# 9

# Government and Development: Closing the Digital Divides

Despite the rapid growth of the Internet, many governments, businesses, and individuals still remain unconnected to its benefits. Among the least-developed countries—where the requisite technological infrastructure, the economic means, and the training may be lacking—only a few are using the Internet for e-mail, let alone for information-gathering or electronic commerce. Even in countries with relatively high Internet penetration, including the United States and those in Western Europe, people with less income and education (among other factors) are without access. There is a growing concern among policymakers that the digital divide between developed and developing countries—as well as within countries—represents a market imperfection, and that the Internet is worsening traditional socioeconomic imbalances.

Once firmly in place, however, the Internet holds the potential to help developing countries and disenfranchised communities leapfrog stages in their economic development, and reach the point where growth is derived more from knowledge and skills and less from resource endowments or manufacturing ability. Traditional barriers to the global marketplace, such as physical remoteness, can be reduced with Internet access. Electronic commerce allows businesses to tailor goods and services to fit the needs of smaller, less affluent consumer bases such as those in developing countries. And technological developments permit governments to forgo expensive investments in infrastructure like copper telecommunications lines for more advanced (and in some cases cheaper) alternatives like third-generation wireless communications.

Hence there are two driving motivations for governments to bridge the digital divide: the risk of exclusion and the potential for inclusion (Braga

1998). Governments are getting involved, often in partnership with the private sector and international agencies like the World Bank. The strategies vary, but typically include building Internet access capabilities (technological as well as financial), and training individuals and businesses to use the Internet and electronic commerce. Some countries, including Malaysia and the United Arab Emirates, are going further by dedicating substantial public funds to finance business incubators and construct technology investment parks.

Can governments succeed in bringing the Internet to those areas where the private sector has not? Should governments intervene beyond streamlining regulations and stimulating private incentive? The majority of current government initiatives to bridge the digital divide are too new for anyone to perform a formal cost-benefit analysis, but some conclusions can be made about their success. One thing is clear, widespread diffusion of the Internet is not possible unless governments create a facilitative policy environment, including general liberalization of the infrastructures that make the Internet and electronic commerce possible.

No government intervention can substitute for these important reforms. Nonetheless, in certain limited cases, particularly education, government can play a more active role. The development of human capital is especially important to ensure that all groups have the skills necessary to keep pace with the rest of the world, and advance. Other, more capital-intensive, interventions like wholesale, publicly-funded business incubators and building extensive technology parks, however, are much less likely to succeed, given that government decision-making proceeds much more slowly than technological innovation.

## The Digital Divide: Rapid, but Uneven, Spread of the Internet

The Internet has spread to more people in more places more quickly than any other communications tool in history, including the telephone, the radio, the PC, and the TV. Today, traffic on the Internet (as measured by the number of Web sites visited by each host) doubles at least every 100 days (ITU 1999, 18).

This remarkable growth, however, has been anything but even. Two kinds of digital divide have emerged: one that separates developing from developed countries, and one that creates disenfranchised groups within countries.

Developing countries tend to lag behind developed countries in levels of Internet penetration. And in every country, regardless of development level, those with less wealth and education (among other characteristics, including greater age) are much less likely to be using the Internet. Indeed, across the globe, today's typical Internet user is male, under 35, college-

**Table 9.1 Distribution of Internet users as a percentage of regional population**

| | **Regional population** (as a percentage of the world's population) | **Internet users** (as a percentage of regional population) |
|---|---|---|
| United States | 4.7 | 26.3 |
| OECD (excluding the United States) | 14.1 | 6.9 |
| Latin America and the Caribbean | 6.8 | .8 |
| Southeast Asia and the Pacific | 8.6 | .5 |
| East Asia | 22.2 | .4 |
| Eastern Europe and the CIS | 5.8 | .4 |
| Arab States | 4.5 | .2 |
| Sub-Saharan Africa | 9.7 | .1 |
| South Asia | 23.5 | .04 |
| **World** | **100** | **2.4** |

*Source:* UNDP, *Human Development Report 1999*, p. 63.

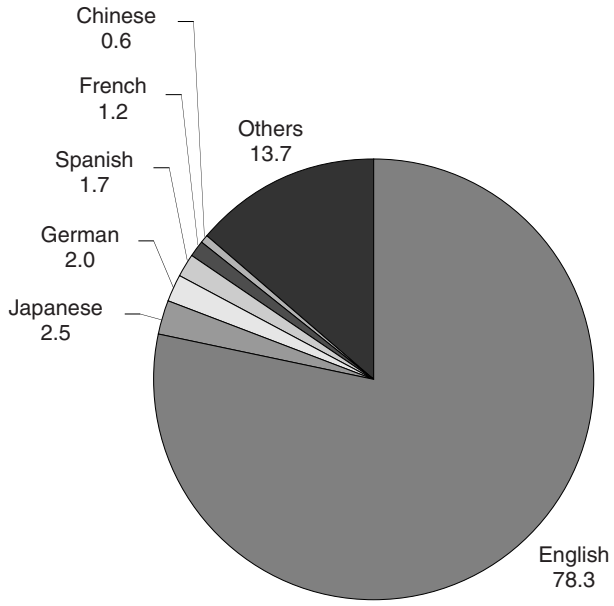
educated, highly paid, urban-based, and English-speaking (UNDP 1999, 63).

The first digital divide separates developed from developing countries, as Internet penetration is correlated with GDP per capita as well as household income. (See figure 1.5.) Although almost all countries now have some Internet connectivity, and the total number of Internet users is growing at breakneck speed, there are still significant disparities in penetration levels. As of mid-1999, there were more Internet hosts in Finland than in all of Latin America and the Caribbean, and more hosts in New York than in all of Africa (ITU 1999, 21). The United States, which has less than 5 percent of the world's population, is home to over 25 percent of all Internet users; South Asia, with almost 24 percent of the world's population, is home to 0.04 percent (table 9.1).

Disparities in Internet access necessarily translate into differences in the use of electronic commerce. Currently, the United States dominates with approximately 85 percent of the world's electronic commerce, with Western Europe and Asia making up almost all of the rest.[1] Although the US share is expected to decline in the near term as electronic commerce takes off in Europe and East Asia, many other parts of the world, including much of Africa and parts of South Asia and Latin America, are growing more slowly.

1. OECD, (1999b, 29). Some sources attribute between 1 and 3 percent to other areas of the world, principally Latin America.

**Figure 9.1 The distribution of language, 1999**




*Source: The Economist* (11 March 2000): 55. Using OECD data.

These disparities are shaping the evolution of the Internet and electronic commerce. Around 80 percent of all Web sites are in English, and much of the information as well as the products offered over the Internet are tailored to US and Western European consumers (ITU 1999, 36) (see figure 9.1). A November 1999 survey by UNESCO and Woyaa, an African Internet portal, found that except for South Africa, there are remarkably few African-based Web sites on the Internet. Moreover, hardly any African businesses have expertise in Web site design or content creation, and many are unaware of the benefits of using the Internet and electronic commerce.[2]

As the UNESCO/Woyaa survey suggests, income is just one determinant of Internet penetration. Other factors, including education and cultural acceptance of the Internet, are perhaps even more important. For example, in a survey in Western Europe, 53 percent of respondents in Sweden had used the Internet in the two weeks before the survey, but only 33 percent in countries of comparable or even higher GDP per capita, including the UK, the Netherlands, Switzerland, and Austria.[3] A similar

2. See the report at http://www.woyaa.com/topWeb/top50report.html.

3. See "Digital Divide Still Apparent in Europe," 12 April 2000, at http://www.nua.ie/surveys/?f=VS&art_id=905355714&rel=true.

contrast exists in six Middle Eastern countries at roughly the same level of human development (a measurement including life expectancy, educational level, and per capita GDP): Lebanon and Jordan have much higher Internet penetration than Saudi Arabia, Tunisia, Algeria, or Syria (ITU 1999, 22-23).

The second digital divide occurs within individual countries, in that income and education, as well as other factors like age and gender, tend to be correlated with Internet access. Though the United States has one of the highest levels of Internet penetration in the world, the US Department of Commerce has documented a growing digital divide since 1995. By examining Census Bureau data on home and work access to telephones, computers, and the Internet, the Department of Commerce has found that, while access is increasing among all demographic groups and geographic locations, a technological disparity is widening along racial, income, age, and geographic lines. According to its most recent report, *Falling through the Net III*, released in July 1999:

- those households with incomes at or greater than $75,000 are more than 20 times more likely to have Internet access than those at the lowest income levels, and more than nine times more likely to have a computer at home;
- regardless of income, whites are more likely to have access to the Internet from home than blacks or Hispanics have from any location. For households with less than $75,000 in income, the gaps between white and black households and white and Hispanic households have increased approximately 5 percentage points since 1997;
- regardless of income, those in rural areas are lagging behind in Internet access. Even at the lowest income levels, those in urban areas are more than twice as likely to have Internet access than those earning the same income in rural areas;
- educated households are far more likely to be connected to the Internet. The divide in access between those at the highest and lowest education levels has increased 25 percent.[4]

Research by other governments and groups like the UN, the ITU, the International Data Corporation, and other private researchers shows that in countries as diverse as the UK and Bangladesh, an internal digital divide has emerged along income, education, gender, and age lines. For example:

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4. Taken from the Executive Summary of *Falling through the Net III*. These reports are available free on the NTIA Web site at http://www.ntia.doc.gov/ntiahome/digitaldivide/. Additional research by Donna Hoffman and Thomas Novak at Vanderbilt University, which uses data from the CommerceNet/Nielsen Internet Demographic Study, echoes the NTIA's findings.

- In South Africa, the typical Internet user had an income seven times the national average, and 90 percent of Latin American Internet users came from upper-income households. Buying a computer costs the average Bangladeshi more than eight years' income.
- Nearly one-third of the world's Internet users have at least one university degree—in the UK it is 50 percent, in China almost 60 percent, in Mexico 67 percent, and in Ireland almost 70 percent.
- Women account for only 25 percent of Internet users in Brazil, 17 percent in Japan and South Africa, 16 percent in Russia, 7 percent in China, and 4 percent in the Arab States.
- The average Internet user in the United States is 36, and in China and the UK, under 30 (UNDP 1999, 62).

## Is Government Intervention Needed?

Since the Internet and electronic commerce are so new, it is only logical that those with first access have greater education and wealth. Certainly, there is a time lag between when early adopters begin to use the Internet and when the new technologies diffuse broadly. Rapidly declining prices for IT products—in particular, computer hardware—will go far to help those of lower income to become Internet users. Yet even as income becomes a less important determinant of Internet penetration, other factors, including a lack of the requisite skills or even interest, could exclude many businesses, individuals, and even governments from the benefits of the Internet and electronic commerce.

Moreover, there is the question of time: How long is it reasonable for countries or groups to wait for access? Indeed, should they wait at all, particularly given the promise of the Internet and electronic commerce to enable countries and groups to leapfrog stages of development, in part by allowing their more active participation in global competition and commerce? If *access* is not the issue, what role can or should governments play in promoting *usage?*

Not only policymakers but importantly also the private sector have a responsibility to work toward closing the international and domestic digital divides. Given network effects, the costs of connecting an additional individual or business or country to the Internet are relatively small compared to the benefits of having more and more participants.

Examples of how businesses in smaller countries and disadvantaged communities can quickly benefit from Internet access and electronic commerce abound. Here are a few:

- A women's weaving cooperative in an isolated village in Guyana is selling its principal product, hammocks, over the Internet for $1,000 each (*New York Times*, 28 March 2000).

- In Peru, indigenous Ashaninkas use public Internet booths to sell their crafts over the Web (*Business Week*, 1 November 1999).
- A man in New York has created an Internet company through which immigrants from Ghana can buy goats for their families and villages back home (Braga 2000).
- Firms in Africa can now access and bid on procurement contracts tendered by General Electric.
- In many developing countries, small businesses (with help from private Web firms, trade associations, chambers of commerce, as well as government agencies sometimes), are forming electronic malls that can attract many more potential customers than the storefront on main street.

As these examples suggest, the Internet can expose poorer and more remote businesses to a much larger and wealthier set of buyers. In this way the Internet enables competition on a more equal footing. More governments are responding to the risk of exclusion and the potential for inclusion, increasing public assistance to bridge the digital divide. The differences in these approaches necessitate continuing analysis of the relative success of each strategy. Government assistance—typically in the form of pilot projects and partnerships with the private sector—can, for instance, be aimed at individuals communities or businesses. The projects can promote use of the Internet through diffused points of public access, such as schools, libraries, and business centers, or through a more centralized location, such as a state-run technology park.

Most pilot projects focus on enhancing the technological and financial ability to access the Internet. An equal if not greater requirement is educating businesses and individuals about the benefits of using the Internet to trade in goods and services, as well as learn and communicate.

The following sections provide examples of how governments are intervening to bridge the international and domestic divides between those with access and those without. The examples are a starting point for sharing experiences and analyzing the success of government interventions. What they show is that the least intrusive projects typically have the greatest potential for success, as do those that collaborate with the private sector. Projects that are more capital intensive, such as exclusive government funding of business incubators or building of extensive technology parks, are more likely to compete against rather than support the private sector.

## Building Capabilities

### Access

Using the Internet requires a number of different technologies, processes, and protocols, but the most basic requirement—and the one in which

many governments are investing—is access. Access requires a technological method of connecting to the Internet (usually by dialing in over fixed local telephone lines) and the financial capability to pay for Internet connections.

## Direct Funding of Access

The most direct government strategy is therefore to increase the number of fixed telephone lines, which, as discussed in Chapter 3, is usually an outcome of liberalization of the communications sector. Some countries have leapfrogged this technology and are investing in advanced access infrastructure like cable and other broadband systems, as well as wireless, fiber optics, and satellites. What, therefore, has been the experience with direct funding of access?

For example, South Korea's Cyber Korea 21 Project will create a countrywide high-speed network by 2001 so that ''anyone, anywhere, at any time'' can receive multimedia services (Kim Dae-jung 1999). In Taipei, the Easy City Project aims to bring low-cost broadband access to every city resident. Most of the cable rewiring for this project will be paid for by private-sector TV operators (*Asia Internetnews*, 12 January 2000).

Underway for more than four years is the SingaporeONE (''One Network for Everyone'') program in which the government has invested some $300 million to build a countrywide broadband infrastructure. The government's National Science and Technology Board and the National Computer Board contracted with the state-controlled telephone and cable companies, SingTel and Singapore Cable Vision, to give every individual and business in the country high-speed broadband access. As part of a general government strategy to increase computer and Internet use, SingaporeONE was supposed to help transform Singapore into an ''intelligent island, where IT is exploited to the fullest to enhance the quality of life of the population at home, work and play.''[5]

While the SingaporeONE program was launched in mid-1998 with great fanfare, it was met with only a tepid response from the public. The government had projected 100,000 users would be accessing the broadband network by the end of 1999, but only 25,000 of Singapore's over 700,000 Internet users had signed up by that date. As the chief executive for multimedia at SingTel, Paul Chong, admits, ''The (takeup rate) has been a bit slower than we had wanted it to be (*Business Week Online*, 10 January 2000).''

The problems that have caused SingaporeONE to fall short of its goals should warn other governments about the pitfalls of intervening in the rapidly-changing Internet marketplace. First, in its vision to connect the entire country in a broadband network, the government did not anticipate

5. From the SingaporeONE Web site, http://www.s-one.gov.sg/.

the rapidity with which regular telephone prices in Singapore would decline. Though the cheapest package for broadband is $20 for 10 hours of monthly use, fixed telephone line access through Pacific Internet and StarHub is practically free (*Business Week Online,* 10 January 2000).

Second, in an effort to protect SingTel from international competition, the government forbade foreign telecom companies from connecting undersea cables to Singapore's broadband network. Thus, though broadband users enjoy very fast Internet access within Singapore itself, the connection slows considerably when a user goes to a site outside of the country (*Business Week Online,* 10 January 2000). Singapore's government may now open up the SingaporeONE network to foreign competition, a move that should decrease prices, improve service, and bring more users onto the network.

In some areas with little funding and where the private sector has not yet shown much interest, international nonprofit organizations and aid agencies are engaged in getting access off the ground. USAID's Leland Initiative is a $15-million program to use satellites to establish an Internet gateway and dedicated access for local ISPs throughout Africa.[6] The initiative has worked in 21 sub-Saharan African countries, including Benin, Eritrea, Kenya, Tanzania, and Zimbabwe. It has become clear that access alone does not promote electronic commerce or development. Consequently, as an important precursor to receiving assistance from the Leland Initiative, governments must agree to allow Internet services delivered by private-sector ISPs, and free and open access to information on the Internet, information that will help businesses communicate and develop and encourage governments to share best practice and experience.

## Financial Incentives to Promote Access

Many governments and aid agencies are helping build the technological capacity for widespread access to the Internet. But a lower-cost, and potentially more successful, strategy is to use financial incentives to encourage access to an existing or even a developing infrastructure. As the number of users increases, policymakers can persuade the private sector to invest its own monies in creating a state-of-the-art Internet backbone, since the potential payoff is larger for every additional connected individual.

The US E-Rate Program, for example, requires the nation's telecommunications companies to give schools and libraries reduced rates for Internet connections and equipment, including networking hardware, hubs, routers, network servers, and cable. Despite initial protests by the telecom companies, the program has been very successful in getting US children

6. See the Leland Initiative Web site at http://www.info.usaid.gov/regions/afr/leland/project.htm.

connected to the Internet (over 90 percent now have some kind of access), and it has overwhelming public approval (Kennard 1999).

It is not just governments that can use financial incentives to encourage access. The Ford Motor Company and Delta Airlines have recently announced programs to provide their employees around the world with home computers and Internet access for as little as $5 per month. The companies are encouraging employees and their families to use the computers and connections as well. In the United States, 3Com has donated $1 million in networking equipment and consulting services to cities around the country to help minorities and low-income families access the Internet (*E-Commerce Times*, 6 April 2000). And in Latin America, Telefónica is hooking up public schools to the Internet for free. The programs make good business sense for Telefónica if schoolchildren grow up to become active users of the Internet and electronic commerce (*Business Week*, 1 November 1999).

### Making Access Accessible

Access must be accessible—that is, the Internet needs to be where people are, not the other way around. So, a number of countries are looking to encourage Internet use by providing points of public access, like Internet cafes, public telephone offices, or even post offices. El Salvador's Infocenters Program, for instance, seeks to establish places throughout the country where individuals can access high-speed, high-quality Internet connections at low cost. Administered by the country's Ministry of Economy, the Infocenters will be licensed to private-sector companies, which will be responsible for day-to-day operations. These licensees could form the nucleus of a new generation of Internet entrepreneurs to serve the El Salvadoran community.

In other countries, the private sector is taking the lead. The Argentine company NetKiosk manufactures and distributes standalone units that allow users to connect to the Internet. The company generates revenue solely through selling advertising on the units, which are typically located in areas like hotel lobbies (*New York Times*, 16 December 1999).

These examples suggest that governments can play a role in access, but the private sector often plays a very important initial role. It will continue to play a role in finding creative ways to promote greater Internet use. The private sector gains because the value of each user to the network is greater than just one. It is critical that governments design their programs so as to complement rather than compete against the private sector.

## Education

Policymakers in most countries play a central role in education funding—both in the narrow sense of schooling and in the broader sense of training.

It is no surprise that many are increasing funding to educate individuals and businesses not only on how to use the Internet for schooling, information-gathering, and electronic commerce, but also the value of doing so. Many of these programs are offered through schools, universities, or technical-training centers. However, experience shows that the most successful programs go beyond donating or subsidizing computer or networking equipment, to training and instruction on how to use the equipment and the connections to make them relevant in daily life.

### Internet in the Classroom

Integrating the Internet into the classroom is one type of involvement. Most educational programs such as the US E-Rate program provide primary and secondary schools with computer equipment and Internet connections. The government of South Korea plans to wire all classrooms and make sure that all 480,000 school teachers have laptop computers (*Associated Press,* 24 January 2000). In Morocco, too, providing schools with computers and networking hardware has been a major thrust of government and international aid programs—yet that hardware sits in its original packaging because training in how to use it was not part of the original funding package.[7] Similarly, new computers in US schools are often idle because there are no trained employees to handle software or networking glitches (*New York Times on the Web*, 26 April 2000).

Training educators on how best to use Internet technologies as part of their teaching method remains the biggest challenge, especially at the primary and secondary levels.[8] Policymakers are responding with increased funding for teacher training in Internet and IT, and computers and networking generally. Among the priorities for Spain's $2.5 billion ''InfoXXI: The Information Society for Everyone'' program is the government-funded training of 125,000 new teachers of information technology (King 1999).

One approach that works well is for educators to share their experiences through the Internet. Mark LaFleur, teacher and principal of the James Faulkner Elementary School in rural Stoddard, New Hampshire in the United States, shows how educators can gradually integrate safe, effective, and enthusiastic use of the Internet into schools and classrooms (LaFleur 2000). There are many other educator sites where teachers can ''compare notes'' and find teaching materials, including one on the World Bank's *Info*Dev Web site and another on Discovery.com.

At the university level, government involvement appears less necessary, as both public and private universities are already embracing the Internet and distance learning. Regional universities are expanding into Internet-

7. Field research by Catherine L. Mann and Sarah Cleeland Knight, September 1999.

8. This is confirmed by the more extensive analysis presented in ITU (1999,91).

linked universities like the Instituto Tecnológico y de Estudios Superiors de Monterrey in Mexico. Many standalone universities offer world class education because they have access to much larger, more up-to-date, and cheaper online libraries. This is of key importance when funds are tight and knowledge is expanding so rapidly. University researchers are also forming networks to which researchers from developing countries have equal access.

There is a critical need to train adults outside of the university system, especially as Internet penetration is highly concentrated among younger people. The Taipei city government now offers every city resident three hours of free Internet training. As the city's mayor, Ma Ting-jeou, explained, ''I want everyone to wake up and read an electronic paper, then use the Internet to check traffic conditions and see which parking garages still have empty spaces'' (*Asia InternetNews,* 12 January 2000). In addition, the city is offering free e-mail accounts; 70,000 city residents have taken advantage of this service.

## Training People in Information Technologies

Three hours of Internet training may not seem long enough to introduce newcomers to the benefits of the Internet, but for many developing countries even the Taipei program would overtax budgets. Moreover, in addition to integrating the Internet into the classroom, it is an important platform for training workers in information technologies. These workers can be the foundation for more rapid growth and development; yet the least-developed countries often cannot afford such training, thus increasing the chances of being left further behind. For the least-developed countries, international donor agencies like the World Bank are stepping in. These agencies use distance education to teach individuals about computers and information technology—they become the trainers who can then teach the educators, as well as build the foundation for deeper integration of the Internet and electronic commerce into business, government, and society. The African Virtual Network broadcasts interactive instruction by satellite in English and French to over 9,000 students in 22 African countries. The network will soon offer degrees in computer science, computer engineering, and electrical engineering.[9]

Technical training in developing countries is also supported by groups like the Internet Society (http://www.isoc.org), an international association of Internet professionals. And the private sector is now active: The partnership between Cisco Systems and UNDP (The Asia Pacific Development Information Program) will set up 10 Cisco Networking Academies

9. See the African Virtual Network's Web site at http://www.avu.org. The World Bank has contributed approximately $6.5 million and the communications company Intelsat is donating free satellite time for the project.

in developing countries in the Asia Pacific Region. These academies will train students in skills specific to building and maintaining network technologies. The pilot program is in Kuala Lumpur, where the master teachers will be educated who will then teach at centers in Bangladesh, Bhutan, Cambodia, Fiji, India, Malaysia, Nepal, Papua New Guinea, and Sri Lanka (asia.Internet.com, 27 August 1999).

Computer and Internet literacy can be an extremely attractive asset for developing countries in bidding for international high-tech investment. In India, the government began stressing education in computers and engineering through its Institutes of Technology in the 1950s and 1960s. Now more than 600 companies export software services from India, employing almost 300,000 computer engineers (*New York Times,* 16 December 1999). Many of these companies are located in Bangalore, which offers tax incentives for software exporters. In Singapore there is a computer for every two students, and the country boasts some of the world's highest science and math test scores (*Red Herring,* January 2000). The importance of such training will only increase over time, as companies integrate computers and the Internet more and more into their production processes and service offerings.

## Incubators

High-tech success seems to come when many firms can cluster together, anchored by scientists, educational institutions, and financial and managerial capital: Route 128 in Massachusetts, Silicon Valley in California, Bangalore in India. Is there a recipe for success, or is the process more organic? Since the evidence is mixed, some governments are actively dedicating public funds to create high-technology business incubators, including direct finance of start-up businesses. However, probably the most important features of business incubators—spirited entrepreneurship and management expertise—can only be created by the private sector. Governments need to be very careful to avoid undercutting the development of the local Internet marketplace in an effort to create it.

The United States is unique in its devotion of private, early-stage capital toward new companies in the IT sector in general, and Internet start-ups in particular. Even in the world's most developed markets, innovative ideas for Internet start-ups can be stillborn for lack of capital. Although the United States and the European Union dedicate similar amounts to early-stage capital (about $9.4 billion per year), in the United States, 50 percent of that is dedicated to the IT sector compared to 7 percent in Europe (*Financial Times,* 23 December 1999).

Governments are trying to counteract this trend through direct financial assistance, which can include loans or loan guarantees, grants, or tax relief. In South Korea, the government is planning to spend one trillion

won this year to help create 5,000 computer-oriented venture companies. These companies are expected to generate more than 100,000 jobs (*South China Morning Post Technology*, 4 January 2000). An important question is can government-directed funding create the right environment of market discipline, managerial focus, and entrepreneurship?

An alternative strategy is more or less government support for business incubators that offer new businesses a range of legal, accounting, and managerial services. These can be important in helping entrepreneurs make contacts and secure vital seed funding. Independent studies in the United States have found that companies participating in incubator programs typically experience healthy growth and higher-than-average survival rates. They also have a large community benefit, in that they create jobs both directly and indirectly.[10]

Enterprise Ireland (http://www.enterprise-ireland.com) is a combination of both financial support as well as business incubator. It is a government agency with an annual budget of over $300 million that promotes Irish start-ups in a variety of sectors, including information technology. In exchange for an equity stake in a new business, Enterprise Ireland assists with business plans, financial and legal contacts, financial support, technical expertise, and market research. It sponsors trade development activities and its trade missions for Irish high-tech start-ups to Silicon Valley have resulted in two sizeable strategic alliances.

Unlike in education, in financing business incubators governments run the risk of competing against the private sector. Many private venture capitalists already offer portfolio companies incubator-like services, including management expertise. And the emergence of formal private incubators has become prevalent. One well-known example is CMGI (now a NASDAQ-100 company), which finances new companies while at the same time supplies what it calls ''intellectual capital,'' including infrastructure support, mentoring, and partnerships.[11] GeoCities and Lycos are two of the many successful Internet companies CMGI has helped to create. SpeedVentures is a European incubator that provides financing, strategic services, as well as office space and support services through ''speedhouses'' (''Natural Born Winner,'' TIME, June 19,2000 Special Report e-Europe). Japanese Softbank is best known for its financial depth. Chambers of commerce or other trade associations can offer incubator services, if not financing. The US Chamber of Commerce, for example, is introducing a new ebiz program, which will offer online incubator services to start-up companies in any industry.[12]

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10. This study was performed in 1997 by the University of Michigan. See http://www.nbia.org/facts.html.

11. See http://www.cmgi.com.

12. See http://www.uschamber.com.

## Technology Parks

Technology parks are supercharged business incubators: They offer a mix of services (technological and financial assistance, as well as training), but at a centralized location. They often offer investment incentives like reduced tax rates, an up-to-date physical infrastructure (office buildings, roads, etc), and simplified government regulations, which make them quite like the more traditional export processing zone. Technology parks also encourage the transfer and commercialization of technology and often have a strong research link with a university.[13] These parks are a big investment.

Many of the newest technology parks seek to attract investment specifically from Internet and IT firms. One example of such a park is Malaysia's Multimedia Super Corridor (MSC).[14] The $10-20 billion project near the capital city of Kuala Lumpur began in 1999 and will comprise an area slightly larger than Singapore. According to Prime Minister Mahatir, the MSC is intended to be ''a centrally located incubator for high-tech companies looking to penetrate the Pacific Rim and Asian markets'' (*Newsbytes News Network*, 12 February 1998). Scheduled for completion in 2005, the MSC will offer high-tech investors high-speed computer connections, Internet and intranet software and applications, and advanced construction techniques for buildings, homes, and public transportation. Called by *Business Week* ''one of the most ambitious government projects ever conceived in Asia,'' the MSC has investment pledges from high-tech giants like Microsoft and Oracle (*Business Week*, 29 March 1999).

While it is far too early to assess the success or failure of the MSC, some observations can be made about its potential to capture investment from the world's largest high-tech companies. Even with high employment and significant technology transfer from multinational high-tech companies to indigenous businesses (an expectation that may not prove realistic), the government would be hard-pressed to recoup its initial investment.

Also, pledges of investment from high-tech firms are susceptible to a range of influences, including macroeconomic performance and government policies toward investment and the Internet. When Prime Minister Mahatir Mohammad blamed the Asian financial crisis on multinational conspirators, and the government moved to restrict content on the Internet, many investors scaled back their initial investment pledges and others backed away altogether. Said one member of the MSC advisory panel, ''The essence of Silicon Valley is not in fiber optic cables, it is the creative, innovative drive, with large numbers of people racing to create

13. Theodore Moran, work in progress.

14. See the Multimedia Super Corridor's Web site at http://www.mdc.com.my/.

new ideas. That's hard to sustain in an atmosphere tinged with political repression'' (*Business Week,* 29 March 1999). This is a reminder that the overall policy environment is the most important factor in diffusing the Internet and electronic commerce into unconnected areas.

One approach to evaluating the potential of these technology parks, is to look to the experience many countries have had with a more traditional model for public investment: export processing zones (EPZs). Research suggests that EPZs create a sizeable financial burden on a country, without any guarantee of return (Alter 1991, Madani 1999). While some EPZs have raised employment, especially among women, their overall success is more strongly correlated with a country's general policy of liberalization and its macroeconomic performance. Furthermore, EPZs can engage each other in a downward cycle of competition, in which each is trying to outdo the others in terms of investment incentives.[15]

## Conclusion

Experience with EPZs should temper government's rush to expend huge sums of public monies for capital-intensive technology parks. The Internet is a particularly inappropriate sector for this kind of government intervention, given that the lightning-speed of change in information technologies makes it extremely difficult to predetermine outcomes.

But government and the private sector together do need to encourage the uptake of the Internet and electronic commerce, especially among individuals and businesses in disadvantaged communities. Network effects mean that the greater the number of Internet users, and the more diverse they are, the greater the value of the Internet marketplace. Programs like the US E-Rate program can persuade the private sector to make additional investments in infrastructure. Education, not only on how to use the Internet and its requisite technologies, but also on why they are important to individuals and businesses, is another area for government action, as Ireland and South Korea demonstrate.

Such actions, however, cannot substitute for a facilitative policy environment that encourages competition in communications, financial services, and distribution and delivery. Governments should also be wary of programs that compete with rather than complement the private sector, including the provision of grants or tax breaks to Internet companies.

In the end, policymakers will need to tailor pilot projects to encourage Internet access to the unique needs of the businesses and individuals in each country. The balance between government action and private-sector leadership is delicate. It should be evaluated not just for immediate impact but for how it will affect the Internet in years to come.

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15. Alter (1991).