are demographically similar to those already on. For example, while more poorer and less-educated people are accessing the Internet, the rate of increased access is higher among the more affluent and better-educated segments of society in developing countries To take another example, if men come to the Internet at a higher rate, the gender divide will grow. This is what has happened in Italy where the percentage of female Internet users deceased between 1999 and 2001 even as the number of female users increased.

The digital divide is wide and deep in developing countries. It is wide in the sense that only a small percentage of the population uses the Internet, and deep in the sense that the consequences for not being online may be greater when moving beyond a subsistence level. There are stark contrasts in the developing world between those connected to the Internet and those who are even more on the periphery. Those with Internet access are much more likely to be living in major urban centers, and to have more education and income. They are better connected to developed countries culturally and economically, and of course, the Internet increases their connectivity.

To be sure, the sizeable populations of some developing countries – such as China and India – mean that there are different impacts of the percentage and the absolute number of people accessing the Internet. China already has the second largest population of Internet users, despite its low percentage of users. This sizeable population of users will be catered to – witness the proliferation of Mandarin-language websites – and can have an impact on the future development of the Internet.

The digital divide has profound impacts on the continuation of social inequality. People, social groups and nations on the wrong side of the digital divide can be excluded from the knowledge economy. If pre-existing inequalities deter people from using computers and the Internet, these inequalities may increase as the Internet becomes more consequential for getting jobs, seeking information, and engaging in civic and entrepreneurial activities.

There are multiple digital divides, not just a single digital divide. Moreover, some of these divides are widening in some countries. Across the eight countries studied, socioeconomic status, gender, life stage, and geographic location significantly affect people's access to and use of the Internet (as summarized in Table 4 and Figure 1).

> Table 4 about here <

> Figure 1 about here <

- *Socioeconomic status: Internet users are more likely to be better off and better educated than non-users in all eight countries surveyed.* In general, the lower the Internet penetration rate in a country, the more elite the online population (see also Chen, Boase, and Wellman, 2002). Although the socioeconomic divide is narrowing in the U.S. and Japan, the digital divide elsewhere seems to be widening along the lines of income and education. (Table 4, column 2).

- *Gender: Men are more likely than women to access and use the Internet.* With the exception of the U.S., the share of female Internet users is lower than their share in the general population in each of the countries surveyed. Yet, this gender divide is narrowing, except in Germany and Italy, and sometimes the divide is small (Table 4, column 3).

- *Life stage: In both developed and developing countries, the Internet penetration rate among younger people is substantially higher than that among older people.* In general, the life stage divide is declining in most countries, except for Korea. Students who go online

via school connections make up a large share of Internet users in developing countries (Table 4, column 4).

● *Geographic location: Geographic location affects access to and use of the Internet.* Richer regions have higher Internet penetration rates than poorer ones. Except for Mexico, the overall trend across the eight countries shows a narrowing, yet persistent, digital divide in terms of geographic location (Table 4, column 5).

As shown in Figure 1, the digital divide has diverse manifestations along these fault lines. For instance, the gender divide is especially wide in Germany and Italy: The percentage of female Internet users is lower than in all other countries reviewed in this chapter – not only in the developed countries but also in China and Mexico (Table 3, last column). Moreover, the intersection of socioeconomic status, gender, age, language, and geographic location tend to increase the digital divide in mutually reinforcing ways within, and between, countries. The largest gap is between (a) better-educated, affluent, younger, English speaking men in developed cities and (b) less-educated, poor, older, non-English speaking women in underdeveloped rural areas.

Bridging the Digital Divide

The Need for Nuanced Understanding and Action: As the diffusion of the Internet is global, important and ongoing, understanding the causes and the impacts of the multiple digital divides has substantial policy implications. Such understanding can provide practical information for decision making: both for targeting market segments with different social and economic backgrounds in different parts of the world, and for building public-NGO-private partnerships for bridging the digital divide. Governments, private sectors, and NGOs have initiated and sponsored numerous programs to bridge the digital divide through Internet connectivity in public places such as schools, community centers, and public libraries. To do this properly, there is a need to evaluate systematically the impacts of such programs, going beyond merely documenting that X percent of group Y in country Z are now connected. A simple commitment to "close the digital divide" will not do. This is not simple, but simplistic. There is no one digital divide.

It is clear that without intervention, the global digital divide will take many years to close within developing countries and between the developing and the developed world. Indeed, the divide may never close. To turn the global digital divide into digital dividends for most people in less developed countries will be a long way with many bumps on the road. Telecommunications policies, infrastructures, as well as education and technology training – in particular the spread of digital literacy – are prerequisites for the transition to the knowledge-based network society. There cannot be access without connectivity. In developing countries, bridging the digital divide requires infrastructure, social capital, and human capital: phone lines, electric lines, Internet networks, computers, affordable publicly-available Internet sites, repair shops, appropriate software and hardware, formal mentoring in knowledgeable use, informal assistance from friends and neighbors, and the narrowing of fundamental social gaps (gender,

socioeconomic status, etc.).In developed countries, bridging the digital divide requires appropriate software, mentoring in knowledge use, assistance from friends and neighbors, and the narrowing of fundamental social gaps (gender, socioeconomic status, etc.).

Government Policies and Enhanced Institutional Arrangements are essential for the transition to the knowledge society. Besides economic wealth, the presence of an appropriate telecommunication policy is the most salient predictor of the variation in the level of Internet connectivity among OECD countries (Hargittai, 1999). For example, the increasingly deregulated telecommunication market in the European Union has led to a substantial decline in access cost and a sharp rise in Internet users. Clearly-defined national strategies promoting the development of the Internet and other ICTs – as in the U.K., Japan, or Korea – accelerate the diffusion of Internet use through government sponsored projects, especially connecting public schools and libraries. Government policies explain at least partially why some less developed countries are going ahead while others are being left behind.

Exploring the Multiplicity of Information and Communication Technologies: Besides the Internet, there are other information and communications technologies, each with different social affordances. Mobile phones diffuse faster than the Internet in many countries (ITU, 2002b). The widespread use of mobile phones suggests that there are alternative routes to getting connected. Broader strata of the population can use mobile phones because they are not as demanding as computers and the PC-based Internet in terms of cost and skills. Mobile phones not only bring convenience and pleasure to urban youth in rich countries, they also provide practical information at low cost to people in remote villages in poor countries, even if they are illiterate and might not be able to come to terms with the technological proficiency required by the PC-based Internet.

Promoting Internet Access at Public Places: The diffusion of the Internet begins with educational and research organizations. It gains momentum when businesses such as commercial ISPs enter the arena, diffusing the Internet beyond ivory towers. There are alternatives to the current mainstream paradigm of individual and organizational computer ownership and home Internet access. The dearth of money, good phone lines, and knowledgeable peers in many less developed countries suggests that public access locations can be a relatively low-cost and powerful means for increasing Internet access and use. These could either be publicly owned (libraries, community centers, etc.) or private entrepreneurial storefronts (cybercafés, Internet cabins). Increasing Internet connectivity in public places would effectively improve the Internet access and use of those who cannot afford computers and the Internet at home or workplace. This is especially true outside the U.S. and most importantly in developing countries (Boase, et al., 2003). For instance, about 4 percent of U.S. Internet users go online in public places (Fallows, 2002). By contrast, more than one-quarter of Chinese Internet users are university students who primarily go online at campus computer labs (CNNIC, 2002). However, once many Chinese – and other poor – students graduate, they can lose access.

Training and Assisting: Taking into account local information needs and providing basic training are keys to successfully narrowing the digital divide in formerly isolated communities, and empowering their disadvantaged members (Lindgaard, 2002). Community facilities play an important role in providing technological training and mentoring that are crucial to bridging the skills divide. Some of these facilities go beyond providing computers and basic training. For example, Intel has sponsored a computer Clubhouse Network that helps poor urban youth develop more advanced knowledge with hardware and software. Through this program, minority youths get the opportunity to nurture their creativity by designing game programs (Marriott, 2002). To turn the digital divide into digital dividends, the first step would be the identification of community needs for computers, the Internet and other ICTs, especially among under-served communities.

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Tables and Figures

Table 1: An Integrative Framework for the Digital Divide

Access	Use
Technological Access	**Technological Literacy**
➢ ICT infrastructure ➢ Hardware, software, bandwidth	➢ Technological skills ➢ Social and cognitive skills
Social Access	**Social Use**
➢ Affordability ➢ Awareness ➢ Language ➢ Content/Usability ➢ Location	➢ Information seeking ➢ Resource mobilization ➢ Social movements ➢ Civic engagement ➢ Social inclusion

Table 2: Source of Data for Each Country

Country	Data Source
U.S.	➢ NITA 1995, 1998, 2000, 2002 ➢ UCLA Internet Report, 2001-2003 ➢ Pew Internet and American Life Studies
U.K.	➢ U.K. Online Annual Report ,2002
Germany	➢ ARD/ZDF-Online surveys ,1999-2002
Italy	➢ OECD and the World Economic Forum ➢ Supplemented by scholarly research
Japan	➢ Japanese Statistics Bureau, MPHPA (Ministry of Public Management, Home Affairs) ➢ World Internet Project Japan, 2002
South Korea	➢ National Computerization Agency, 2002 ➢ National Statistical Office ➢ Supplemented by scholarly research
China	➢ CNNIC, 1997-2003
Mexico	➢ World Economic Forum, 2002 ➢ OECD, 2002 ➢ NUA ➢ Supplemented by scholarly research

Table 3: Number and Percentage of Population Online in the Eight Countries

Country	Number of population online in 2002 (millions, month)[a]	Percent of population online in 2002[a]	Number of population online in 2001 (millions)[b]	Percent of population online in 2001[b]	Number of PC Users in 2001 (millions)[b]	Percent of female users in population online 2002[b]
U.S.	166 (Apr)	59	143	50	178	51 (2001)
U.K.	34 (Sept)	57	24	40	22	43 (2001)
S. Korea	26 (July)	54	24	52	12	45
Japan	56 (June)	44	56	44	44	41 (2001)
Germany	32 (Aug)	39	31	37	32	37 (2001)
Italy	19(Aug, 2001)	33(Aug, 2001)	16	28	11	37 (2001)
China	58 (Dec)	4.8	34	2.5	25	39
Mexico	Not Available	Not Available	3.6	3.6	7	42

Sources: [a]: NUA, http://www.nua.ie/surveys/how_many_online/, 2003; [b] ITU, 2002b

Table 4: Summary of Internet Access in the Eight Countries

Country	Socioeconomic Status	Gender	Life Stage	Geographic Location
U.S.	Declining yet persistent	51% of Internet users are female. However, the Internet penetration rate among men is still higher than that among women.	Declining yet persistent	Declining yet persistent
U.K.	Increasing	Declining yet persistent	Declining yet persistent	Declining yet persistent
Germany	Increasing	Increasing	Declining yet persistent	Declining
Italy	A deep digital divide based on education.	Increasing	Younger Italians are more likely to access and use the Internet. Trend is not available.	Northern Italy is leading the south in Internet diffusion.
Japan	Declining yet persistent	Declining yet persistent (reversed digital divide in mobile Internet)	There is a generation-al divide.	Major cities have higher Internet diffusion than smaller cities.
Korea (Rep.)	Increasing	Persistent	Increasing	Declining. However, Seoul is still the most wired area in the country.
China	Huge yet slightly declining	Declining yet persistent	Slightly declining	Huge yet slightly declining
Mexico	Huge	42 percent of Internet users are women.	Younger Mexicans make up the majority of Internet users.	Very uneven. Users are concentrated in the centre, the Guadalajara area, and Monterrey.

Figure 1: Trends of the Digital Divide by Country

Country	Socioeconomic Status	Gender	Geographic Location	Life Stage
U.S.	⬇	⬇	⬇	⬇
U.K.	⬆	⬇	⬇	⬇
Germany	⬆	⬆	⬇	⬇
Japan	⬇	⬇ reversed in mobile Internet: women higher	⬇	➡
S. Korea	⬆	➡	⬇	⬆
China	⬇	⬇	⬇	⬇
Italy	?	⬆	⬇ north leads the south	?
Mexico	?	?	⬇ very uneven	? university students