The Societal Impact of the World Wide Web–Key Challenges for the 21st Century

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This paper addresses the impact of information technology (IT) and the World Wide Web (WWW) on the 21st Century and the challenges which we will face as responsible members of a dynamically changing society. Reviewing the spread of potentially alienating technology, the paper highlights the implications for change with reference to the "haves" and the "have nots"- developing societies, economically disadvantaged groups, women and children. The authors argue that organisational, sociological and cultural factors may inhibit an effective transformation to a global Information Society. Particular consideration is given to policies, infrastructure, human resources and development responsibilities in developing societies.

INTRODUCTION

Many lessons from history offer strong evidence that technology can have a definite effect on the social and political aspects of human life. At times it is difficult to grasp how supposedly neutral technology might lead to social upheavals, mass migrations of people, and shifts in wealth and power. Yet a quick retrospective look at the last few centuries finds that various technologies have done just that, challenging the notion of the neutrality of technology. Some examples include the printing press, railways, and the telephone.

The effects of these technologies usually begin in our minds by changing the way we view time and space. Railways made the world seem smaller by enabling us to send goods, people, and information to many parts of the world in a fraction of the time it took before. Telephones changed the way we think about both time and distance, enabling us to stay connected without needing to be physically displaced. While new technologies create new opportunities for certain individuals or groups to gain wealth, there are other economic implications with a wider ranging impact, political and social. Eventually, as the technology matures, social upheavals, mass migrations, and shifts in economic and political power can be observed. We find concrete examples of this dynamic phenomenon during the Reformation, the industrial revolution, and more recently, as we witness the on-going information technology revolution.

Before the Reformation, the church controlled an effective monopoly on knowledge and education. The introduction of the printing press in Western Europe in the mid-15th century made knowledge and ideas in book form widely available to a great many more people. Printing hastened the Reformation, and the Reformation spread printing further. By the early 16th century, when Martin Luther posted his 95 theses on the castle church, the political movement was well underway. The printing press changed the way in which we collected, transmitted, and preserved information prior to that time. Mass production and dissemination of new ideas, and more rapid response from others were instrumental in launching a worldwide social phenomenon.

Dramatic changes in the economic and social structures in the 18th century characterized the industrial revolution. Technological innovations were made in transportation and communication with the development of the steam engine, steam shipping, and the telegraph. These inventions and technological innovations were integral in creating the factory system and large-scale machine production. Owners of factories were the new wealthy. The laboring population, formerly employed predominantly in agriculture, moved in mass to the factory urban centers. This led

to social changes as women and children were introduced into the workforce. Factory labor separated work from the home and there was a decline of skilled crafts as work became more specialized along the assembly line.

The inventions of the telegraph and telephone dramatically changed the manner in which we conduct business and live our daily lives. They allowed the collection, validation, and dissemination of information in a timely and financially efficient manner. More recently, we are experiencing the information technology revolution, led by the introduction of computers. The rate of change has accelerated from previous times – with generations of technology passing us by in matters of months rather than decades. We are witnessing significant shifts in wealth and power before our eyes. Small start-up high technology and Internet companies, and their young owners, represent a very wealthy class – and an extremely powerful one. Small countries such as Singapore and Ireland, through the strategic use of information technology and aggressive national policy, have transformed their respective economies and positioned themselves in the competitive global economy.

The Internet, a complex network of networks, is frequently spoken of as a tool for countries to do likewise. The Internet removes the geographical and time limitations of operating in a global economy. The banking industry has been revolutionized with Internet banks who can collect, validate, and disseminate information and services to any people group – internal to the organization and external to its customers–in a timely and financially efficient manner. Similar scenarios exist in the worlds of retail, healthcare, and transportation.

There is an underlying assumption in the popular belief that the Internet may be the savior to the developing countries of the world. Such thinking is dependent on a single premise: the belief that access to information gives access to the global marketplace which in turn leads to economic growth. Information is power; knowledge is wealth. The vehicle for access is information technology and communications infrastructure (ITC). Mohammad Nasim, the minister for post and telecommunications in Bangladesh, one of the poorest countries in the world, restated the premise, saying "We know full well how important a role telecommunications play in a country's economic development (Zaman, 1999). The converse is also true. Lack of IT access leads to an increased inability to compete in the global market place which leads to further economic poverty. What we are witnessing is therefore either an upward or downward spiral phenomenon. This raises some interesting and important questions for society, such as: What is the current information access through the Internet? Who are the "haves" and the "have-nots" of information access? How can the Internet address the societal challenges?

This paper attempts to address these questions and related issues. In the first section we document the current state of information technology diffusion and connectivity, and related factors such as GDP, population density, and cultural attitudes. The second section examines more fully the question of who comprises the "haves" and the "have-nots" so frequently mentioned. Across and within country comparisons are made, noting in particular disadvantaged groups, urban vs. rural communities, and women and children as groups that are frequently forgotten, but who are vital to true transformation to a global information society. The third section offers some concrete suggestions as to how the Internet may be used to address the growing gap between those who have and those who don't. We report some country examples which illustrate both the progress and the magnitude of the challenge as societies, governments, and other key change agents attempt to redress the problem. Finally, we make two observations. One is that for those who don't have, there is little demand *to have*, as well. This is in large part explained by the second observation, which is that a multilevel complex challenge must be overcome in order to leverage technology-based services, such as offered by the Internet, as a sociological tool to reduce economic disparity. We challenge the reader to look inward for each one's individual responsibility in this big picture.

INFORMATION TECHNOLOGY ACCESS

In 1995, the world IT market as measured by the revenue of primary vendors was worth an estimated US$527.9 billion. Between 1987 and 1994, its growth rate averaged nearly

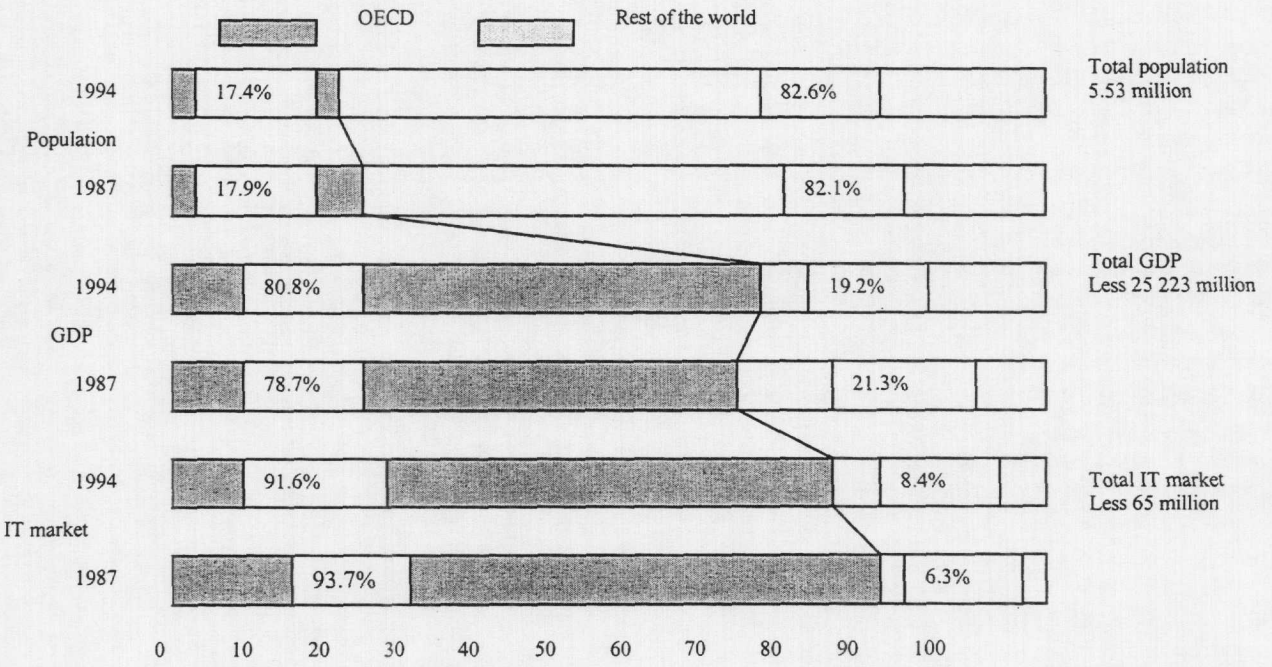
twice that of GDP worldwide. It was particularly high in Asia climbing from 17.5% to 20.9% of world share during that time. Nevertheless this strong growth did little to redress the geographical imbalance in the world IT market—*markets outside Asia and the OECD area (ROW) accounted for only 4% of the world total.*

From a world population of 5.53 billion, *ROW accounts for 82.6%* of the total population yet from a world GDP of US$25,223 billion, *ROW accounts for only 19.2%* (decreasing >2% over the last 7 years) and from a total IT market of US$455 billion, *ROW accounts for only 8.4%* . See Figure 1.

The IT market has remained concentrated within the G7 countries at around 88%, with the United States accounting for 46% of the market. In terms of installed PC base the US was by far the world leader with 86.3 million units, well ahead of Japan (19.1m), Germany (13.5m) and the UK (10.9m). In the US this averages at 32.8 PCs per 100 inhabitants. The Internet now reaches into every part of the globe with the number of host computers connected to the Internet increasing from 3.2 million in July 1994 to 6.6 million in July 1995, 12.9 million in 1996, 16.1 million by January 1997 and 29.7 million by January 1998 (Network Wizards). This is more than a tenfold increase since July 1993 as shown in Figure 2.

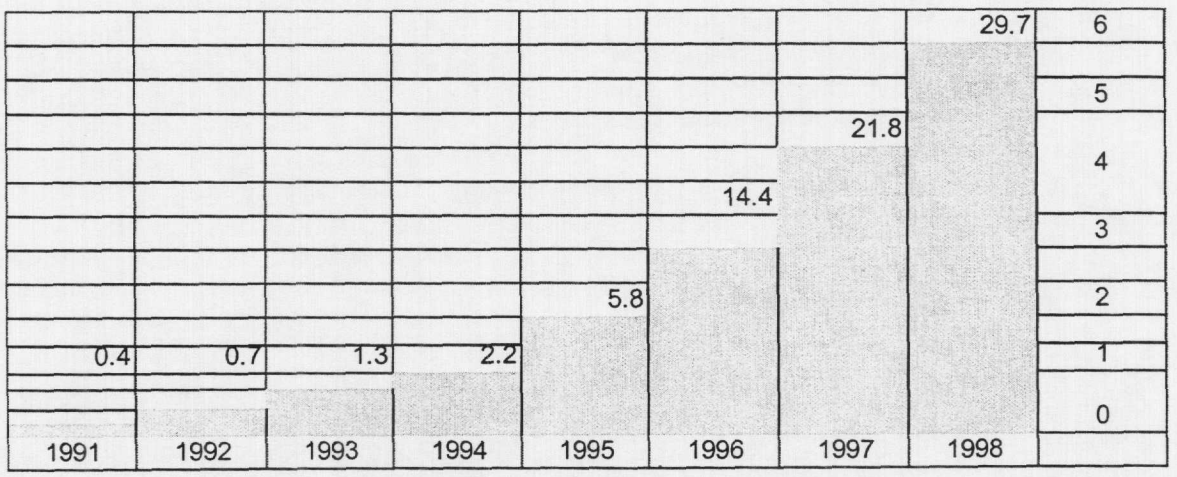
Recent estimates indicate that some 90 countries, just under 5 million machines and some 100 million users worldwide are connected to the Internet (NUA Internets Survey, 1998). However, Internet hosts per 1 million inhabitants by country income show huge differences between the rich and the poor, with 31,046 hosts for the highest income countries and only 9

Figure 1: Share of OECD Member Countries in world population, GDP and IT market 1987–1994



Source: World Bank

Figure 2: Internet Host Computers (millions)



per million inhabitants in the poorest. The level of LAN implementation differs significantly across countries, with the US accounting for 55%, Western Europe 32% and *ROW only 13%* of the installed base of LAN servers .

This has to be examined at two levels: the rates of PC diffusion and connectivity. In terms of the number of corporate PCs per 100 white-collar workers, leading countries such as Norway, Switzerland and the US have more than 100, major Western European countries 60-80 and Japan only 24 (see Figure 3). As for PCs connected to LANs, 64% of corporate PCs are on a network in the US but only 21% in Japan (Dataquest, 1995). Corporate cultures in Asia may be less conducive to on-line management.

Access to telephone service is a good indicator of the state of a country's telecommunications infrastructure as this plays a large role in accessibility to information. More than 90% households in high income countries have a telephone line (and some have more than one), whereas only 2% of households in low income countries are similarly served. Of 950 million households in the world, 65% of the total do not have a telephone. Figure 4 shows the distribution of telecommunications against wealth.

The technology gap is strikingly apparent in telephone usage, where consumers in the United States make an average of 2,170 calls per inhabitant annually, which converts into just under seven calls a day. Only Canada and Singapore come close to the American average; Canada because of the similarity of culture and technological deployment, and Singapore by virtue of the heavy concentration of business within the small city-state. The United States' use of the telephone remains approximately three times higher than the European, Japanese and Australian averages, which seem to be clustered at between the 600-800 call per inhabitant level.

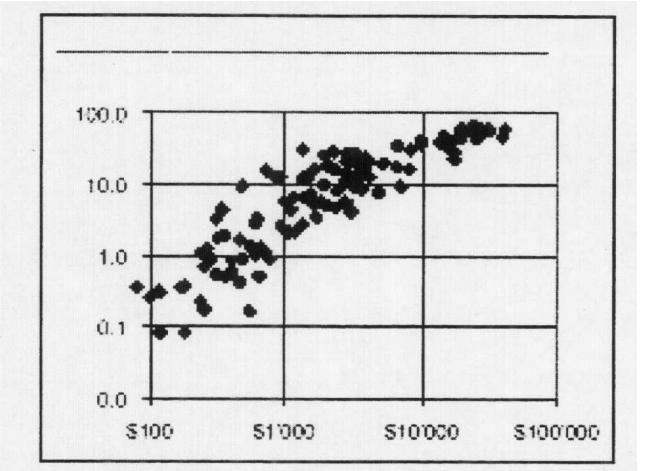
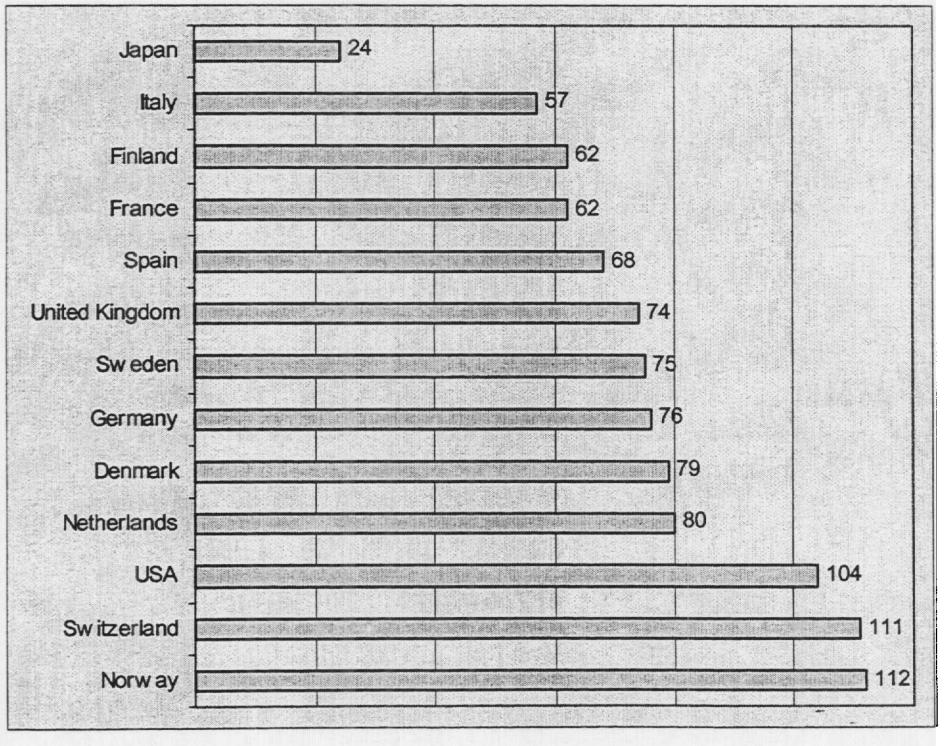


Figure 4: Lines per 100 inhabitants in relation to GDP

The difference between the United States and the Latin American and some of the Asian countries is even more striking. The average American makes ten times as many calls as the average Mexican, 20 times as many calls as the average Chinese, and 40 times as many as the average Indian. As the developing countries make greater inroads into extending their networks and their inhabitants succeed in integrating the telephone more into their daily lives, it is to be expected that their telephone usage will eventually start to catch up to that of the more developed countries but it will undoubtedly take some time to do so.

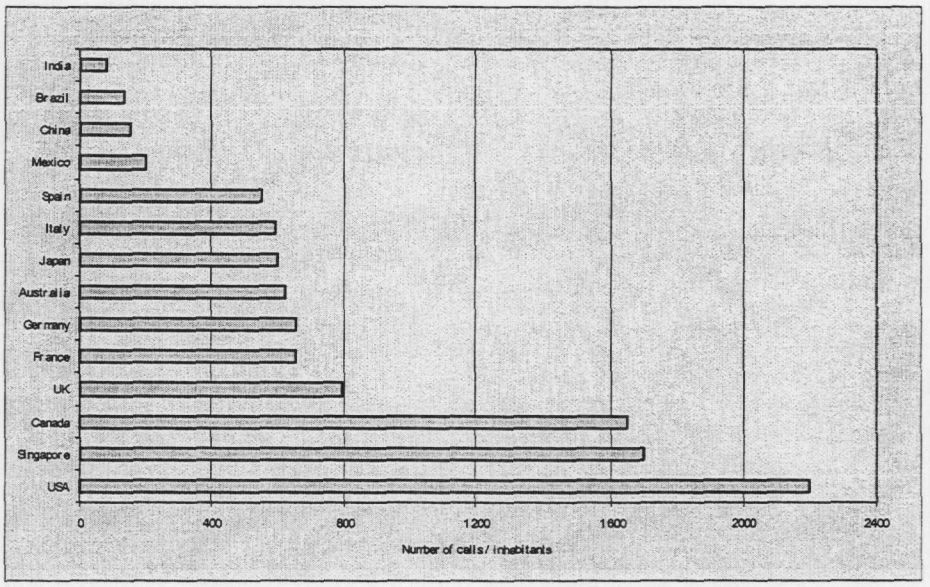
Figure 3: Number of PCs per 100 white collar workers



While the technology invasion has offered developing countries amazing opportunities to leapfrog over stages of growth in their programs for industrialisation and advancement, the drive for information can often occur only at the expense of other basic infrastructure needs which are regarded as norms for advanced societies. Illustrative of these trade-offs are countries who are currently making major investments into their ITC infrastructure, as shown in Table 1. China aims to enter the 21st century as an information economy yet has an average GDP which is only 1/50th of the US; Argentina has a school life expectancy of less than 4 years com-

pared to over 16 in Australia, and India boasts a female adult illiteracy problem of 62.3%. The statistics are even more alarming when comparisons are made with rural communities, where only 7% of the rural population in China and 2% in Argentina have access to sanitation.

Figure 5: Number of Calls per Capita by Country



The Haves and The Have-Nots

The haves and have-nots are generally differentiated based on a variety of factors such as income and education levels. We generally think of the haves and the have-nots from the perspective of the international arena, dividing countries into two large categories: developed and developing, with the greater proportion of countries considered developing. There is a tight coupling between the ITC infrastructure of a country and its income status. It comes as little surprise then that despite rapid growth of the Internet, some 97% of users are in high-income countries which account for just 15% of the world's population (Tarjanne, 1996). The US boasts four out of ten homes owning a personal computer and one in three of these has a modem enabling the computer and telephone to be connected (see Figure 6). By the year 2000 at least half of all US homes will have two or more telecommunications lines. At present the median age of users is 32 years and dropping, 64% have college degrees and 25% have an annual income higher than $80,000. Half of Internet users have managerial or professional jobs and 31% are women. There are now more than a million Web sites for them to visit.

It is also useful to examine the question of the haves and have-nots from a second vantage point–a within country perspective. In fact, while the majority of the population within a developed country may qualify as "have," there is a subset of the population which does not meet the criteria. For example, the United States is considered a developed country, but the poorest 20% of households receive a smaller share of income than in almost any other developed country. Over six million homes did not have phone service in 1997 (ITU, 1998). By regions, households in Oceania (predominantly Australia and New Zealand) are the most wired with penetration rates of over 90%. This is in contrast to Asia, where about 20% of households have a telephone, and to Africa, where the figure drops to 6% (ITU, 1998). Within country comparison by urban and rural areas also shows marked differences. Over 80% of Thailand's population still lives in rural areas, yet less than 40% of telephone lines in the country are in non-urban areas. These within country variances at best retard the overall economic growth of the respective countries.

Whether developed or developing, we also observe significant segments of the population that do not have access

Table1: Worldwide Indicators

	1995 US$ gdp pc	School life expectancy	Adult (F) illiteracy	Economic Rural Activity %	% access to sanitation
USA	26037	15.8	3.1	59.9	*
Japan	41718	14.8	*	50.0	*
UK	18913	16.3	*	52.8	*
Australia	20046	16.2	*	48.1	*
China	582	*	27.3	72.9	7
India	365	*	62.3	*	14
Philippines	1093	11.0	5.7	49.0	67
Argentina	8055	3.8	3.8	41.3	2
Vietnam	270	*	8.8	74.1	15

* not available

to the ITC infrastructure. These groups are characterized by low income, young limited education, member of a minority group, elderly, handicapped, and rural. The irony is that it is these groups that, were they to have access, they would be simultaneously empowered to take steps to improve their economic well-being. It is these groups that receive huge benefits from being able to engage in job search activities, take educational classes, or access government reports on-line for example.

Falling Through the Net: Defining the Digital Divide

A 1999 survey of the digital divide in the U.S. (third in a series from 1995) shows that while there is expanded information access, there is a persisting "digital divide" which has actually increased since the first survey (see Figures 7 and 8). The least connected are typically lower income groups, and Blacks and Hispanics. Additional geographical locations (urban city centre and rural), age, education and household type are additional factors leading to disadvantaged groups. The following are profiles of groups that are among the "least connected," according to the 1999 data:

- **Rural Poor** – Those living in rural areas at the lowest income levels are among the least connected. Rural households earning less than $5,000 per year have the lowest telephone penetration rates (74.4%), followed by central cities (75.2%) and urban areas (76.8%). In 1994, by contrast central city poor were the least connected. Rural households earning between $5,000-$10,000 have the lowest PC-ownership rates (7.9%) and online access rates (2.3%), followed by urban areas (10.5%, 4.4%) and central cities (11%, 4.6%).

A high-income household in an urban area is more than *twenty times* as likely as a rural, low-income household to have Internet access.

- **Rural and Central City Minorities** – "Other non-Hispanic" households, including Native Americans, Asian Americans, and Eskimos, are least likely to have telephone service in rural areas (82.8%), particularly at low incomes (64.3%). Black and Hispanic households also have low telephone rates in rural areas (83.2% and 85%), especially at low incomes (73.6% and 72.2%). As in 1994, Blacks have the lowest PC-ownership rates in rural areas (14.9%), followed by Blacks and Hispanics in central cities (17.1% and 16.2%, respectively). On-line access is also the lowest for Black households in rural areas (5.5%) and central cities (5.8%), followed by Hispanic households in central cities (7.0%) and rural areas (7.3%).

To put this in simple terms: a child in a low-income White family is three times as likely to have Internet access as a child in a comparable Black family and four times as likely as children in a comparable Hispanic household.

- **Young Households** — Young households (below age 25) also appear to be particularly burdened. Young, rural, low-income households have telephone penetration rates of only 65.4%, and only 15.5% of these households are likely to own a PC. Similarly, young households with children are also less likely to have phones or PCs: those in central cities have the lowest rates (73.4% for phones, 13.3% for PCs), followed by urban (76% for phones, 14.5% for PCs) and rural locales (79.6% for phones, 21.2% for PCs).
- **Female-Headed Households** – Single-parent, female households also lag significantly behind the national average. They trail the telephone rate for married couples with children by ten percentage points (86.3% versus 96%). They are also significantly less likely than dual-parent households to have a PC (25% versus 57.2%) or to have on-line access (9.2% versus 29.4%). Female-headed households in central cities are particularly unlikely to own PCs or have on-line access (20.2%, 6.4%), compared to dual-parent households (52%, 27.3%) or even male-headed

Figure 6: Percent of U.S. Households with a Telephone, Computer and Internet use.

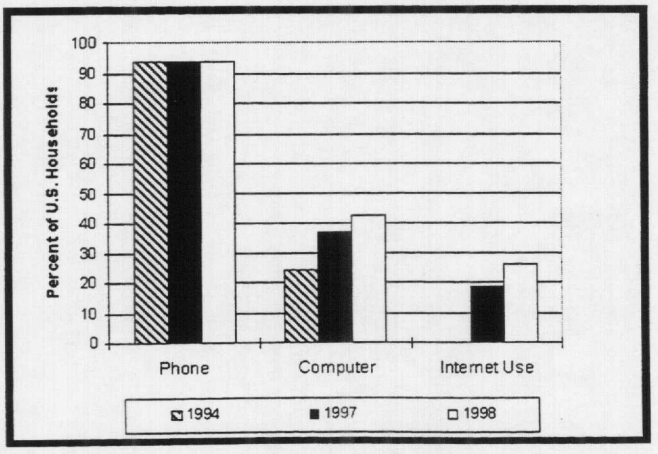
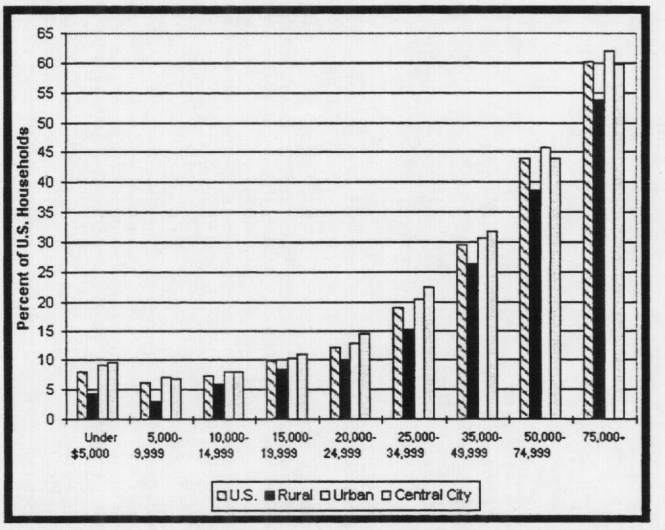


Figure 7: Percent of U.S. Households with a Computer by Income



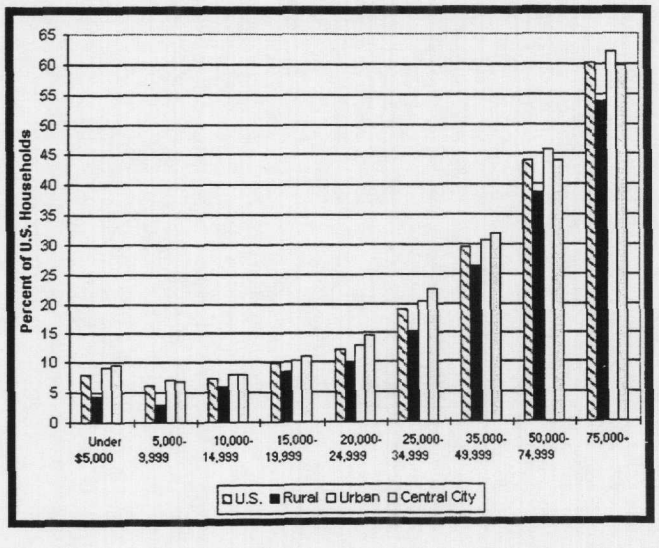
households (28%, 11.2%) in the same areas.

The data reveal that the digital divide– the disparities in access to telephones, personal computers and the Internet across certain demographic groups–still exists and in many cases has widened significantly. The gap for computers and Internet access has generally grown larger by categories of education, income and race. This remains the chief concern as those already with access to electronic resources make rapid gains while leaving other households behind. We are witnessing the wholesale disappearance of work accessible to the urban poor. Without intervention, unemployment, poverty, and out-migration will likely increase, exacerbating the structural problems typical of rural areas (OTA, 1996).

In Australia, the picture is very similar. The report "Women's Access to Online Services", produced by the Office of the Status of Women in December 1996, states: 'The Governments' focus on commerce has meant that the social consequences of becoming an 'information society' have been largely ignored. This may have been exacerbated by the apparent lack of women in decision-making positions in industry and relevant departments." The most recent data from the Australian Bureau of Statistics (1998) estimated 262,000 users who indicated use of the Internet at home with about 178,000 being men and 84,000 women (68%:32%). Women's representation amongst email users was even lower –at only 26%. Women over the age of 55 were extremely poorly represented. However, perhaps a more important issue is "What access opportunities are open to women who don't have a computer and modem at home?" AGB McNair estimate that in the region of only 13% of Australian women over the age of 14 have ever accessed the Internet!

Other countries' digital divides also persist; the percentages are simply higher for the have nots. For example, Egypt's "haves / have nots" ratio, a lower-middle income country as defined by the World Bank [1], represents less than 8% of its 60 million plus population.

Figure 8: Percent of U.S. Households using the Internet by Income



There are astonishing exceptions to the rule–one example is women farmers. The DSS CRP case studies found that women farmers "were the enthusiasts, the main drivers, while their husbands, if they had no prior computer experience, were reluctant to touch the CIN (Community Information Network)". Weather information, farming practices, health and education were all foci but further email was used to develop support networks, thereby reducing social and cultural isolation. Strangely it is not only those women typically identified as culturally isolated (aboriginal, non-English speaking, remote communities such as mining) but also professionally educated women whose need for professional support, continuing education and contact with like-minded peers is not adequately met.

Increasingly, education, health, legal services and social communications are moving to computer-based technology. The success of the Ipswich Global Infolinks project "SeniorNet" is another startling example. One resident said "I personally find the Internet to be a fascinating medium where any information seems available.... [it] opens up a whole new world for elderly people and keeps the mind active ... there is no age limit to having a good time surfing the net "(des Artes, 1996).

The Internet is increasingly viewed as the window to the global economy. Is then the Internet the secret weapon for the have-nots? Is it for the masses? One may argue that what subsistence farmers in Afghanistan, or Korea, or Cambodia need is NOT high-tech science and complex systems, but immunizations, basic literacy, disease and drought-resistant cereals and oilseeds, simple pumps, or deep-drop toilets. The fallacy of the pro-Internet argument is that it ignores the social and economic implications of the technology, as highlighted in this discussion.

A second argument in favor of the technology is that it will assist developing countries in leapfrogging stages in the development process. Many highly successful initiatives are taking place in developing countries to promote community-based Internet access for health (effective water sourcing, sanitation, bioengineering of crop production), educational (electronic network of schools), and other applications. The Mbendi AfroPaedia Web site (www.mbendi.co.za), the pan-European FRIENDS (Farming and Rural Information Expertise and News Dissemination Service) project, and the Mediterranean Institute of Teleactivity (IMeT) are representative of these types of initiatives (Stratte-McClure, 1999). Compelling examples demonstrate the pay-off: In rural southern Ghana, petrol stations are able to place orders with suppliers by phone when previously they could only be made by traveling to Accra; in Zimbabwe, one company generated $15 million of business by advertising on the Internet; in China, a little girl's life was saved when her doctor posted her symptoms to an

Internet discussion group and received an immediate answer. Sam Pitroda, Indian government advisor, states, "IT is not a luxury but VITAL to basic activities, such as bringing food to market, preventing drought, a major source of new jobs and wealth." The conundrum is that sustainable development is an immensely complex process having its roots in educational and infrastructural building; what then is the role for the Internet in this process?

HOW CAN THE INTERNET ADDRESS THE CHALLENGE?

It is recognized that an educated population with skills and knowledge in information technology is an instrumental part of sustainable development. The irony is that while the volume of information and knowledge that is available is increasing, the percentage of the world population able to have access to and derive value from it, seems to becoming smaller. The gap between the haves and the have nots is increasing significantly–both on a global and local basis (Novak & Hoffman, 1998). The magnitude of the challenge within countries is related to income distribution and country size. Central and Eastern European countries enjoy high teledensities in relation to their income levels because they have more even levels of income distribution than other regions (ITU, 1998:1.2.3). In terms of size, smaller countries are more able to reinvent themselves than countries such as China with massive populations and huge geographic expanse. Ireland and Singapore are good examples of small countries who, through aggressive national policy towards technology and education, repositioned themselves in the global market.

Is the Internet the secret weapon to bring equality to the masses?–to close the gap? Fact one: Information represents power in both the political and economic spheres. Fact two: Almost every emerging society has made it a priority to participate in the global information society, bearing witness to the belief in its ability positively to effect their country's well-being. Fact three: The Internet is the technological innovation that can provide access to the same markets, and the same information within the same time frame as is the case with more developed countries. It would seem therefore that the answer to the question is "yes" — but that access is a necessary albeit insufficient solution. What then are the implications?

The traditional approach for introducing technological innovations has been through the educational system and the workplace. The problem is that a significant portion of the have-not segment does not participate in these venues. A nontraditional approach must be taken.

If access to the have-nots is to be achieved, then technological innovations, such as the Internet, need to be brought specifically to the target group and on their level. Venues where Internet' awareness, exposure, and ultimately, familiarity need to be developed. Candidate sites include communal gatherings such as the post office, hospitals, banks, and the local merchant. Furthermore, the have-nots must perceive value, an incentive to take the steps to go beyond simple awareness to becoming an actual user of the technology. The success of this effort is necessarily linked with the extent to which applications are socially and culturally appropriate and specifically address those daily life issues that concern the intended users, such as registering to vote, access to government information, access to medical information and assistance, or bus schedules.

In the local village or community where the deployment is being made, co-opting a key individual is instrumental to success. The key individual receives the benefits of training plus the respect of his or her community as the knowledge broker. They are instrumental in introducing the technology to others. Use of the systems, at least initially, will likely need to be heavily if not totally subsidized. This certainly raises the bar for many developing countries and also illustrates how country size quickly becomes a significant factor.

Egypt is an example of a country that developed a model that includes education and training, infrastructure, and IT in general and Internet access over time, all together. Moreover, it developed applications that would be culturally and socially appropriate so as to gain widespread support for the effort. But, results do not come overnight: There is a requirement for champions and long-term commitment on the behalf of the sponsor– in this case, the Egyptian government. In the late 1980s, Egypt began to deploy computer-based systems in its 27 governorates, creating Information and Decision Support Centers (IDSC) (Nidumolu et al., 1996; Kamel, 1997, 1995; El-Sherif & El-Sawy, 1988). The effort was part of a comprehensive plan to introduce and rationalize the use of information technology in key sectors in the economy. Over time, the IDSCs have been extended into the local villages and more rural areas. There are currently 1,102 IDSC facilities. Technology Community Centers represent the most recent efforts to introduce and rationalize the use of information technology in general, and specifically the Internet, to the general populace (Loch et al., 1999). The focus of the community centers is on children up to the age of 20. Egypt's income distribution and population demographics are typical of many developing countries. Less than 10% of the population comprises the haves subset of the population. More than 60% of its population is under the age of 30; of that segment, more than 50% is under 20 years of age. The implication is that the extent to which these segments are exposed to advanced technologies, and educational and training opportunities is highly correlated with the future economic well-being of the country.

The International Telecommunication Union's (ITU) Telecommunication Development Bureau (BDT) has a program for Multipurpose Community Telecentres (MCTs) for rural and remote areas. The ITU is working in partnership with other international organizations and the private sector, installing pilot MCTs in and around a dozen countries. The

operating principal of this effort is the information premise: Access to information [services] brings about improved access to the local marketplace which in turn enhances economic growth and which ultimately impacts the global competitiveness of the country. MCTs articulate the premise slightly differently, also arguing that access to information services can also help to lessen isolation and combat the problem of brain drain from rural to urban areas. Contrary to past history where technological innovations were contributors to mass migration of people, the Internet might allow people to remain in place while making available needed information.

The project in Uganda subsidized by the BDT exemplifies the above. The MCT will be installed in Nakaseke to provide individuals with access to telephones, facsimile machines and computing facilities, including Internet access. It offers training, technical support, and professional guidance to produce electronic information reflecting local knowledge and requirements. The library is integrated into the telecentre. The MCT will provide support to teachers in the local school system through information support to the school libraries, the provision of visual resources, training for teachers in the use of computers and distance education. The staff of the local hospital will use the facility for telemedicine applications, continuing education for health staff, and access for local health worker to medical-related resources on the Internet. Other targeted local user groups include small businesses and farmers, local councils, the women's training organization, nongovernmental organizations, and the general public (ITU, 1998: Box 5.1).

SUMMARY OBSERVATIONS

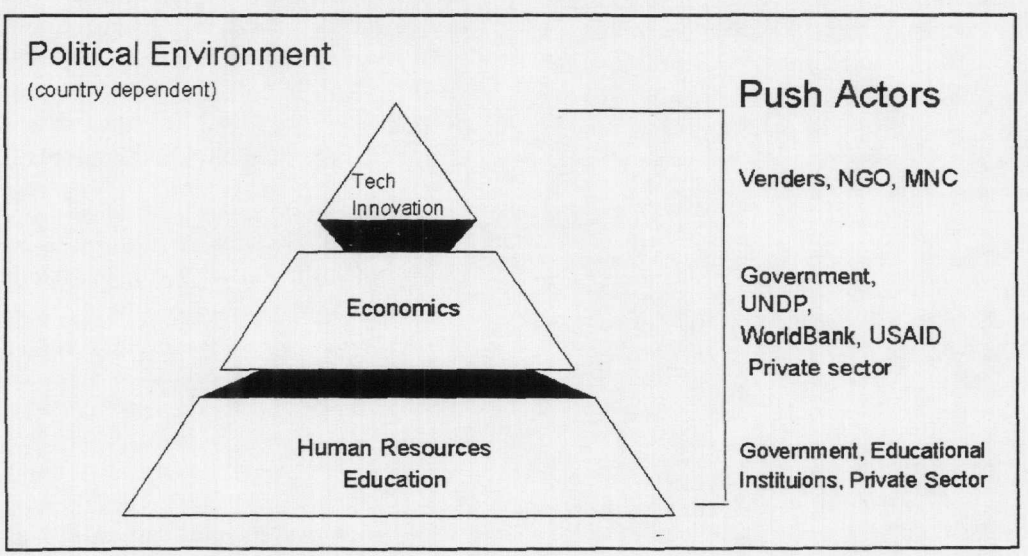
True, the Internet and its associated developments, such as the World Wide Web, are a developed global phenomenon. True, the gap between the economically advantaged and disadvantaged continues to increase in both developed and developing economies. With the experiences in Egypt and Uganda as exemplars, we can make several observations that may be useful to other organizations and governmental agencies considering such initiatives or for researchers examining such initiatives.

First, existing articulated demand for technology-based services by the have not group for such services is likely to be small to nonexistent. Hence the effort is very much characteristic of a push phenomenon (Gilbert, 1996; Gurbaxani, 1990). Central and local government authorities, international agencies, and leading entities from the private sector are playing, and must continue to play, key roles. Aggressive IT policy by the Singaporean government transformed Singapore within a twenty year time frame. Other countries, such as Uganda and Egypt as highlighted in this paper, are making inroads, but one must acknowledge that it is a long road to travel.

Second, there are three levels of challenges that are part of this effort. The first level is a human resource challenge. The availability of quality education and the level of literacy are both part of this challenge. The second level is the economic challenge. On an individual basis, the ability to pay for service is minimal. This places additional pressure on the providers to make the service inexpensive and widely available. On a country/governmental level, such efforts stretch the economic resources of the providing agencies. The geographic size, and population distribution and size are all factors that make this level a particularly difficult challenge. The magnitude of the task for China, for example, far exceeds that of Singapore simply due to its geographic span and population demographics.

The third level is the technological innovation itself. In the case of the Internet, a base level of infrastructure must be

Figure 9: Three Challenges to Technological Innovation Deployment



in place to be able to deliver access to the Internet, and in turn, access to the global marketplace. All three levels are interrelated. The simple availability of the technology is insufficient; training to support its use must also be available. All levels reside in a political environment which varies from country to country. Figure 9 depicts these levels in context.

THE REAL CHALLENGE?

Information technology is generally perceived as a major facilitator for globalisation, with the implication that hitherto underdeveloped regions can now gain access to worldwide resources and expertise, which will in turn lead to enhanced economic development. Globalisation theorists, however, argue that it is only capital that has escaped the confines of space (Bauman, 1998; Beck, 2000). Capital has gained almost unlimited, instantaneous mobility, whereas people remain relatively immobile. One could argue that the development of global networks serves only to enhance the more developed nations and support the most dominant values leading to increased exploitation of the less developed nations and the more disadvantaged sectors of society (Castells, 2000).

A powerful tool, such as the Internet, used creatively can serve to begin to reduce the growing and persistent gap between the haves and the have-nots but only if we begin to address the kind of problems identified in this paper.

Consider these words which come from the Cyberspace declaration of independence (Barlow, 1996):

- Cyberspace is a world that is both everywhere and nowhere
- A world that all may enter without privilege or prejudice accorded by race, economic power, military force, or station of birth
- A world where anyone, anywhere may express his or her beliefs
- A world where legal concepts of property, expression, identity, movement and context do not apply
- A world of no matter.

It is in our hands to make our new world matter and for it to be a cyber civilisation to be proud of. Otherwise the proud boast that: "We will create a civilisation of the Mind in cyberspace. May it be more humane and fair than the world your governments have made before" (Barlow, 1996) will remain empty rhetoric.

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ENDNOTE

1 The World Bank has defined economic groupings of countries based on Gross National Product (GNP) per capita. Economies are currently classified based on their 1995 GNP per capita as follows: Low Income – economies with a GNP per capita of US $75 or less; Lower-middle income – economies with a GNP per capita of more than US $ 766 and less than US $3,035; Upper-middle income – economies with a GNP per capita of more than US $ 3,035 and less than $9,386; and High income – economies with a GNP per capita of more than US $8,956(ITU, 1998).

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