CUBA

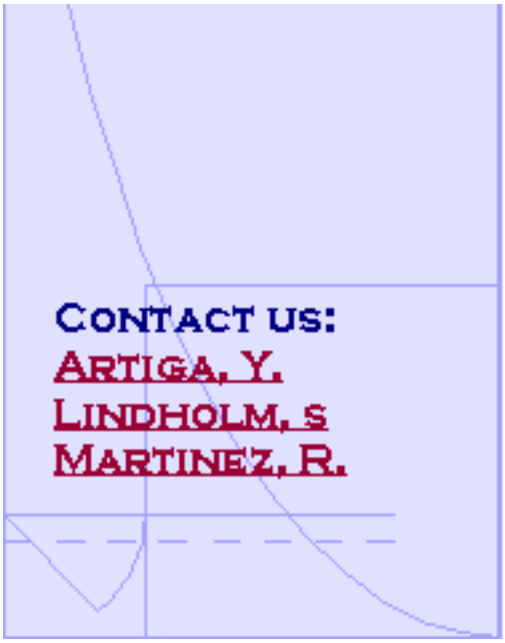
CUBA INTERNET DEVELOPMENT WORKGROUP

FOR STANFORD UNIVERSITY CS377C

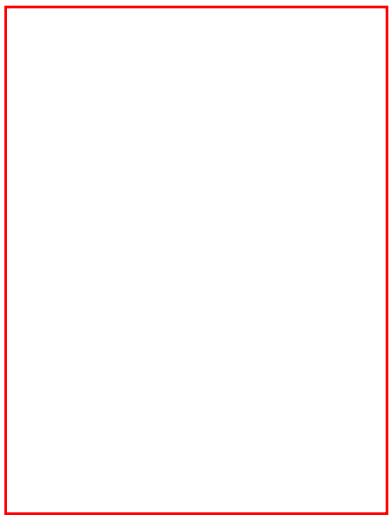
Welcome to our website, here you can find information on the development of the internet in Cuba, as well as social, political, and economic consequences of said development. Please feel free to explore and enjoy our site.

Check out the Powerpoint slides we used for our first presentation by clicking here.

index



Youth Computing Clubs



A student works at a terminal in Havana's Joven Club de Computacion, a youth center for computer training. Scott Wilson - The Washington Post)

Cuba has one of the lowest per capita rates of computer and telephone ownership in the hemisphere. Only a select few Cubans, mostly those with access to U.S. dollars, can afford a computer, even with deep discounts that come with government approval. Nevertheless things like the youth computer clubs offer youth access to computers.

Computer youth clubs are springing up everywhere. The clubs are owned and operated by the Cuban Communist government and therefore do offer access with restrictions. Castro himself has pledged strong support for the Youth Computing Clubs (YCC's), which are providing a greater base of knowledgeable users for the future. The first one opened in November 1987, and quickly became jammed with students ranging in age from 4 to 40 wanting to take computer courses offered at youth clubs. The clubs are filled with both students too young to read, learning how to use the mouse, to older students learning HTML and Microsoft Office. A reported 100,000 people completed the Youth Computing Clubs' computer education classes between 1993 and 1993.

The walls of the computer clubs are adorned with slogans and posters. The predominant slogan is "Creemos en el Futuro" ("We Believe in the Future"). Posters advertise courses in software programming, multimedia, computer repair, and e-commerce.

YCC's network is linked to the Internet though CENIAI. Many have reported that it is difficult to get into some of these clubs, for example in order to get e-mail, a member must get permission from YCC's board.

Resources

Articles

- "Dotcommies take over Cuba." The Christian Science Monitor. Dec.20 , 2000.
- "Web of Resistance Rises in Cuba." The Washington Post. Dec. 26, 2000.
- "Cuba's Newest Information War: Keeping the Internet Revolution Under Control." USC Annenberg Journalism Review. May. 6, 1998.

Speeches

- Speech Fidel castro made at the opening of the Youth Club Computer and Electronics Center in Havana on 7 March

Universities and Technical Schools

Overview

Eight Cuban universities offer degrees in information technology, and the Institute for Science operates 40 branches around the island providing adult education in computer science.

Cuba's largest IT programs are at ISPAJE and the University of Havana, which are focusing on creating a larger IT graduate base to boost the Cuban economy. More than 13,000 students have graduated from computer science and computer engineering programs. However, industry estimates project that the Cuban high-tech industry currently employs only 5,000 workers (34).

The Cuban government's restrictive attitude towards information and lack of Internet access are a constraint. Currently, the Cuban government invests 1.17% of GDP to technological research and development. IT professionals are increasing, with a rate of 1.8 scientists and engineers per 1,000 citizens, 47 universities, and over 200 research and development centers. However, IT training is restricted by the technology currently in use. Much of Cuban connectivity is based on the X.25 protocol, which is outdated and poorly suited to IP traffic. Technological training will likely shift when more capital is available (35).

Limited access to hardware and information compounds these difficulties as well. IT professionals must contend with 2,400 bps data transfers and constant redialing to make connections. Cuban technicians cannot go online and download the latest version of software or hardware and very few have access to technical books or industry journals (36).

Since Cuba is not a nation engulfed in IT such as the United States or other higher-income nations, the focus of Cuban IT is still on programming and not on other areas such as training or hardware development. Cuban IT professionals continue to meet the country's technical needs, but with antiquated IT infrastructure and poor anti-piracy laws, few IT professionals are flocking to the software development industry.

Instituto Superior Politecnico Jose Antonio Echeverria

Cuba's equivalent of MIT. Among its graduates are members of Castro inner circle, and it is the chief recruting location arriving dot-com executives who just a few years ago looked to the Bahamas and the British Virgin Islands for qualified high-tech workers.

Resources

As of two years ago, Cuba's only Internet link to the US was 64kbps, over satellite. WilTel, anticipating higher demand in a post-embargo climate, had applied to the Commerce Department in 1994 to lay fiber for a 2.5 gigabit link. The State Department gave the proposal a favorable review that year, but it sank in political mire. Quest Net, a smaller ISP in Florida, not to be confused with Quest Communications, proposed in March 1999 to build a 40 gigabit connection to Cuba, but it was not optimistic about its chances of receiving US governmental permission.

It turns out that US intelligence agencies were responsible for blocking the undersea cables; it is easy to eavesdrop on satellite calls, but impossible to eavesdrop on a glass cable.

Cuba's telecommunications backbone is based on X.25, run over coaxial cable, with the exception of a fiber-optic backbone using frame-relay in Havana connecting each ministry, another on the Isla de la Juventud, and one US-built and one Soviet-built microwave link between provinces. Where Cuba chose X.25 instead of frame relay, it did so for lack of expertise. The US has authorized 953 voice channels between the mainland and Cuba, although the demand is not high; only 504 of them are in use. The reason is that a phone call lasting barely a minute costs half a month's salary for an average Cuban. Another 162 circuits are provided by five portable groundstations to Italcable, they are located in tourist areas.

Cuban Telecommunications Structure and Investment

Converge Digest - QUEST NET SEEKS TO BUILD 40 GBPS US-CUBA FIBER LINK

Cuba News - The Miami Herald

Most of Cuba's telephone system dates from the 1930s and 40s, and it has deteriorated rapidly since the fall of the Soviet Union. Cuba made an effort to modernize in a 51/49 joint venture with Grupo Domos, a Mexican company, but Grupo Domos ran into financial difficulty after paying $745m. Grupo Domos sold what was left of its stake - 29.99% - to Italy's Stet company.

Cuba promised at the end of 2000 to digitize Havana's telephones, promising to have 65% digitized by the end of this year and 92% by 2004, and 78% digitized country-wide by 2004. In addition, 50,000 new public telephones will be installed throughout the island. Cuba claims that it has widened its nationwide data network and installed fiber in provincial capitals, but without giving specifics.

Grupo Domos Abandona Cuba

Priority for Public and Rural Telephone Development

Emphasis on Education

Many developing countries have experienced difficulty in building and maintaining networks because of the lack of specialists and sufficient technical training. However, the internet has not been widely accepted as a communication form because the population in general is unfamiliar with computers. Cuba, with its strong emphasis on technological education and research, will be much more equipped to deal with these challenges than will other developing countries.

Education has long since been a priority in Cuban Society. The state provides free schooling from primary school to university or technical school. Education is mandatory between the ages of 6 and 11. Almost all children continue with secondary education. Cuba has an average of one teacher for every 45 inhabitants.

Using a definition of literacy as individuals over age 15 who can read and write, 95.7% of Cubans are literate. And the island has more college graduates per capita than any other Latin American country.

Castro himself has been very supportive not only of education itself, but also of the improvement and increase of technological education. For example, the government has also placed an estimated 20,000 computers in secondary schools.

Resources

Internet access is completely unaffordable to most businesses and citizens - charges run $675 - US dollars, paid in cash - a month for "high speed" business access, and $450 for everyone else; the average monthly Cuban salary is $10, paid in pesos.

There is, in fact, no high speed access in Cuba. Cuba's only connection to the Internet is a 64kbps Sprint satellite link; 11 million people share a connection ten times smaller than what one US family with a DSL line has. All Internet access in Cuba goes through a government agency known as CENIAI; it is widely believed that the Castro regime reads all e-mail sent to or from Cuba.

CENIAI

Cuba has a portal. It's pretty cute. Like Yahoo, it has eight categories on the first page. But if you click on "Health & Science," you get Infomed. Click on "News & Media," you get two choices, AIN and Granma. You get the picture: Communism at its finest.

Cubaweb

Cubans are no longer allowed into government computer stores; only government officials and foreigners with passports may buy computers there. The most common way of buying a computer is buying it from another user; another is "redistributing" stolen computers from government offices. The Cuban government now views computers as more of a problem than a help. If a laptop enters the country with a foreigner, the serial numbers are recorded to ensure the laptop also leaves the country with the foreigner.

National Economy

As a Socialist Country that had allied itself with the USSR, Cuba's economy suffered some serious setbacks during the collapse of the Eastern European Communist bloc. GDP contracted from an estimated high in 1989 of 14.5 billion (US Dollars) to a low of 9.5 billion (US dollars) in 1993. GDP for 1999 is estimated at 18.6 billion (US dollars). Currently, the Cuban government is reporting a growth rate of about 6.2% thanks in large part to the growing importance of the tourist industry. Tourism has surpassed the sugar industry as the leading source of foreign capital influx to the island; receipts from visitors to Cuba surpassed 1.1 billion US dollars last year. Mexico was the largest single source of tourists in the year 2000, responsible for approximately 1.8 million visits.

Wage inequality, a growing problem in most Latin American nations, is not a factor because of Cuba's socialist economic system. However, a bifurcated system is emerging with the increase of tourism; one which separates between workers in the traditional sectors (where wages are paid in Cuba pesos), and those employed in tourism, where access to foreign currency through tips, is increasing wage disparity.

Resources

Britannica Online: Nations of the World Statistics, Cuba
CIA World Factbook 2000: Cuba
Cuba: aluvion de inversion
CyberAtlas Geographics: Cuba's Online Population
Annual International Energy

overview

InfoMed, Cuba's project to link its hospitals and medical schools, was built in 1992. In recent years, InfoMed has offered the National Telemedicine Network, allowing distance diagnoses of CAT scans, MRI, x-ray, and biopsy images, and the Virtual University of Medicine, offering thirty, Web-based formal courses for credit to upgrade the skills of specialists.

The network has always used Linux for its file servers, and InfoMed technicians have recently begun to convert all other institutions in Cuba to Linux, as well as helping their Caribbean neighbors build their own networks. Two staff members attended the first LinuxWorld Conference in Silicon Valley, whereupon Deputy Director Valentin Gonzalez panted, "Coming to this conference is like a Catholic visiting the Vatican."

Unfortunately, American restrictions on computer exports, as well as lack of funds, prevent Cuba's 70,000 physicians and researchers from having access to the computers they need. While China is allowed to import computers up to 12,300 MTOPS, corresponding to eight-way Pentium III servers, Cuba is limited to computers of 24.8 MTOPS, corresponding to the slowest 486 ever made. Fortunately, Congress has been willing to issue waivers from time to time. Recently, an unnamed American medical clinic offered to donate 1,800 Pentium computers, running at speeds up to 166MHz, to the Ministry of Public Health. Congress authorized that about a fourth of them could be sent.

USA-Cuba InfoMed Project

InfoMed

Links

Here are some additional links that can provide you with further examples of Cuba's Online presence:

CENAI--#1 Cuban ISP provider
Isla Grande & Columbusnet--Cuban ISP providers,
CIGET--Leading Cuban Technology and Informatics site
Cuba Gob--official government website, provides legal materials.
CubaWeb--the National Website of Cuba
Granma--Cuba's official newspaper--published in 6 languages
Info Com--public messages and yellow pages
Infomed--Leading site with medical information and resources
Prensa-Latina--a great source of latin american current events from the Cuban perspective

overview

Labor Market

Overview

One of the main questions many Cubans and others are interested in, is to what extent will the new Internet-based electronic commerce provide new opportunities for individual entrepreneurs, small businesses, larger internationally-oriented companies, and consumers?

Although, Cuba has one of the best-educated workforces in the Caribbean and Latin America, because job opportunities are vehemently dictated by the government, IT professionals frequently find few opportunities. Economic use of the Internet in Cuba has followed the country's general pattern of economic bifurcation, where market mechanisms are introduced only in the dollar-denominated, export-oriented sector. To prevent the creation of class divisions between Cubans, the government has allowed only a minimum of market reform in the domestic economy. Without a major and committed liberalization of restrictions on private enterprises, scholars believe that there is little chance of the emergence of a class of Internet entrepreneurs that might exert political pressure on the regime.

The Cuban labor force has an economically active population of 4.5 million workers. The state sector dominates 76% of the Cuban economy, while private sector endeavors comprise only 24%. By occupation, the labor market is comprised of the following sectors: services and government, 30%; industry, 22%; agriculture, 20%; commerce, 11%; construction, 10%; and transportation and communications, 7%. (High-tech workers are included in the services and government category.) The unemployment rate is 6%(According to a December 1999 estimate). Approximately 170,000 Cubans are self-employed. Until 1995, the Cuban government forbade university graduates from self-employment, but removed this ban on July 1, 1995.

Despite highly publicized migration attempts, migration has not significantly impacted the Cuban economy. The current net migration rate is 1.52 migrant per 1,000 citizens. Therefore, "brain drain" of IT professionals have not been a significant problem.

Income and Purchasing Power

Monthly salaries in state-run positions range from 150-200 pesos for secretaries and laborers to 300-425 pesos for engineering and medical professionals. Government-sponsored pensions range from 120-190 pesos per month. Self-employed individuals earn between 300-1,200 pesos, on average. (Currently, 20 pesos equate to $1 USD.) Subsequently, entrepreneurial ventures are beginning to increase in number.

To give an indication of purchasing power, consider the following price listing at a Havana farmers

market:

1 pound rice: 4 pesos
1 bunch carrots: 6 pesos
1 pound black bean: 10 pesos
1 pound pork: 28 pesos
1 turkey: 200 pesos (32)

Most Cuban workers receive monthly food rations to supplement their incomes. However, monthly rations cover less than two weeks of minimum food requirements. Food and necessary consumer goods must be purchased in dollar shops or on the agricultural and black markets. Subsequently, private remittances from friends and families living abroad have become a significant element of the Cuban economy. Revenues from foreign remittances have skyrocketed to approximately 780 million pesos (33).

Hardware Manufacturing

No major global hardware companies have operations in Cuba. Cuba does produce limited quantities of hardware products; however, exports are minimal, and Cuba is not recognized as a global or regional player in any hardware niche. Cuban industrial planners look more to software development as the future of Cuban IT progress.

Software Manufacturing

There are 30 software development companies-none existed three years ago. Total software exports for 2000-$14 million-this is a 650% increase since 1999.

Silicon Calle

Cuba currently has no specific high-tech area similar to Silicon Valley. However, the Cuban government is promoting an initiative which they refer to as Silicon Calle: The High Technology Nexus of Cuba.

There is very little information available on this initiative other than the government's statement that "Silicon Calle is the best term for an emergent, albeit not clearly defined, inCUBAbator of high technology and communications in Cuba today" (93).

Resources

Articles

- "Dictatorships in the Digital Age: Some Considerations on the Internet in China and Cuba". Information Impacts Magazine. October 2000.
- Viva la Digital Revolution in Cuba. San Francisco Chronicle. January 8, 2001.

Others

- The World Factbook 2000

Surprisingly, Cuba's largest earner of foreign currency is now tourism, earning $1.5 billion in 1997 on 1.1 million people. In 2000, 1.8 million tourists were expected. The tourists largely come from Canada, but also from Italy, Spain, France, Mexico, and Britain. Unfortunately, the numbers dipped in the first quarter of 1999 when the Cuban government cracked down on prostitution - Havana hotels now stay vacant, and fewer unaccompanied men travel to Cuba. It seems, however, that making the island a more "wholesome, family-oriented" place has more than compensated, attracting record numbers of people to Varradero Beach and other resorts that the government continues to build.

CNN - Sex Trade Crackdown Not Slowing Cuban Tourism

AP - Cuban Tourist Market Growing Fast

Nothing is taxed in Cuba.

The dollar was legalized in 1993. Until then, Cubans were barred from entering dollar stores, so they had to beg tourists to exchange dollars for pesos and buy things for them. Now, anyone with a relative in Miami, or who works in the tourism industry - about a third of the population - can live extremely well, buying vegetable oil, meat, milk, shampoo, washing machines, sporting goods, watches, ice cream, pizza, and so on. Capital mobility is still under tight control; it is illegal to bring Cuban pesos into the country, and the official exchange rate has been pegged to the US dollar at exactly one-to-one since 1993, although pesos are non-convertible.

The black-market value of the peso plummeted to 150 per dollar after the collapse of the Soviet Union. Although it eventually crept up to 25 per dollar, the Cuban government requires hard currency for imports. Unwilling to let the exchange rate float, yet needing to have some method of skimming dollars from the local economy, the Cuban government decided to open an exchange house that converted at the black-market rate.

Known as Cadeca, short for "casa de cambio," the government exchange house is aimed strictly at locals, not tourists. Tourists who use the service may convert a maximum of 10 pesos back to dollars, and to do so, they need to turn in the receipt from when they received the pesos. Fortunately, pesos are completely unnecessary, except for riding the bus.

The Implications of Currency Substitution Experiences in Latin America and in Eastern Europe for Cuba

ABC News - Dollar Lifts Cuban Economy

ABC News - US Opens Cuban Doors, but Just a Crack

Most foreign investment in Cuba relates to tourism, medicine, or food production, not telecommunications. Notably, UNICEF donated $80,000 for computers in Cuban medical schools.

[The Sociological Impact of Rising Foreign Investment]

Cuba officially believes in intellectual property: It recognizes its responsibility to the international community, wishes to foment a culture of respect for trademarks and copyright, and wants to guarantee that Cuban efforts will be respected abroad. It is party to international treaties (OMC, GATT).

However, because of the US embargo to Cuba, it is impossible to obtain legal copies of American software. Further, few Cubans would be able to afford the software, unless it were sold at a drastically reduced rate, and the antediluvian computers Cubans are forced to use would not be able to run the most current versions.

[Sistema Nacional PI]

[Che is Dead]

Internet Regulation

Government Regulation

Cuba first gained its own internet address on January 12, 1995 when Inter-NIC (the internet's regulatory board) granted a class B internet address (.cu) to Centro Nacional de Intercambio Automatizado de Informacion (CENIAI). CENIAI was already the host to the largest internal network of scientific research, and as an extension of the governments Ministry of Steel, Metallurgy, and Electronics (SME), was best poised to handle the technical difficulties of providing limited access to the nation. This license was handled in conjunction with the Ministry of Communications and the Ministry of Defense. As of January 13, 2001 the Ministry of Science and Technology was created to replace the former Ministries of Communication and of SME. Thus this new government Ministry of Science and Technology currently controls and regulates Cuban access to the Internet.

Law Decree 209, passed in June of 1996 is the official regulatory decree. This law requires that a license be granted to people wishing to have access to the Internet. This license may only be issued if one has an affiliation to one of the 10 government approved associations. These associations were said to be part of a first phase of Internet development in Cuba; associations were granted priority depending upon their ability to advance the government's economic, political, and social goals.

The Decree created an Inter-Ministerial Commission to regulate management and development of the national network. The five members on the board were to be CITMA, MINCOM, Ministry of the Interior, Ministry of Justice, and the Ministry of the Revolutionary Armed Forces. Cuba seemed to have back stepped from the position that all Cubans had the fundamental right to access the human patrimony provided by the net, to a more conservative stance, which demanded the most practical applications first. It is true that the Cuban Infrastructure is antiquated and incapable of handling the traffic that common Internet access might require, yet, the Cuban Government has used the Internet as an effective political tool as well by limiting the access to party loyalists.

It remains to be seen whether the Cuban governments claims that access was only limited because of Technical difficulties with Cuban infrastructure was honest. New Telecom modernization efforts have improved island communications and could, potentially, allow for an opening of internet access within Cuba. Efforts underway, currently include a digitization of the Cuban telephone network, and the installation of satellite communication systems that are more dependable, as well as the strengthening of telephone access of the population. Currently, 14 VSAT are being installed in order to expand and improve the cell phone network, and 21 stations that transmit calls through the radio network, are in place in remote southern areas. Also, 50,000 additional public phones will be installed throughout the island by 2004. It is also expected that by 2004, 92% of Havana will run on a digital phone network. The improvements in the

infrastructure, and Cuba's glowing success in tourism and bio technologies, will hopefully allow for an expansion of the internet into a "phase two: the private sector."

Access Limits

Other Repressive regimes have attempted to control the democratic effects of the Internet by controlling/restricting content with limited success. However, Cuba's efforts to diminish these effects through the limit of access to only those officials who have previously proven themselves capable of handling internet access, has been much more successful. It is often argued that the Internet is a tool that will increase information flow, which inherently will make repressed peoples yearn for the freedom of democratic reforms. Indeed, this has been the hope of the US government in regards to Cuba, as shown through the US broadcast of radio free Havana. Yet, Castro has been extremely confident in walking the fine line between the economic and educational benefits that the internet provides, and the political and social costs that such a freedom may cause his dictatorship. This is not to be unexpected, as the people who do have internet access in Cuba, are those who are to fearful to misuse it, lest the privilege be taken away.

Cuban Democratization

The Internet has served in Castro's interests as a defense mechanism against US imperialist policy. Cuban government officials often say that the Internet provides them with the opportunity to present the reality of Cuba to the world. This is demonstrated through the number of nationally sponsored websites, such as cubanet.cu, or the great number of travel and biotech websites that are available. Indeed, even Granma, the official Cuban newspaper that is rapidly losing credibility within Cuba, has renewed itself by offering its content in 6 languages. Cuba is using its status as the weakling state very effective internationally against US aggression
(i.e. Toriccelli Act of 92, or the Helms Burton act of 96). In fact, a recent UN vote that would have implied UN approval of the United States' embargo on the island was rejected by a margin of 167 to 3. The 3 in favor being The US, the Marshall Islands, and Israel. Indeed the US is apparently out of sync with world views on the communist regime, and missing an opportunity to economically infiltrate the island because of the embargo. It is possible that the embargo may be lifted sooner than expected, as corporate pressure within the US forces government officials to reconsider their Cuba Stance. In addition, 45% of Cubans feel that the embargo should be lifted, so their political pressure is no longer as important as it once was.

Resources

Boas, Taylor "The Dictator's Dilemma? The Internet and US policy toward Cuba" Washington Quarterly 23:3 pp 57-67 Summer 2000.
Cuba, the Internet and US Policy by Nelson Valdes
?Cuba Libre? by T. Boas
Dictatorships in the Digital Age
The Impact of the Internet on the Politics of Cuba by Andy Williamson

overview

[The Internet in China and Cuba]
[Telephone development]
[ZDNET: news update]

www.cubalibre.cu?

TAYLOR C. BOAS

The Internet and its Prospects for a Democratic Society in Cuba

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We have no elected government, nor are we likely to have one, so I address you with no greater authority than that with which liberty itself always speaks. I declare the global social space we are building to be naturally independent of the tyrannies you seek to impose on us. You have no moral right to rule us nor do you possess any methods of enforcement we have true reason to fear." These words are taken from the "Declaration of the Independence of Cyberspace," presented on February 8, 1996 at the World Economic Forum in Davos, Switzerland by John Perry Barlow, co-founder of the Electronic Frontier Foundation. While his grandiose proclamation is an extreme one indeed, his words are indicative of an increasingly widespread sentiment among everyone from philosophers to computer scientists that the internet is rendering national sovereignty obsolete, making it increasingly difficult for nations to control citizens' access to information, and contributing to a worldwide trend toward democracy. Governments across the globe have responded to the potential threat posed by this information revolution by attempting to regulate the internet in one way or another. Efforts to do so have ranged from the United States' Communications Decency Act, which attempted to levy fines for providing "indecent" material online, to Myanmar's fifteen-year mandatory prison sentence for anyone caught in possession of networked computers without authorization.

Social scientists and journalists have begun to study the societal effects of the global diffusion of the internet, looking primarily at different nations' attempts to regulate the technology and the relative success of their efforts. As the internet is still in its infancy, the interpretations of its capability to engender change are quite varied; some are optimistic about the internet's potential to promote worldwide freedom and democracy, while others expect repressive regimes to control this technology like they have other forms

of communication in the past. So far, most of the scholarly attention on the issue has been paid to authoritarian countries in Southeast Asia such as China and Singapore, as well as certain Western democracies like Germany, France, and the United States. Very little analysis has been focused, however, on a case that is relatively unique among authoritarian regimes: Cuba.

While both China and Singapore have a strong industrial base and free access to Western technology, Cuba has made gains in its networking technology in spite of the US embargo, its decrepit telecommunications system, its cash-starved economy, and its status as a developing nation. Unlike China and Singapore, whose efforts to control the internet have involved attempts at isolating the country's computer users from the global community, Cuba has consistently pushed for greater electronic connectivity to the outside world. Rather than establish elaborate mechanisms to censor the material available on the internet, Cuba has regulated the technology mainly by restricting access to it. This introduction of a government-controlled internet, however, is coming at a time of social, political, and economic liberalization for the country. As one of the few remaining members of the former Soviet bloc, Cuba has been struggling to redefine its identity in the post Cold War period. Since the demise of the Soviet Union in 1991, Cuba has instituted a number of gradual economic and political reforms which many say are leading the country in the direction of openness and democracy. If the current social and political theory on the internet claims that it is an inherently democratizing technology, what role, if any, is it playing in this gradual shift in Cuban society?

To address that question, it is necessary to examine prevailing thought on internet communication as well as the status of Cuban internet development. Important to this is a discussion of theory on the social and political effects of internet communication and its applicability to the Cuban case, beginning with a look at general information technology theory, as well as some specific arguments on the correlation between the internet and democracy and the technological difficulties of regulation. Observers have differed with regard to the effectiveness of the ways in which nations try to control and regulate the internet. These perspectives will be discussed

with respect to Cuban networking history, the status of the telecommunications system, and the major computer networks that exist in the country. Finally, arguments will be considered that suggest on the one hand that the internet has a democratizing effect on Cuba and on the other that it has a negligible political effect on the country, illuminating Cuba's best prospects for a more open and democratic society. This evidence supports the notion that the internet is contributing to democratization in Cuba in three significant ways: by strengthening civil society through the empowerment of non-governmental organizations (NGOs), by laying the communications groundwork for a future democratic society, and by opening the country and its government to the scrutiny of the outside world.

Information Technology and Internet Theory

A discussion of any communication form from a social science perspective must begin with a look at information technology (IT) theory, which analyzes the social and political effects of communication media ranging from the printing press to cable TV. Except for the most recent writings in the field, IT theory has yet to fully incorporate the modern internet, but it does pay a good deal of attention to satellite telephone and television and other high-tech forms of global communication. Many of IT's proponents herald the reversal of George Orwell's vision of state-dominated technology presented in the book *1984*. In today's world, they claim, technology empowers individuals rather than rulers, and people have multiple ways of knowing exactly what their government is doing. Walter Wriston, among others, argues that the improvements in information technology of the late twentieth century have eroded the sovereignty of traditional nation-states. In support of this thesis, he points to the photos of the Chernobyl disaster taken by a privately-owned French satellite, which forced the Soviet government to change its official explanation of the disaster. He also argues that the worldwide diffusion of electronic financial data diminishes a state's ability to lie to its citizens about economic prosperity or insulate its markets from global shocks.

Should internet technologies be considered any different from other high-tech forms of global communication?

Much of IT theory also looks at the democratic influence of global communication. Wriston claims that in the global village that has been created by today's technology, people are aware of the rights and freedoms that the rest of the world enjoys, and it is difficult for a government to deny them the "established customs of the village." Eugene Skolnikoff likewise agrees on the democratic potential of modern IT; after looking at examples of information flow in the Soviet Union during *glasnost* and the 1991 coup attempt, he concludes that "the introduction of information technologies...tends, on balance, to have consequences that are biased in the direction of increased limitations on the centralization of political power and toward greater openness within a society."

As mentioned above, most of the general theory on IT was developed before modern internet services–email, Usenet newsgroups, and the World Wide Web–were widespread or even available. Should internet technologies be considered any different from other high-tech forms of global communication? Many observers do not see a distinction between different forms of communication, but rather a synthesis, as print media, cable TV, telephone communication, and computer networks all converge into one giant information superhighway. Along these lines, Wriston argues that the strong international support for free speech in print will prevail in this new information synthesis. Communications scholar Ithiel de Sola Pool, however, sees a distinction between the democratic potential of different communication media. Freedom, he claims, is more likely when access to communication is more dispersed and widely available, whereas control is more likely when the means of communication are concentrated and monopolized. Christopher Kedzie, in a 1996 study of the internet and democratization, further categorized forms of communication as multidirectional (many-to-many), unidirectional (one-to-many), or bidirectional (one-to-one). Multidirectional communications, of which the internet is an example, may be inherently conducive to the formation of democratic institutions, since individuals can both receive from the masses and broadcast to them. In contrast, unidirectional communication such as television and radio places information control in the hands of a few, and bidirectional communication such as the telephone tends to empower

everyone without significantly tilting the balance one way or another.

Kedzie's argument is based primarily on statistics rather than theory, and he does not explain exactly how interconnectivity promotes democratization, other than pointing out the inherently pluralistic nature of multidirectional communication. One idea is suggested, however, with his reference to the dictator's dilemma and the virtuous circle of causality. The dictator's dilemma theory holds that a state's initial opening to capital–either in the form of direct communications investment, or in general–increases interconnectivity and thus eventually leads to a more democratic society. This theory in itself does not explain exactly how the interconnectivity influences democratization, but various scholars have offered a number of ideas. Nelson Valdés, although critical of the internet's democratic potential, presents a summary of the major theses that support it. One argument claims that interconnectivity makes the citizens of a repressive country aware of the political, social, and economic reality of the outside world, and the fact that their lot could be improved; it thus encourages a "revolution of rising expectations." This assumes, of course, that the internet is providing information which is not otherwise flowing into the country. A similar argument holds that the decentralized nature of the internet and its multidirectional character is itself a model for democracy.

Just as important as citizens of a closed society catching a glimpse of the outside world, however, is the outside world discovering what is happening within a repressive country. If the internet facilitates the publicizing of human rights abuses and political repression by an authoritarian regime, other countries are likely to take notice and exert pressure for change, making it more difficult for the dictator to continue with impunity. Also, it is clear that the internet can provide a base for popular communication within a country, which aids underground organization activity and strengthens civil society. A combination of the influences of improved organization capability and international scrutiny can be seen in the use of the internet by several dissident or rebellious groups in recent history. Lawrence Greenberg and Seymour Goodman, for instance, mention the Zapatistas' use of e-mail

in their 1994 uprising to send orders, agitate the Mexican government, and publicize their plight to the world media. Press notes the popular use of the Soviet network Relcom to circulate uncensored news and information during the 1991 coup attempt.

Despite these arguments for the democratizing potential of interconnectivity, many political scientists would be skeptical of the claim that the internet can wrench power from a dictator who does not want to relinquish it. Nations have dealt with communications advances since the days of the telegraph without it seriously undermining their political control, and they have developed successful means for regulating telephone, radio, and television communication. Is the internet really so fundamentally different, or are the claims for its democratizing potential simply hype surrounding a new communications medium? Certainly, there are those technological determinists who prophesy an information revolution without fully understanding the political and social realities that they claim will be revolutionized.

The fact that the internet was built to withstand a nuclear attack makes it exceedingly difficult for anyone to censor.

A look at the technology behind the internet, however, shows that it can indeed be nearly impossible for anyone to police. Part of the difficulty lies in the structure of the internet itself: a packet-switching network, with information exchanged by a set of rules known as Transmission Control Protocol and Internet Protocol (TCP / IP). Data traveling on the internet is broken up into packets and sent to its destination via any number of intermediary network connections, following whatever path is most convenient at the moment the information is transmitted. Internet data does not necessarily follow the same path twice, and if one path is overloaded or blocked, it can be relatively easily rerouted. The internet has no central command center and is not "run" from any one location; it is simply a set of connections between computers and protocols that computers must follow to exchange that data with each other. It was explicitly designed that way by the U.S. Department of Defense to be a decentralized network, so that an enemy could not incapacitate the entire network by destroying any one part of it.

The fact that the internet was built to withstand a nuclear attack makes it exceedingly difficult for anyone to censor. As

John Gilmore, co-founder of the Electronic Frontier Foundation, has claimed, "the internet interprets censorship as damage and routes around it." Most of the efforts at national censorship spring from a desire to restrict information from other societies where moral or political standards may be different, but censorship tools are weak at best, often due to the very global nature of the internet. Commercially available software like Surfwatch, or national firewalls built on a similar concept, can filter out words and phrases in an attempt to eliminate pornography and political material, but they tend to cut out too much or too little, and it is expensive to maintain and update the elaborate system necessary for this type of censorship. Rather than censor based on the content of material, some countries are attempting to eliminate all information coming from a particular nation or from the outside in general. This is easier to do, since every internet communication carries an internet protocol address that, like a telephone country code, identifies its source.

There are, however, ways around this type of control as well. If users can establish accounts in another country, they may access these accounts by telnetting, so that the computer that processes their data is located in another country with looser regulations. If a website is located in a country to which access is blocked, a user can access the information it contains through mirror sites located in other parts of the globe. An example of this kind of frustrated national regulation is that of Germany, which has blocked its citizens' access to certain US-based holocaust denial sites, yet an internet user who wishes to view them can use the Great Web Canadianizer, which copies the offending information to computers in Canada that the German user can then access without restriction. Essentially, as lawyer Michael Froomkin has argued, the internet allows for "regulatory arbitrage": choosing which rules one wants to have enforced, where the country with the loosest regulations sets the standard.

If a government is concerned that people might be circumventing national barriers that it has established to control information flow, or distributing unwelcome pornographic or political material, it might try to monitor individual communications to catch and punish the offenders. Tracing an e-mail, however, is much more difficult than

steaming open a letter or tapping a phone line because of the anonymizing and encrypting tools that are available to almost any internet user. Theoretically, a government would have to go to so much trouble to catch a determined internet user that the effort would be prohibitively expensive and time-consuming if possible at all. Essentially, argues Froomkin, a government can restrict access to the internet, but once access is granted, there is no way to limit what information can be sent and received.

Is Regulation a Possibility?

Not all communications scholars are convinced that the internet is impossible to regulate, however, and neither are a number of authoritarian governments which have made strong efforts to censor the material available online. Critics of the impossibility of regulation point to some real world examples and theories of their own to counter the argument that the internet necessarily impinges on national sovereignty. Greenberg and Goodman have taken this critical stance, pointing to a number of ways in which governments can control a global technology through the power they exert within their territorial borders. The regulatory strategies they identify fall into two main categories: restriction of access and censorship. In the first category, a government can control access to individuals through its licensing of the networks that provide internet service and can direct the building of networks from the ground up when little infrastructure already exists. It is significantly easier for authoritarian governments in developing countries to control access when they have always been in charge of the building of networks, as opposed to trying to exert control over an anarchic structure that already exists.

In the category of censorship, Greenberg and Goodman point out a number of ways in which governments can place pressure on outsiders to stop providing objectionable material; this is perhaps a tacit acknowledgment of the difficulty of censoring internally. An authoritarian regime can threaten to prevent outside firms from doing business in its own country, a strategy employed by China with respect to satellite television. Likewise, a country can sue an offending foreign firm under its own legal system. An example of this is

the much-publicized case in which Compuserve, an American internet service provider, was sued in German courts for allowing that country's citizens access to materials that violated German law. In terms of domestic monitoring, a government can set up sting operations in which one party to an illicit communication collaborates with authorities, or it can coerce a domestic internet service provider into assisting with monitoring individual communications.

China has consulted with a Silicon Valley firm in the building of its national networks and is making use of the latest technology from Sun Microsystems; Cuba has been lucky to receive donations of used personal computers from American humanitarian groups.

To support such theories on the possibility or impossibility of internet regulation, most scholars have looked at cases of authoritarian governments in Southeast Asia. Almost all countries, the United States included, have attempted to regulate the internet to some degree, but most Western countries are already too connected and have too strong a tradition of democratic government to allow the strong crackdown that is possible under authoritarian regimes. The Southeast Asian countries studied are particularly interesting cases because each of their governments has a vested interest in providing up-to-date communications technology to attract foreign business and investment, but most are also extremely concerned about the infusions of values and morals that this connection to the outside world may bring. Most of their efforts to control the internet have involved what Froomkin argues is impossible to do effectively: promote domestic connectivity, monitor internal internet traffic, and censor material coming from outside by means of a national firewall system.

For the purposes of comparison and contrast, several generalizations can be drawn from the cases of Singapore, China, and Vietnam. China and Singapore have promoted broad-based domestic connections to their national networks but have attempted to extensively monitor or censor material. Both programs are in the developmental stage, so their effectiveness cannot be conclusively judged. However, evidence suggests that some unauthorized information passes through the barriers in both countries. In China and Singapore, the development of the internet has been primarily driven by economic concerns.

Vietnam is also responding to economic incentives in its network development, but it is not promoting informational isolation as are the other two countries. There are several

possible reasons for this. One is that Vietnam has long been isolated against its will and is looking for greater connectivity to the world through the internet; another is that the country cannot throw around the economic weight that China and Singapore can, and it must open up to attract investors rather than define the terms upon which it will do business. There appears to be little popular connectivity in the country, perhaps because the internet infrastructure is still under development and has been targeted at the business sector, though another reason to consider is that the government may not be interested in giving access to potentially subversive members of society. The possibility of this second case is significant. If Froomkin is correct in his assessment that a government can only control the internet by restricting access, is there then a solution to the dictator's dilemma–a system of informational apartheid, in which the dictator allows access where it is economically beneficial, but restricts it where politically subversive? This question is essential to the discussion of the Cuban case.

An Overview of Cuban Networks

In 1983, the National Center for Automated Information Interchange (CENIAI), which at that time was a subdivision of the Cuban Academy of Sciences, made the first international satellite link to Soviet databases via IASnet, a network for socialist countries allied with the USSR. CENIAI established the first domestic network in 1988, primarily for use in the scientific community. Throughout the 1990s, Cuban networks developed further with continued emphasis on scientific access to email and databases, though connections began to extend to secondary education and the government as well. By March 1997, Cuba had established 32 large networks connecting government agencies, universities, research centers, youth computer clubs, and various other entities.

CENIAI is Cuba's central network, and its largest, and it serves as a connection point for the other networks within the country, as well as the gateway to the outside world via the direct internet connection. The network connects mostly government agencies and institutions in the hard sciences. Cuba's science community is also served by CIGBnet, operated by the Center for Genetic Engineering and

Biotechnology. CIGBnet was launched in 1991 to connect Cuba's four major biotechnology research centers; it had over 1500 users as of 1995, and offers services such as email, database searches, and mailing lists. InfoMed, which was established in 1993 by the Ministry of Public Health, is a comprehensive effort to connect members of Cuba's medical community to each other and to the outside world.

The fourth major network, TinoRed, departs most sharply from the government-directed model of internet development. TinoRed is a non-profit Cuban NGO which offers free service to organizations in the areas of social science, culture, health, education, and religion. The network links 150 Youth Computer Clubs located throughout the island, which offer walk-in centers for relatively unstructured computer use as well as a number of computer classes. TinoRed is also the gateway to Red David, which provides networking for a number of Cuban NGOs. Valdés notes that this subnetwork has a "highly democratic and participatory subculture." Like InfoMed, TinoRed has received significant support from international donors and NGOs such as the Association for Progressive Communication.

Analysis of the Internet's Social and Political Effects in Cuba

Given the current status of Cuban networks and the significant growth that they have experienced in the past decade, there is little doubt that Cuba has made impressive gains in internet communications by both developing country and Latin American standards. Its success is even more impressive when one considers that all of the major networking developments have taken place in a period in which Cuba has had to cope with the loss of Soviet trade and the tightening of the U.S. embargo. China has consulted with a Silicon Valley firm in the building of its national networks and is making use of the latest technology from Sun Microsystems; Cuba has been lucky to receive donations of used personal computers from American humanitarian groups. As in other developing countries, however, the majority of network building has been government-led; the Cuban government has a long history of maintaining tight control over information. The state has successfully dealt with most other

forms of potentially subversive communication, from jamming the Miami-based Radio Martí to filtering printed news through the official Communist Party newspaper. Is there any reason to expect that the internet in Cuba will be any different? Will this new technology have a democratizing or opening effect that other forms of communication have not?

Critics of technological determinism would argue against this position for a number of reasons. The government has maintained a heavy hand in restricting internet access, which so far has gone almost exclusively to state-approved entities. While foreign businesses and tourist operations can purchase accounts on one of the networks, there are no commercial internet service providers that offer access to individuals, even if they have dollars to pay for it. Unlike Singapore, Cuba has no cyber-cafes offering public access to the internet, though the Youth Computer Clubs do allow some walk-in public computing. All of the internet traffic leaving the island currently passes through CENIAI's recently established direct internet connection, a predicament which would have to change only if use increased significantly. Some skeptics note the cost and scarcity of computers and modems in Cuba and doubt that anyone without government or commercial connections could obtain the equipment necessary to allow internet access. With the current status of the domestic telephone system, others point out, many homes where dissidents might be based do not even have access to reliable phone service.

One of the strongest arguments against a potential democratizing effect of Cuban networks is that the greatest Cuban presence on the internet is the country's government itself. When strengthening U.S.-Cuba telecommunications in the 1992 Cuba Democracy Act, many U.S. policymakers believed, somewhat naively, that what they were promoting would be a one-way flow of democratic concepts to Cuba. The Cuban government, however, had its own plans for participating in the market of ideas. In mid-1996, Prensa Latina, the official Cuban news agency, issued a statement saying that "Cuba, with full access to Internet information and services, expects to be an active supplier of information and not just a passive recipient." In response to the proliferation of anti-Castro propaganda on the Web, the Cuban government

launched its own official home page, CubaWeb (http://www.cubaweb.cu), in January of 1996. From this page, one can read the online version of the official Communist Party newspaper in five languages, examine the new Cuban law on foreign investment, check out the home page of the luxurious Horizontes Hotel, or select a car to rent for an upcoming trip to the island. Much of the home page provides useful and unbiased information on everything from Cuban music to the schedule of events at the Havana convention center, but the page has its political advantages as well. In a report on the first anniversary of its online edition, the Communist Party newspaper *Granma International* said that putting news on the internet was "not just a judicious but a total and primarily political success." It further notes that "it's somewhat ironic that the internet, created in the United States and almost 70% operated from that country, has become an effective tool for enabling this weekly to bring to the world what the world wants and is rarely able to know about Cuba: the truth."

To understand fully Cuban networking in the global context of the internet, one should examine how the country's experience compares with those of other authoritarian regimes. Cuba is unique when compared to China and Singapore in that it has consistently pushed toward greater internet connectivity rather than isolation from the rest of the world. The country's 1992 connection to Web Networks in Canada was achieved relatively smoothly and without opposition on the Cuban side. In the years following, as the Miami exile community discovered Cuba's connection, there were increasing numbers of anti-regime messages sent into Cuba via email; in one case, the U.S. Interests Section in Havana (the substitute for an American embassy) acquired a TinoRed account and used it to post information on U.S. policy toward Cuba. Such incidents fueled the debate over the internet in Cuba, and they lent support to those in the government that opposed greater connectivity because of the increased potential for the spread of subversive ideas.

The debate was brought to a climax in January 1995, when Cuba was given permission to establish a direct internet connection. However, there was significant support for the internet within the government, and Valdés claims that "by

early 1996, the debate over networking had clearly been settled in favor of greater connectivity." Decree-Law 209 established a governing structure for the internet that was divided among five ministries, "in decided contrast to the 1994 attempt by the Ministry of Communication to centralize control of all facets of networking and telecommunications." Upon its establishment, the direct internet connection was described by the Ministry of Foreign Affairs in an overwhelmingly positive statement:

> Cuba is connected...to the Internet, turning into a reality what had been a dream for so long: having access to an international patrimony of knowledge used by some 36 million clients of 160 nations. As a result of the efforts of hundreds of specialists, Cuba will have access from now on to some 34,000 data bases of the most ample spectrum of social, political, economic, scientific, and sports information.

Such optimistic words were not just the official party line, either. In a private e-mail sent after the internet connection was established, Jesus Martinez, director of CENIAI, said that "after so many days, years, of sacrifice and worry, I have the great satisfaction of informing you that our beloved Cuba, our alligator of the Antilles, has been able to be connected to the Internet as we had desired."

One could argue that Cuba has been able to promote international connectivity without worrying about extensive censorship because the government is able to control who within the country has internet access. In this sense, Cuba may be a similar case to Vietnam, which has also been developing its internet connections but has not set up any elaborate censorship mechanisms. Both countries have been isolated for years, to a large extent because of similar U.S. embargoes, and it may be understandable that they are striving to establish connections with the rest of the world rather than limit them as China and Singapore have done. Both need to entice foreign investment and are unable to use economic weight to force eager investors to deal with limits on free information. Both are building the internet from the ground up, and both have the ability to control its growth, at least for the present.

Through the restriction of internet access to government-approved entities, it might seem that Cuba has indeed found a solution to the dictator's dilemma–it appears to be exploiting the economic benefits of internet access for the government, business, tourism, and scientific sectors without allowing the kind of popular connections that might introduce subversive ideas.

The problem with this kind of argument, however, is that it presents the dictator's dilemma and its solution in absolute terms–either the state has complete control over the internet, or dissidents and subversive agents are using it as a means to organize underground opposition. U.S. policy toward Cuba, and its goal of democratization for the country have always centered around the possibility of subversion: the hope that a popular upsurge of democratic sentiment will force Castro's resignation or allow a coalition of dissidents to overthrow him. The economic embargo against Cuba, the government support for anti-Castro propaganda on Radio Martí, and the authorization for improved telecommunications links have all worked toward this end. The greatest prospects for stable democratization, however, are often found in gradual and non-violent transfers from authoritarianism, as witnessed in Argentina and Chile. Wriston, who does not frame the dictator's dilemna in terms of subversion and dissidence, suggests that information technology can encourage such gradual transitions. When a government is faced with a potential profusion of communications linkages, he says, there are only two ways it can stay in power. One is to censor content and restrict access in the familiar pattern; the other is for the government to "allow its policies to be guided by that national conversation and so keep the confidence not only of 'the people' but also of the bureaucrats and the army. But a government that consents to be so guided has become in some sense, however attenuated, democratic and is likely to keep moving in that direction."

There is considerable evidence that Cuba is currently undergoing a gradual transition in the direction of democracy. After the demise of the Soviet Union, Cuba, like other former members of the Soviet Bloc, has been forced to make changes in its firm control over society. Most noticeable are the economic developments: the courting of foreign investment,

the permission of self-employment, the opening of private farmers' markets, and the legalization of dollars. There have also been several hesitant but significant political and ideological reforms, including the increased freedom of religion, epitomized by the Pope's visit to the island and the election of the National Assembly in 1993. Cuba's government has allowed significant movement toward free speech. Larry Press says that "as a visitor, one is struck by the willingness of people on the street to speak openly of politics, and of cultural liberalization," and he notes the open success in Cuba of a recent movie, *Strawberries and Chocolate*, which includes political criticism and is sympathetic to homosexuality.

Wayne S. Smith, a former foreign service official at the U.S. embassy in Havana and chief of the city's U.S. Interest Section from 1979 to 1982, has argued that these changes are encouraging and that the U.S. should promote further transformation toward democracy by supporting this gradual loosening of control rather than an abrupt change that may never come. The word *democracy*, when used in the Cuban context, does necessitate some explanation; Smith envisions that a multiparty system is at least a decade away, and that a single non-communist party (similar to Mexico's PRI) is a more likely intermediate step. Other groups would eventually be allowed to register as opposition parties, he predicts, and the system that eventually emerges would most likely resemble one of the social democracies of Europe. Even with a single all-incorporating party, however, these changes would certainly entail greater popular participation–either through a more open civil society and a corporatist governing structure which includes previously repressed political opinions in popular debate, or through elections which act as more than referenda to rubber-stamp the legitimacy of the current regime. If gradual changes such as these are the best prospects for an open, democratic society in Cuba, then the internet is promoting democratization to the extent that it facilitates and encourages these changes. Evidence supports the argument that it is indeed doing so, by strengthening the organizational base for Cuban NGOs, establishing the communications infrastructure for a future democratic society, and allowing the rest of the world to focus its eyes on Cuba's transition-in-progress.

Prospects for Gradual Change

As mentioned earlier, TinoRed is the gateway to Red David, which provides internet access for a number of Cuban NGOs. Gillian Gunn, who has studied NGOs in Cuba, estimates that there were 2,200 registered NGOs as of February 1995, including churches, cultural centers, private think tanks, and branches of international organizations such as the masons and the Red Cross. Cuban NGOs are officially controlled by the State Committee on Economic Cooperation (CECE), but many have obtained significant individuality and freedom as organizations in an authoritarian country. International donors are required to obtain permission before giving money to an NGO, but once CECE has approved the contribution, the donor works directly with the Cuban NGO on whatever project is being supported. Some NGOs have been successful in using international funds, which can be retracted by the donor, as a bargaining tool with the state. Current U.S. policy allows for humanitarian donations to Cuban NGOs, and groups in the United States have supplied them with everything from vans to computers to medicine. While an openly subversive group would clearly not be allowed to exist as an NGO in Cuba, the policy of allowing NGOs to proliferate inherently strengthens civil society. As the Catholic bishop of Santiago, Cuba recently put it, "It is important that a space be created in Cuba, a no man's land where one can do things without having to declare oneself for or against the state. The more the no man's land grows, the better. This strategy would expand that space."

One way in which the global nature of the internet will encourage democratization in Cuba is in the increased attention that the rest of the

To the extent that NGOs are allowed internet access, the internet is strengthening civil society and democracy in Cuba. Communication is one of the biggest challenges for budding organizations, and the internet makes it easy for them to disseminate messages. The internet also facilitates international communication with potential donors and allied NGOs abroad, strengthening the connections necessary for funding donations and making it easier to use foreign organizations as leverage when bargaining with the state. Gunn has claimed that email is essential to the existence of Cuba's NGOs, and that it has facilitated much of her research with them. The service of TinoRed is free to all NGOs in Cuba, and if the government approves an NGO's existence, it is unlikely that it would deny that group access to the internet.

world will be able to pay to a formerly closed society.

When recently contacted, TinoRed administrators were unable to provide a current listing of organizations with internet access, because TinoRed's dial-up connection with Web Networks recently ended, and the network has not yet been connected internationally through CENIAI's gateway. Once TinoRed is fully connected to the internet through this direct link, there should be significant prospects for proliferation of access, as NGOs will be enjoying quick and reliable international email for the first time.

In addition to facilitating the growth of NGOs and civil society, the spread of the internet in Cuba is laying the infrastructure–both in physical and human capital–for a democratic society of the future. Like the empowerment of NGOs through better communications, this is not a direct cause of immediate democratization, but it facilitates a gradual change that has already begun and is likely to continue in the future. Many developing countries have experienced difficulty in building and maintaining networks because of the lack of specialists and sufficient technical training. However, the internet has not been widely accepted as a communication form because the population in general is unfamiliar with computers. Cuba, with its strong emphasis on technological education and research, will be much more equipped to deal with these challenges than will other developing nations. Castro himself has pledged strong support for the Youth Computing Clubs, which are providing a greater base of knowledgeable users for the future. The government has placed 20,000 computers in secondary schools, and a reported 100,000 people completed the Youth Computing Clubs' computer education classes between 1993 and 1996. It is encouraging to think that the next generation of Cuban leaders, who are growing up in a period of gradual reform, will be technologically adept enough to use the internet as they institute change.

In addition to facilitating computer education to build a knowledgeable user community, the establishment of the internet in Cuba helps to lay the communications groundwork for a future democracy. Larry Press cites the popular belief that open elections will one day be held in Cuba, and he notes that internet communication will be helpful to parties and candidates as it has been in other countries. The internet will

be important to Cuban small businesses in a situation of loosened economic control, and greater access would allow them to compete more effectively with the strong foreign interests that could threaten to dominate a privatized economy. While the government may have relatively strong control of the internet now, it is building the technological infrastructure that is necessary to support a democratic society that could emerge.

Empowering NGOs and laying communications infrastructure are primarily domestic effects of network connectivity in Cuba, despite the fact that they involve international linkages. One way in which the global nature of the internet will encourage democratization in Cuba is in the increased attention that the rest of the world will be able to pay to a formerly closed society. In the era of the internet, an interesting phenomenon has emerged in Cuba: independent journalists. In a state concerned with counter-revolutionary propaganda, the only news permitted by the government is disseminated via the "official" press: the *Granma* and Prensa Latina. For years, it was virtually impossible for anyone not adhering to the party line to access printing materials and circulate an unofficial newspaper or magazine. Now, however, one can log-on to the CubaNet site based in Miami (http: / / www.cubanet.org) and read articles from the underground journalists of the Independent Press Bureau of Cuba, the Independent Press Agency of Cuba, CubaPress, and scores of other agencies around the island. This type of journalism was made possible by improved telecommunications between the U.S. and Cuba in 1994, when Cuban reporters could finally make direct calls to Miami and Puerto Rico to read their dispatches to colleagues who would then transcribe them by hand. From there, the articles were posted on the internet or e-mailed to the rest of the world.

Independent journalists attempt to present the real news underlying the state's official interpretations. Many of their stories are inherently of an anti-Castro nature, and certainly would not qualify as unbiased reporting. However, they do report on subjects that the official press would never consider, from the treatment of political prisoners to the funeral perks given to Communist Party officials. The internet news presented by the underground journalists is obviously not

read widely by the Cuban public, so it is unlikely that it will foment serious opposition to the government on the home front. As mentioned earlier, however, attempting to promote subversion from inside is probably not Cuba's best prospect for a stable process of democratization.

Meanwhile, underground reporting by the independent press encourages the government's reluctant loosening of political control. Elise Ackerman notes that independent journalists are unlikely to provoke Castro's overthrow, but they could be a catalyst for change in other ways; with the world reading independent news on the internet, the Cuban government knows that its actions are in the spotlight, and that it must watch its step. Foreign investors and foreign governments are usually wary of dealing with regimes condemned for human rights violations, so the government has had to temper its repression of the independent press. Whereas in the past it would have simply imprisoned the dissidents, it is now resorting to psychological deterrence, such as organizing groups of state sympathizers to harass underground journalists at their bureaus and their homes. While this kind of repression is disturbing, it is far from imprisonment without trial, and despite the government's efforts, the message of independent journalists has been transmitted to the outside world. Admittedly, the existence of the independent press in Cuba is not a direct product of internet access within the country. It is, however, related to improved telecommunications. The pressure that the underground journalists' world audience is able to place on the Cuban government is a consequence of the global nature of the internet.

Conclusion

The three examples detailed above show ways that the presence of the internet in Cuba is contributing to, and should be able to promote, a more open and democratic society. To be sure, the gradual transition is not as dramatic as the ideal scenario envisioned by the technological determinist, in which an infusion of democratic ideas from the far reaches of the Web foments the popular opposition necessary to topple a repressive regime. The technological determinist's scenario has not, however, occurred anywhere in the world to date. In

many transitions, such as the 1991 dissolution of the Soviet Union, improved internet communications plays a role, but always within the context of other social and political factors. In Cuba, these factors suggest that the best prospects for democracy are to facilitate the changes that have begun to occur.

Cuba is a unique case when compared to many other authoritarian societies dealing with the expansion of the internet. While China has attempted to isolate itself from the outside world, Cuba has consistently pushed for greater international connectivity, and as Singapore has sought to wire every home and business in the country, Cuba has restricted internal access. Some might argue that a strategy of restricted access and international connection for government-approved entities may be a solution to the dictator's dilemma for Cuba. Although the internet has not led to a significant increase in subversive activity within Cuba, framing the argument in terms of subversion ignores the point that Cuba's best prospects for stable democracy may be gradual change rather than violent upheaval. The evidence presented in this paper has shown that the internet is facilitating Cuba's gradual transition toward a more open and democratic society by empowering NGOs, laying the groundwork for future democracy, and allowing the world to watch Cuba closely during its transition. In these ways, the internet is helping to turn the virtuous circle that will result in both greater interconnectivity and greater democracy in the future.

The internet has historic potential for the spread of democracy throughout the world, more so perhaps than any other communications technology since the invention of the printing press. Hopefully, the influence of this new technology will continue to promote the gradual shift toward democracy and openness in Cuba. One day, as a modern-day Jose Martí might have envisioned, www.cubalibre.cu will be a reality.

Cuba has spent a billion dollars in biotechnology over the past eight years on biotechnology. While biotechnology labs are outfitted with the best purification and production lines outside Britain or the United States, other academic disciplines endure severe neglect and the rest of the country slides into a pre-industrial state. Castro's gamble is that biotechnology will aid Cubans - as it has, for instance, by developing a pest-resistant strain of sugar cane - and earn foreign currency. Although it brings in $100m a year, sanctions have denied the nascent industry its most lucrative market, the US, and it has stumbled in the face of more well-heeled competitors.

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CIGB's network technology is standard, but old. The four buildings at the main CIGB campus are interconnected by fiber-optic cable, but backbones inside the buildings are based on 10Base2. 10Base2 has been obsolete in the United States for more than a decade because network errors tend to bring down the entire subnet and finding the recalcitrant T-piece can be time-consuming, as every workstation has one. Reliability and configurability are probably less of a problem for CIGB, as 10Base2 is only used in the backbone. Subnets are based on 10BaseT. Two of the other campuses connect to the main campus through RENACYT, over X.25, and other two campuses connect through dial-up UUCP.

Servers run NetWare and free versions of Unix. The intranet is well-designed and easy-to-use, although one definitely gets the sense of playing in a sandbox when using it; it lists only 43 resources, lacking the better-known resources in the English world, yet including frivolities like the speeches of the Public Minister of Health. The resources that are available use a custom CGI front-end to ensure security.

However, biomedical researchers do have access to the entire Internet. If they need something not available on InfoMed, they simply need to fill out a form detailing what they're planning to look for. They will know within 24 hours if their request has been granted, and if it has, they may use e-mail and the Internet for free, freely.

Paper by the Center for Genetic Engineering and Biotechnology describing CIGBnet

Online Journalism Review at USC: Cuba's Newest Information War

Banking System

The Cuban banking sector is undergoing many reforms. Over 15,000 of Cuba's 19,000 workers in the banking sector have undergone re-training in an effort to comply with the full extent of banking reform. In addition to this, the government is pushing for the presence of more technologies in the banking sector. Currently, only 330 Cuban Corporations have access to online banking resources. In addition to this, the government is increasing the push for the use of ATM cards in major metropolitan areas, even though there are currently only 57 ATM machines in the city of Havana—with 100 expected to be installed by the end of this year.

Law Decree 172, enacted by the Cuban Government in May of 1997, seriously reformed the Cuban banking sector by changing the duties of the Cuban Central Bank, and by creating subsidiaries that help create, and manage, capital accumulation. Law Decree 172 replaced 16 previous laws regarding the banking sector, and in effect helped to simplify the Rule of Law in an effort to protect the national economy from potential future setbacks. Up to 39 state controlled and foreign banking institutions currently have operations in Cuba, each with a clear subdivision of duties.

Among the most important are the Banco de Credito y Comercio and the Banco Popular de Ahorro. Together, these banks have over 500 different locations from which they serve the Island's population. Both of these institutions deal in Cuban Pesos, as well as in foreign currency, and are the primary banking resource for the population. The Central Bank, which is in charge of coining money and protecting the value of the Cuban currency abroad, has been subdivided into two parts, the National Bank of Cuba and the Cuban Exterior bank. Other changes include the creation of an International Financing Bank, and the International Bank of Commerce, these two banks deal only in foreign currency, and are officially in charge of providing foreign businesses with banking services. Other banks serving exclusively foreign clients are the Metropolitan Bank—which has been set up to serve the staff of the many foreign embassies in Cuba—and the 13 foreign banks with with dealings in Cuba. These 13 established foreign banks are regulated through the new "Grupo de Supervision Bancaria" regulatory agency. While the entire banking sector, has the new Central Office of Risk Management (Central de Informacion de Riesgo).

Resources

Boas, Taylor "The Dictator's Dilemma? The Internet and US policy toward Cuba" Washington Quarterly 23:3 pp 57-67 Summer 2000.

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Overview

Demographics

Cuba, a Caribbean Island measuring 110, 860 sq km, has a population of about 11,142,000. At 28%, Cubans between 15-29 years old are the largest demographic group; 23% of Cubans are under 15 years old and another 22% of Cubans are between the ages of 30-44. At 13.2 (birth rate per 1000 population), Cubans also have a lower birth rate than the world average of 25.0.

Ethnically, Cuba is a highly diverse and integrated country. It is estimated that 50% of Cuba's population is mulatto, 37% is white, 11% is black, and that 2% is of a Chinese or other ethnic background; it is difficult to confirm these numbers since the Cuban government no longer requests this information as part of the national census. The Pre-Spanish native population of Cuba is not a noticeable factor in the country's demographics as it is in other Latin American countries, as these groups disappeared under Spanish Colonial rule.

Vital Statistics

Cuba's literacy rate of 96% is amongst the highest in the developing world. Cuba's healthcare system, also separate it from much of the developing world; Cubans have an average life expectancy of 76 years, and a lower death rate than the United States (7.4 vs. 8.7). Cuba also beat the world average of 9.3. About 76% of Cubans live in Urban Areas; 26% of Cubans live in rural zones. There are approximately 4 major urban zones, they consist of: Havanna, population 2,175,995, Santiago de Cuba 440, 084; Camaguey 293,961; Holguin 242,085; and Guantanamo 207,796.

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Map of Cuba