# THE PAST, PRESENT AND FUTURE OF THE INTERNET IN CUBA

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This paper looks at the past, present and future of the Internet in Cuba.[1] At the dawn of the Internet, Cuba led the Caribbean in computer networking and was well positioned to continue to lead. But the Cuban Internet stagnated due to the collapse of the Soviet Union, the U.S. embargo, and the "dictator's dilemma"—a desire to enjoy the benefits of connectivity without its political and cultural risks.

Today, Cuban infrastructure, skills, and application sophistication are behind the rest of the Caribbean and most of the world. The Cuban Internet is like their old cars—Cuba is stuck at Web 1.0.

What of the outlook for the future? Here we have questions and predictions, but few certain answers. The ALBA-1 undersea cable connecting Cuba and Venezuela has been installed and will begin service in the fall of 2011.[2] The cable will dramatically increase the speed of Cuban international connectivity and decrease its cost. It seems safe to predict that current users in areas like education, health care, government and tourism will be first to reap the benefit of ALBA-1.

New domestic communication infrastructure and human resources will be needed if Cuba is to utilize the cable, but it is not clear how this investment will be financed or how much progress has been made to date. Given the U.S. trade embargo and Chinese involvement in the ALBA-1 cable, it is likely that the Chinese will also be involved in the upgrading of domestic infrastructure. U.S. and Cuban leaders are also aging and will doubtless change, but it is uncertain how those changes will impact the Internet.

## THE CUBAN INTERNET—PAST[3]

Cuba was the most advanced networking nation in the Caribbean in the pre-Internet era. Cuba accounted for 32% of Caribbean international news and email traffic and had more user accounts than the rest of the Caribbean combined.[4]

Four Cuban organizations had networks and exchanged international email and news on a daily basis:

- CENIAI (Center for the Automatic Interchange of Information)—Soviet connection
- Tinored—Youth computer clubs
- CIGBnet—Center for Genetic Engineering and Biotechnology
- InfoMed—National System of Health Information

The networking organization CENIAI was strong and a Caribbean leader since they had been Cuba's gateway to the Soviet bloc since 1982. Their staff was well educated and understood the importance of computer networks.

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1. This paper draws upon a more detailed report on the state of the Internet in Cuba: http://som.csudh.edu/fac/lpress/cuba/chapters/lpdraft2.docx.

2. http://laredcubana.blogspot.com/2011/08/alba-1–cable-to-begin-service-in.html.

3. For historical reports on the state of the Internet in Cuba, see http://som.csudh.edu/fac/lpress/cubabiblio.htm.

4. Press, L., and Armas, C., "Cuban Network Update," *OnTheInternet*, pp 46–49, Vol. 2, No. 1, Jan/Feb, 1996.

The other organizations reflect values of the revolution—education, health care and support for the countryside. CIGBnet and InfoMed reflected the Cuban emphasis on health care and medical science. The Youth Computer Clubs (YCC) were unique education centers found throughout the island at a time when networks in developing nations were almost always restricted to one or two cities.

On September 9, 1996 Cuba connected to the Internet with the cooperation of the U.S. National Science Foundation's International Connections Management program, which assisted research and education networks in developing nations to connect to the Internet.[5]

CENIAI Director Jesús Martínez sent the traditional first email to his colleagues in the Internet community when they established their first connection to the Internet.[6] Martínez' message radiated pride and optimism. He foresaw a new era and had reason to be optimistic. Cuba had trained technicians at CENIAI and other organizations and a grass roots training program for users in the YCCs. Sadly, in spite of this, the Cuban Internet stagnated, while most of the world raced ahead.

During this period, I conducted two studies of the Cuban Internet.[7] The studies used a broad, 6–dimension Mosaic Group framework for characterizing the state of the Internet in a nation.[8] After two years, Cuba remained at the lowest level in five of the six dimensions.[9]

## THE CUBAN INTERNET—PRESENT[10]

The situation has not improved much since that time. Cuba is now last among the Caribbean nations in broadband Internet subscribers and secure Internet servers.[11] Only Belize, Bolivia, El Salvador, Haiti, Nicaragua and Surinam trail Cuba in Internet users per capita, and Cuba is far below average for the region. It is also noteworthy that the number of PCs on the Internet and the number of *.cu* domain names actually declined in 2010.

Cuba made gains in mobile phone subscriptions in 2010, but the per capita subscriber rate exceeds that of only 8 of the nations reporting to the International Telecommunication Union: St. Helena, Myanmar, D.P.R. Korea, Eritrea, Solomon Islands, Somalia, Marshall Islands, and Ethiopia.[12]

Cuba claims to have 1.79 million Internet users, but the experience of a Cuban Internet user is nothing like that of users in developed nations. They are stuck in the dial-up era of the 1990s—access is slow, expensive and restricted.

All aspects of the Cuban Internet—international links, the access network and the domestic backbone—are slow. Cuba's international links are via satellite and have a total capacity of only 209 Mbps upstream and 379 down. This is very slow for an island with a population over 11 million. To put it in context, my university has around 10,000 students and our Internet connection speed is 1 Gbps.

5. Press, L., "Seeding Networks: the Federal Role," *Communications of the ACM*, pp 11–18, Vol 39., No. 10, October, 1996, reprinted in *OnTheInternet*, Vol. 3, No. 1, January/February, 1997, pp. 13–22.

6. http://laredcubana.blogspot.com/2011/02/cubas-first-internet-connection.html.

7. For links to reports on that work, see http://som.csudh.edu/fac/lpress/cubabiblio.htm.

8. For the Mosaic Group see: http://mosaic.unomaha.edu/. For an article outlining the analysis framework, using Cuba as an example, see: Larry Press, Grey Burkhart, Will Foster, Seymour Goodman, Peter Wolcott, and Jon Woodard, "An Internet Diffusion Framework," *Communications of the ACM*, Vol. 41, No. 10, pp. 21–26, October, 1998, http://som.csudh.edu/fac/lpress/articles/acmfwk/acmfrwk.htm.

9. http://som.csudh.edu/fac/lpress/devnat/nations/cuba/cubadim.htm.

10. For a more detailed report on the state of the Internet in Cuba as of January 2011, see http://som.csudh.edu/fac/lpress/cuba/chapters/lpdraft2.docx.

11. http://laredcubana.blogspot.com/2011/07/ict-statistics-for-2010–more-internet.html; 2011, Oficina Nacional de Estadísticas, *Anuario Estadístico de Cuba 2009*, Section 17 (information and communication technology), http://www.one.cu/aec2010/esp/20080618_tabla_cuadro.htm.

12. ITU database, queried July 2011.

This situation will finally change with the lighting of the ALBA-1 undersea cable from Venezuela.

The access network is also slow and outdated. Nearly all connections are over the telephone network using analog modems, although ISDN service is advertised as available in a few locations.

I know less about the backbone networks. There is some intra and intercity fiber and high speed microwave links, but, given the low speed of international links and the access network, there would have been no need to construct a high speed backbone. That situation changes with the installation of ALBA-1.

We can measure Internet speed using Ping, a program that reports the time it takes to send a data packet from one Internet host to another and receive confirmation that it was received. Tests from my university show an average Ping time of .634 seconds to *www.jovenclub.cu* in Cuba, while Ping times to UCLA, Google, Ford and the University of Chile were .019, .023, .079, and .199 seconds respectively. Cuba's Ping time of .634 seconds seems fast, but at that speed, real time applications like voice or video conversation or browsing modern, complex Web sites are impractical.

We can see the contribution of the slow access, backbone and international links by considering Ping times from within Cuba. A colleague in Cuba used a program called Traceroute to identify the computers his packets passed through between his university and Google. Pinging those intermediate computers, he found average round trip time within Cuba to be .11 seconds, average time from Cuba to Florida .58 seconds and average time from Florida to Google .02 seconds. The international satellite link is clearly a bottleneck, but the speed within Cuba, in its access and backbone networks, is also unacceptable by modern standards.

Cuban Internet access is not only slow, it is also expensive in absolute terms and even more so relative to Cuban incomes. Access in an ETECSA Internet center, cybercafé or hotel costs between 6 and 12 CUC (1 CUC = $1.08) per hour.[13] Bear in mind that these are for dial-up or Wi-Fi links, and the average monthly salary in Cuba is around $20.[14]

A foreign resident or someone who needs home connectivity for his or her work may get a home account, but these are also expensive. For example, 10 hours of dial-up Internet per month cost 15 CUC, 15 hours of international email and intra-national Web 15 CUC, and 10 hours of intra-national email and Web 20 CUC.

Note that people with home or business accounts often share them illegally. For example, an anonymous user stated that home accounts are limited to a specified number of hours per month, but "part of this time is usually (and illegally) shared with other for a fee of $20–$30."[15]

Organizations can also get dedicated Internet links. An extremely slow 19.2 kbps link is 120 CUC intra-nationally and 330 CUC internationally. The highest available speed is 2 Mbps, at a cost of 7,295 or 24,170 CUC, respectively. These are much slower and more expensive than such connections in a developed nation. As a point of reference, I pay $49.99 per month for 15 Mbps upstream and 3 Mbps downstream. Cuba's extreme rates must be special prices for foreign organizations.

We have seen that the Cuban Internet is slow and expensive, what about access and control? Cuba had the third-lowest ranking of 37 nations in Freedom House's Freedom on the Net report for 2011,[16] and, as shown in this anonymously compiled table (Table 1), no Cuban users have unrestricted international Internet access and email:

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13. ETECSA is the state telephone and Internet service provider. All prices in this section are quotes from their database as of July 2011. http://www.etecsa.cu/index.php?sel=inicio&content=areasdeinternet.

14. http://www.state.gov/r/pa/ei/bgn/2886.htm.

15. http://laredcubana.blogspot.com/2011/06/conversation-with-cuban.html.

16. http://www.freedomhouse.org/template.cfm?page=70&release=1427.

**Table 1.   International Internet and Email Access**

|  | Post Office | YCC | University | Work | Hotel | Home |
|---|---|---|---|---|---|---|
| Domestic email | Y | Y | Y | Y | Y | Y |
| International email | Y | N | Y | Y/N | Y | Y |
| Visit domestic Web pages | Y | Y | Y | Y | Y | Y |
| Visit international pages without restriction | N | N | N | N | N | N |
| Visit international pages with some blocked | Y | N | Y | Y | Y | Y |

**Table 2.   Frequency of Internet Use (%)**

| Frequency | Total | Men | Women |
|---|---|---|---|
| At least once per day | 22.6 | 23.1 | 22.1 |
| At least once per week | 35.6 | 34.9 | 36.3 |
| At least once per month | 30.8 | 32.1 | 29.6 |
| Less than once per month | 11.0 | 9.9 | 12.0 |

**Table 3.   Location of Internet Use (%)**

| Location | Total | Men | Women |
|---|---|---|---|
| Home | 5.9 | 5.8 | 5.9 |
| Work | 7.4 | 6.8 | 7.9 |
| School | 59.9 | 59.1 | 60.8 |
| Another person's home | 15.6 | 16,2 | 15.1 |
| Youth Computer Club | 5.4 | 5.4 | 5.3 |
| Post Office | 2.4 | 3.0 | 1.9 |
| Other | 3.4 | 3.7 | 3.1 |

Note that these restrictions follow from both a lack of capacity and political considerations. The attempt to control the Internet has also led to bureaucracy. For example, the Ministry of Informatics and Communication (MIC) requires paperwork for a simple Wi-Fi access point.[17]

Cuba claims to have 1.79 million users, but, as in Table 2, they use the Internet much less frequently than those in developed nations.[18] And, as shown in Table 3, the majority use it in a public place where the computer is shared and subject to surveillance.[19] A recent report from the Committee to Protect Journalists found that Cuban journalism is now focused on the Internet and that the government strategy has shifted from long jail sentences to frequent, low-profile harassment.[20]

We have been speaking about wired access, but what about mobile access? As we saw, the number of cell phones in Cuba is increasing, but Cubans use second generation cell phones for text messaging and voice calls, not Internet access. There's little or no smartphone Internet access as we know it in Cuba.[21]

The Mosaic Group analysis framework also considers organizational infrastructure and the number and sophistication of applications, and, again, we see stagnation.

Cuban Web sites harken back to the 1990s. They are collections of static pages with little user contributed data or use of heavy AJAX techniques. We do not see open application program interfaces or mash-ups between multiple services.

In short, Cuba is stuck at Web 1.0, which means the skills of Cuban developers are out of date by western standards as are the skills and expectations of users. Regulatory organizations like the Ministry of Communications and networking organizations like CENIAI also lack modern skills and capacity.

There were three major causes for this stagnation.

1. First was the U. S. embargo, which blocked attempts to connect Cuba via undersea cable and raised the cost of networking and computing equipment on the island.

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17. http://laredcubana.blogspot.com/2011/03/internet-is-dumb-and-micro-management.html.

18. Dirección de Turismo, Comercio y Servicios de Cuba, *Tecnologías de la Información y las Comunicaciones: Uso y Acceso en Cuba*, Septiembre 2010. http://www.one.cu/publicaciones/06turismoycomercio/TIC/2009%20TIC%20Uso%20y%20Acceso%20en%20Cuba.pdf.

19. Ibid.

20. http://laredcubana.blogspot.com/2011/07/committee-to-protect-journalists-report.html.

21. Frank, Marc, "Cuban cellphones hit 1 million, Net access lags," Reuters, July 7, 2011, http://www.reuters.com/article/2011/07/07/us-cuba-telecom-idUSTRE76661920110707.

2. The second was the dissolution of the Soviet Union, and its disastrous impact on the Cuban economy.

3. Third was what I called the "dictator's dilemma"—ambiguity over the perceived political and social risks of free speech on the Internet and its value as an economic, scientific, and educational tool.

Let us look briefly at each of these factors. The embargo kept Cuba from getting an undersea cable connection to the Internet until this year, resulting, as we have seen, in very slow international connectivity. While one could get American and other computers in Cuba, the embargo made them more expensive. It also raised the price of communication and networking equipment.

The impact of the embargo has diminished. The undersea cable from Venezuela will allow a dramatic increase in international speed and capacity. U.S. manufacturers are declining relative to Asia in the production of computers and the Chinese are now a willing source of world-class networking equipment.

Even without the embargo, computing and communication equipment would have been difficult to afford because the Cuban economy suffered through what they called the "special period," following the dissolution of the Soviet Union. GDP per capita dropped by 26% in 1991, rebounded in 1992, and then dropped by 18% in 1996.[22] This economic blow occurred near the time Cuba was connecting to the Internet

Cuba sought foreign investment, but it was a hard sell because Cuban technology and organizations were geared toward the communist nations, and were not attractive to westerners. Cuba also imposed limitations on would-be investors.

The dictator's dilemma also had to be resolved.[23] Cuban ambivalence over the dictator's dilemma was demonstrated at the 1995 Central Committee meeting of the Communist Party. Carlos Lage, Secretary of the Executive Council of Ministers, was pro Internet. He pointed out that "one telex can cost twelve dollars [whereas] the same message costs 75 cents in the form of a fax and 3 cents via the Internet."

At the same meeting, Raúl Castro stated that "the glasnost which undermined the USSR and other socialist countries consisted in handing over the mass media, one by one, to the enemies of socialism."

Fidel appears to have been ambivalent. He saw to it that the Youth Computer Clubs were funded and their headquarters was the building that had been the Havana Sears and Roebuck department store. Castro spoke at the headquarters dedication, and his framed autograph reading "I envy you" hangs on the wall there. Oscar Visiedo, CENIAI director in the pre-Internet era, recalls that when he showed Fidel some rudimentary internet technology, he recognized the fact that if this were not something that Cuba developed (in whatever controlled fashion), Cuba would be left decades behind the rest of the world.[24] In spite of this awareness, Castro allowed the hard liners and bureaucratic infighters to control the Internet.

Cuba resolved the dictator's dilemma by opting for a tightly controlled Internet. They justify this control by claiming they are at "cyberwar" with the United States, and it is true that the United States has attempted to influence Cuban public opinion by supporting dissident voices and civil society organizations. This effort has included U.S.-funded attempts to smuggle in low-capacity satellite Internet equipment, at least two of which have failed.[25] Even if they had succeeded, these clumsy efforts would have made little difference. In failing, they provided an excellent opportunity for the Cuban government to claim they

22. World Bank database.

23. Press, Larry, *Cuban Telecommunications, Computer Networking and U. S. Policy Implications*, DRU-1330–1–OSD, Santa Monica, CA: Rand, July 1996, http://www.rand.org/pubs/drafts/DRU1330–1/.

24. Visiedo, Oscar, interview, January, 2011.

25. http://laredcubana.blogspot.com/2011/03/us-and-cuba-both-overestimate-impact-of.html.

were under attack and justified in their control over the Internet and journalists.[26]

We have also come to have a more nuanced view of the dictator's dilemma. The Internet can be a tool for democracy and protest, but it can also be used as a tool of a dictator. According to the Committee to Protect Journalists, there are around 40 dissident Cuban bloggers and 1,000 pro-government bloggers who are often subsidized and given Internet access.[27] Like protesters, the government can use the Internet to plan their own operations and they can use it as a surveillance tool. The Internet is also used by those planning terror and violence. For example, Al-Aqsa used Google Earth to plan missile launches into Israel.[28] Finally, those with access to the Internet tend to be the establishment, who are not likely to be dissatisfied with the current regime.

We have looked at the past and present, what do we see when we look to the future? Might the Cuban Internet rebound and what would that mean?

### THE CUBAN INTERNET—FUTURE[29]

Let us consider four factors that will impact the future of the Cuban Internet: (1) the ALBA-1 undersea cable; (2) Chinese investments; (3) the aging of the Cuban government leadership and of the leadership of the Cuban community in the United States; and (4) Cuban social values.

There are many cables surrounding Cuba, but, until now, none connecting it. The ALBA-I undersea cable from Venezuela to Cuba has been installed and is expected to begin operation in the fall of 2011.[30] The cable will eliminate the current satellite bottleneck, but, if there is no complementary infrastructure on the island, it will become a strong link in a weak chain. To utilize the capacity of the cable, Cuba must invest in physical infrastructure and human capital. Access and backbone networks would need to be upgraded and new technical skills would be needed.[31] We hope this investment has been well planned and is underway.

There is also the political question of access to the cable. For example, there is an active alternative blogging community in Cuba. Daniel Wilkinson posits that since the alternative blogs are seldom read in Cuba, their major impact is on the Cuban exile community, whose leaders have largely shaped U.S. policy. He also credits them for being moderate—for telling stories of life in Cuba rather than calling for the overthrow of the government. They also criticize the U.S. embargo.[32]

Ted Henken has conducted interviews of many Cuban bloggers and studied their writing and backgrounds. He has developed a comprehensive view of a heterogeneous blogging community ranging from pro-government "oficialistas" to dissident bloggers the government labels "mercenarios," implying that they are subsidized by the United States. Henken also notes that while few Cubans have Internet access for reading blogs, their content is often circulated on flash drives. The dissident blogging community will not benefit from the cable unless it leads to freer access and lower prices for the general public. People who use the Internet in their current work in areas like government, education and health care and the pro-government media are most likely to see improved service.

China has played a major role in the financing and installation of the ALBA-I cable. In spite of financial tensions surrounding the restructuring of Cuba's

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26. http://laredcubana.blogspot.com/2011/02/eduardo-fontes-53–minute-video-of.html.

27. Phillips, Karen, *After the Black Spring, Cuba's New Repression*, The Committee to Protect Journalists, 2011, http://www.cpj.org/reports/2011/07/after-the-black-spring-cubas-new-repression.php and http://laredcubana.blogspot.com/2011/07/committee-to-protect-journalists-report.html.

28. http://cis471.blogspot.com/2007/10/terrorists-use-google-earth.html.

29. For ongoing discussion of the Cuban Internet, see http://laredcubana.blogspot.com.

30. http://laredcubana.blogspot.com/2011/08/alba-1–cable-to-begin-service-in.html.

31. http://laredcubana.blogspot.com/2011/03/cuba-needs-domestic-upgrade-to-utilize.html.

32. http://laredcubana.blogspot.com/2011/07/yoanis-iphone-and-jesus-vision.html.

debt to China, new Chinese investments were announced recently. At one time, the U.S. dominated the networking equipment market, but China is now a leading manufacturer, and they are not bound by the U.S. embargo. The Chinese also have extensive experience installing networks in developing nations, including their own.

We wonder to what extent China will be involved in financing and building the infrastructure upgrades necessary to utilize the ALBA-I cable and what that will mean for U.S. firms when the embargo is lifted.[33] The U.S. has capital and an entrepreneurial Cuban ex-pat community, but, will it be too late for the U.S. to gain a foothold? Will China have eaten our lunch?

Aging leadership is another factor that will influence the future of the Cuban internet. Both the Cuban leadership and the leaders of the U.S.-based Cuban opposition leaders are aging, and will be replaced. How will that change the Internet?

Consider the contrast in style and content of the keynote addresses at the biannual Informatica Conference in Havana.[34] The 2007 keynote was given by Ramiro Valdés Menéndez, then Minister of Informatics and Communications (MIC), who fought along with Fidel Castro during the revolution. Valdés reiterated the policy that had been in place since the dictator's dilemma debate of the 1990s, calling the Internet one of the "mechanisms for global extermination" which "could and should be controlled and used to serve peace and development."

By way of contrast, the 2011 Informatica keynote was delivered by Deputy Minister of MIC, Jorge Luis Perdomo. He said limitations on Internet access were technical, not political and stressed the government's willingness to open access to the general public. The government also unblocked access to over 40 Cuban Voices blogs, so they can now be read by those with Internet access in Cuba.

Are the times changing? Valdés and Perdomo certainly look like they are of different generations. But keep in mind that Valdés has been promoted to Vice President of the State Council and the new head of MIC is an army general. Leadership of the U.S. expatriate Cuban community is also aging and demands are changing. At some point, the embargo will end. Stay tuned.

Cuba's emphasis on education and health care will also be important in shaping the future of the Internet. A thriving Internet requires both trained, demanding users and skilled technicians. Cuba is 100% literate, and the Youth Computer Clubs and universities have trained many users, albeit on relatively obsolete technology. Cuban tertiary education expenditure and enrollment rates are the highest among the Latin American and Caribbean nations.[35]

Seventeen Cuban universities and 25 professional and technical schools offer a specialization in information and communication technology.[36] The newest and most prominent of these is the specialized University of Informatics Science (UCI). UCI was founded in 2002 and had over 10,000 students by 2007. UCI students combine practical work with study, and hopefully these students are already working with modern equipment and applications in anticipation of the ALBA-I cable.

The health sector is also poised to make good use of the undersea cable. As shown in Table 4, their current network, InfoMed, is quite strong by Cuban standards and Cuba is known for health care and research.[37] InfoMed and the universities will almost certainly be early beneficiaries of the ALBA-I cable.

33. http://laredcubana.blogspot.com/2011/06/will-china-be-helping-with-domestic.html.

34. http://laredcubana.blogspot.com/2011/02/dictators-dilemma.html.

35. World Bank database, queried January 2011.

36. Oficina Nacional de Estadísticas, *Anuario Estadístico de Cuba 2009*, http://www.one.cu/aec2009/esp/17_tabla_cuadro.htm.

37. Dirección de Turismo, Comercio y Servicios de Cuba, *Tecnologías de la Información y las Comunicaciones: Uso y Acceso en Cuba*, Septiembre 2010. http://www.one.cu/publicaciones/06turismoycomercio/TIC/2009%20TIC%20Uso%20y%20Acceso%20en%20Cuba.pdf.

**Table 4.    Internet Access in the Health Sector**

|  | Total | Clinics | Hospitals | Institutes |
|---|---|---|---|---|
| Health centers | 730 | 498 | 219 | 13 |
| Number of computers | 12,684 | 8,796 | 3,264 | 624 |
|   In fundamental activities | 12,684 | 8,796 | 3,264 | 624 |
|   With Internet access | 4,291 | 2,600 | 1,236 | 455 |
|   In information projects | 12,684 | 8,796 | 3,264 | 624 |
| Number of workers who use computers | 133,705 | 74,505 | 53,000 | 6,200 |
|   With Internet access | 131,805 | 74,505 | 53,000 | 4,300 |
|   Access from home | 58,920 | 30,400 | 24,900 | 3,620 |

The Cuban Internet began with great promise, which was has not been fulfilled, but we hope the situation will improve. Cuba will soon have an undersea cable. They have access to world class Chinese networking equipment and expertise. The political situation in the United States is slowly changing as the revolution fades further into the past, and the Cuban leaders are old and also changing. Most important, there is a good deal of pent up demand for the Internet among the well-educated Cuban population.

Let's hope that Cuba belatedly succeeds in fulfilling Jesus Martinez' 1996 promise of a new era.