"The Powerful Force": An Examination of the Internet in Senegal

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Dedication:

To Blaise Rodriguez,

for keeping his cybercafé open late for me,

and being the first to show me true Senegalese *teranga*.

and to

My parents, Sydney and Mehrdad Farivar,

for their unwavering encouragement and support in all of my endeavors,

and for showing me how to log on to the Internet in 1995.

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Thank you for writing such awesome music to write by.

And to Rachel Metz:

Merci pour tout.

Prologue, or, the Wanderlust Geek Travels to Africa:

I am a wanderlust geek. I have lived on four continents within the last six years. In addition to my trusty G4 Powerbook, I usually carry four gadgets (digital camera, MiniDisc player, iPod and a cell phone) with me in my backpack and on my person. I love traveling, and I love technology – not always in that order.

So is it not surprising that one of the first things that I did when I got to Dakar in October 2002 to begin the first of seven months on my junior year abroad in Senegal was to find a cybercafé, which was less than a quarter block from where myself and my fellow *toubaabs*[1] stayed for our first few days. It was well-lit, had lots of computers, had English QWERTY keyboards, and only cost me 500 CFA (about $0.80 US) per hour. Good deal.

But after a few days, I discovered a cybercafé about a half a block in another direction from our temporary locus in Dakar, the Baobab Center, where many American students pass through every year to take various classes, usually Senegalese cultural orientation and the lingua franca of Senegal, Wolof.

This cybercafé was smaller and not as well lit as the other one. It had French AZERTY keyboards, and only six computers. Tucked away between two houses on a small residential side street, this place had character. It was frequented by Senegalese youths, business men, and younger women. Activities varied from simple email to looking for online relationships in foreign lands to even sending some of that 419 Nigerian spam. While I didn't know his name, the owner was courteous and recognized me as I started to come back and forth. On top of that, it only cost 300 CFA ($0.50 US) per hour. I became a regular at this cybercafé very quickly, often coming twice a day to read online news, send email, and post in my online journal.

The owner, a man named Blaise Rodriguez, was one of my first initial links into Senegalese life. A gregarious man with a jolly pot-belly, Blaise himself was a geek too. When he wasn't overseeing the cybercafé, he was on the computers too, sending email, and catching up with the world.

I spent the 2002-2003 academic year on a study abroad program through the University of Madison, Wisconsin. After my initial month in Dakar staying with a host family, I became a student at the Université Gaston Berger in Saint-Louis. As part of the Madison program, each American student was required to do some form of original research. I knew from the time that I left Madison for orientation in September 2002 that I wanted to do something about the Internet and cybercafés. Of course, I didn't know what I would find – and little did I expect that this would turn into such an involved and elaborate project, representing the culmination of my studies at UC Berkeley. This project began as nothing more than an idea to explore cybercafés, to discover who runs them, why, where they get the money, and what people in Africa use with them. Now that it is complete, the project has taken a long and arduous course, and I now feel like I am only beginning to understand the recent history and developments of what may turn out to be one of the African leaders in telecommunications.

After having been a regular at the cybercafé for some time, I told Blaise about my project and wanted to know if we could set up an interview. Within a few days, I found myself sitting in his living room, on the opposite side of the wall of the cybercafé, talking about the Internet in Senegal over two bottles of Coca-Cola. A few days later, I introduced him to various technology news sites and showed him LiveJournal.com, a popular blogging Web site. He often kept the cybercafé open for me a good hour or so after he wanted to close, frequently approaching 1 a.m..

We became instant friends.

Literature Review:

For a great deal of the 19th and 20th century, various theorists have debated as to how best countries can develop socially and economically. They range from Karl Marx's *Communist Manifesto*[2], which describes all economic activity in terms of the relationship between workers and the owners of the means of production – and calling for a Communist Revolution. Others, like Fredreich Hayek, have recently argued[3] in favor of pure free-market capitalism à la Adam Smith. Other theorists have come up with various responses and frameworks of analysis toward the goal of economic development.

In the 20th century, three major theories have been proposed, illustrating various schools of thought as to how countries can develop economically. These include Liberal Theory (Rostow), Dependency Theory (Galtung) and Nationalist Theory (Krasner). By exploring these theories, I hope to gain a new understanding of their meaning in the 21st century, as accompanied by new technological developments.

I will define development as the Nigerian chemistry professor, Dr. Chimere Ikoku, did in a 1995 speech at the University of Maiduguri (Nigera): "the collective of activities by any human society directed at reducing the totality of perceived obstacles to a higher standard of living, thus maximizing the quality of life of its citizens."[4]

Within the last century, many other and more complete definitions of development have been proposed. Notably, they include the definition put forward in the 1974 Cocoyoc Declaration, by a group of Southern countries.

> Development should not be limited to the satisfaction of basic needs … Development includes freedom of expression and impression, the right to give and to receive ideas and stimulus. There is a deep social need to participate in shaping the basis of one's own existence, and to make some contribution to the fashioning of the world's future. Above all, development includes the right to work, by which we mean not simply having a job but finding self-realization in work, the right not to be alienated through production processes that use human beings as tools.[5]

Still others have concluded that defining development is nearly impossible to come up with a universally agreed upon definition, as was the case at the 1981 First World Congress on Development.

> A whole constellation of economic, political, social, legal, educational and other practices

> and ideologies have been deployed around the concept and the idea of development. Their manifestation express the undeployed original meaning of the term. Accordingly, any definition of development involves a definition of the problem area in which the enormous question has to be asked. The economic theory adopted, the economic practices applied and the policies pursued, constitute the discourse of development and express its implicit meaning. But in their turn, these historic tasks reflect a representation of the world and of the role of human beings of the world. The meaning of development is defined by the meaning men give to their overall social existence through economics and politics.[6]

However, Dr. Ikoku's simple and powerful definition goes beyond mere productive capacity, it aims to include the collectivity of a society's quality of life, which is not necessarily measured by traditional metrics such as gross domestic product per capita.

Prior to these more progressive theories of development, there were these classic three. The first, one of the most revered theories of development comes to social science from Walter Rostow. In 1960, this professor of economics and history at the University of Texas at Austin, first proposed his liberal vision of economic growth. He identifies five stages that all societies must go through to achieve full economic maturity. These include "the traditional society, the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass-consumption."[7]

In a traditional society, Rostow argues that the main feature is that the society is highly agricultural, and that because it has not adopted Newtonian science and technology, that there remains a "ceiling" on the potential output for that society. As Rostow writes: "This ceiling resulted from the fact that the potentialities which flow from modern science and technology were either not available or not regularly and systematically applied."[8] In other words, due to a scientific and technological deficiency, such societies were confined by the fate of their agricultural harvest and the meteorological conditions that controlled that output. Rostow's highlighting of the use of technology is significant. It shows that even at a very early stage, the first of his five stages, that technological change is the means for improved economic activity.

The next phase in Rostow's theory is the "preconditions for take-off" phase. This phase, he argues, is when a society is able to adopt modern science, and cast off its old ways. This society will take advantage of new industrial forms of manufacture and new and more efficient agricultural techniques to

produce a greater quantity of goods more efficiently. He notes that financial and capital investment are also features of this period, and that economic activity expands as a result. "Investment increases, notably in transport, communications, and in raw materials in which other nations may have an economic interest. The scope of commerce, internal and external, widens."[9] Again, Rostow points out the importance of technological change to this second phase as well. Not only is the technological capacity confined to merely manufacturing physical goods, but the notion that the rate at which communications can take place, in other words, the velocity of the information over the communicative channels can also play a decisive role. In addition to physical changes, Rostow also discusses institutional change within a society, and claims that an "effective centralized national state" is also vital to this stage as well.

Rostow's third stage ("take-off") also emphasizes the role that technology plays in creating an industrial manufacturing base. "In Britain and the well-endowed parts of the world populated substantially from Britain (the United States, Canada etc.) the proximate stimulus for take-off was mainly (but not wholly) technological."[10] Beyond adopting new manufacturing techniques, Rostow also cites the importance of "effective investment and savings" of at least five to 10 percent of the national income.[11] The combination of these things, he argues, allows for economic growth to be sustained on a regular basis. As examples of periods in history where this stage manifested itself, Rostow cites Britain from 1783 - 1803, the United States from 1820 – 1860 and also Russia and Canada from 1890 – 1914.

By the fourth stage, when 10 to 20 percent of income is steadily invested, allows modern technology to overtake "the whole front of its economic activity."[12] In this stage, modern technological advancements take over every form of production, and the society has the ability to technologically manufacture anything that it wishes, Rostow argues. The age of high mass-consumption, the final stage, is the point where societies "have chosen to allocate increased resources to social welfare and security" instead of devoting large portions of national time, money and energy towards more manufacturing and further technological innovation.

These five stages are one good way to explain how Western societies have been able to economically

develop over the last few centuries. However, this theory tends to focus mostly on somewhat discrete and seemingly spontaneous moments of political and technological change. Rostow focuses his attention on the individual as the center unit of analysis and assumes that these countries can easily adopt policies which will put them on a path towards development. He believes, in the classic Smithian liberal philosophy, that given the right political framework and the right technological tools, that any society is composed of individuals who drive a society forward. The variables are merely the country's physical endowments and historical societies that present themselves – and if a society is pulled into a growth phase because of military force by another competing society.[13]

However, some social theorists do not agree with Rostow's vision, that given enough time, every society will reach the mass-consumption phase. Some do not share Rostow that every society has roughly the same potential for economic growth. If Rostow can be thought of as an extremity on a spectrum of the possibility of economic growth, then it is only natural to suppose that there would be a polar opposite. Indeed, some theorists have come up with theories based on a different economic vision.

Johan Galtung, a professor at the University of Oslo, argued in 1971 that the world can be divided up into two sections (and a sub-section), the Center and the Periphery (and the Semi-Periphery). Center nations, he implies, are the developed world – nations like the United States and the United Kingdom. Periphery nations are developing nations, such as sub-Saharan African nations, Caribbean nations and many Latin American states as well. Galtung views world international economic and political affairs along a system of imperialism, an implicit dominant relationship of the Center over the Periphery – this theory is known as Structural Theory, or Dependency Theory. It requires that Periphery nations be dependent on the Center nation(s) – and that the nature of this relationship is fixed and permanent. Periphery nations can hope to, at best, alter the degree of this dependency, but the fundamental relationship will remain.[14]

Galtung draws on Marxist-Leninist tradition to form his theories,[15] and like Lenin, remains rigid in his belief that changing this framework is nearly impossible. Galtung defines “imperialism” as follows:

> A relation between a center and a Periphery nation so that: 1) there is a h*armony of*

> *Interest* between the center in the Center nation and the *center in the Periphery* nation. 2) There is more *disharmony of Interest* within the Periphery nation than within the Center nations, 3) there is *disharmony of interest* between the *periphery in the Center* nation and the *periphery in the Periphery* nation.[16]

Essentially, this means that the elites in the Center nation will communicate with the elites in the Periphery such that wealth is transferred from the Periphery to the Center nation. Furthermore, the combination of both intra and international relationships create conditions such that a dependency is created. The Periphery nations become dependent on the Center nations to purchase their few primary exports, and to provide them with consumer and finished goods that are only produced in the Center nations.

As such, Periphery nations will always be fully dependent on Center nations for any kind of technological advancement, argues Galtung. He discusses that if the means of production, knowledge and innovation remain in the Center, that there will always be a dependent, exploitive and imperialistic dynamic involved between the Center and the Periphery. As Galtung writes:

> The division of labor between teachers and learners is clear: it is not the division of labor as such (found in most situations of transmission of knowledge) that constitutes imperialism, but the location of the teachers, and of the learners, in a broader setting. If the Center always provides the teachers and the definition of that worthy of being taught (from the gospels of Christianity to the gospels of Technology), and the Periphery always provides the learners, then there is a pattern which smacks of imperialism.[17]

Thus, the only way to counter this endless cycle is for the Periphery to begin innovating and to being generating its own knowledge, but in Galtung's framework, this is not possible. Therefore, Galtung's outlook is a rather cynical one, and identifies the unit of analysis as class-based rather than on the individual. He believes that those classes are more or less fixed.

Given that classic Marxism-Leninism as a political system has collapsed by the end of the 20th century, nearly 20 years after Galtung proposed this theory, it could be argued that his theory holds true, along purely economic rather than political lines. However, it remains fundamentally inadequate in explaining how nations are able to move from the Periphery to the Semi-Periphery (India, for example), and from the Semi-Periphery to the Center (South Korea).

With Galtung's cynical impossibility towards development, and Rostow's positive plausibility towards development, it would seem that neither Liberal Theory nor Dependency Theory is able to fully explain how nations in the 21st century can develop. Yet one more theory remains which lies outside this hypothetical spectrum development capability – Nationalist Theory.

Dr. Stephen Krasner of Stanford University wrote in 1985 about Nationalist Theory, which stipulates that developing nations have and will pursue economic development by banding together and pursuing political means to solve economic problems, all in their own nationalistic interest. He argues that nationalistic political solidarity on the international level is the answer to economic woes, and that the fundamental unit of analysis is the state, and its political actions, and not the individual or the socio-economic class.

He argues that in order to cope with their "poverty and vulnerability," the developing world has supported international regimes in global forums where authoritative allocation is preferred over market-oriented regimes. He claims that this is because they can provide "more stable and predictable transaction flows. External shocks and pressures are threatening to developing countries because their slack resources and adjustment capabilities are so limited."[18]

Furthermore, Krasner argues that there are three main variables which dictate the alternation of international regimes: "the nature of existing institutional structures; the ability to formulate a coherent system of ideas, which set the agenda for international negotiations and cemented Third world unity; and the attitude and power of the North."[19]

With the evolution of the United Nations in the post-WWII period, Krasner argues, the principle of sovereign equality has reigned. Therefore, with the sheer number of developing countries, they were able to take control of international institutions and make their case for altering the political discourse in their favor. Continuing in that vein, developing states are able to band together (à la the Group of 77) and present their case before the entire United Nations – allowing for more authoritative control, in direct contrast to the classical liberal regimes favored by the Northern countries. Finally, he argues, that

within the last half century, with the erosion of pure American hegemonic political and economic power, developing countries have been able to muscle their way into the international policy discussion. But as Krasner argues, it is important to acknowledge that this is merely a political tool to gain favor in the international system, and to gain economic developmental power for their country.

> The countries of the South are not purveyors of some new and superior morality, nor are their policies any less reasonable than those of the industrialized world. They are behaving the way states have always behaved; they are trying to maximize their power – their ability to control their own destinies.[20]

This form of new nationalism has been a backlash against both the classical Liberal and Marxist orders that preceded it. Since the fall of the backbone of the political manifestation of Marxist theory, the Soviet Union, and the fact that relatively few countries post World War II have been lifted out of poverty, some social theorists are postulating on a new type of development theory. Most development theorists such as the Barbara Ward (Cocoyuc Declaration) and members of the 1981 World Congress on Development, and their followers have come up with a far more comprehensive model of development than any of these three major schools of thought.

The World Bank has cited six major components to development, which illustrate this larger and more comprehensive approach. These include:

> Poverty: Reducing by half the proportion of people in extreme poverty by 2015.
>
> Mortality: Reducing by two-thirds the mortality rates for infants and children under 5 and by three-fourths the mortality rates for mothers by 2015.
>
> Education: Achieving universal primary education in all countries by 2015.
>
> Health: Providing access to reproductive health services for all individuals of appropriate age no later than 2015.
>
> Gender: Demonstrating progress toward gender equality and the empowerment of women by eliminating gender disparities in primary and secondary education by 2005.
>
> Environment: Implementing national strategies for sustainable development to 2005 to ensure that the current loss of environmental resources is revered globally and nationally by 2015.[21]

This type of program aims to have a far more just and equitable approach to development rather than one that is merely efficient and productive. Much of the development rhetoric since the end of the Cold War

has focused on this type of understanding. Still others have called for an end to the notion of development completely. They are part of the more recent "post-development" school, where some have called for a fundamental redefinition of "development" much more along the lines of the World Bank's new and more progressive definition, rather than one closer to Rostow's line of analysis.

While theorists like Rostow, Galtung, and Krasner have proposed economic and political theories to explain economic development in the global South, these ideas to not provide a complete picture. While the political and economic dynamics are certainly important, others have argued that technological change, specifically in the domain of communications has been a key catalyst for economic growth throughout the centuries, and most particularly within the last century, when dramatic new communications technologies were made available to the masses.

Other authors, such as the Massachusetts Institute of Technology sociology professor Daniel Lerner has argued that that communications technologies could act as a catalyst for social change and economic development. Lerner's theory of the "multiplier" demonstrated that widespread communications technologies would indeed encourage and foster growth and social development due to the fact that information pertaining to developing effects would be diffused much more quickly.

> The multiplicative property of communication lies in its power to raise and spread empathy among its audiences. Empathy is a multiplier because it equips individuals to make use of *vicarious* experience, i.e., experiences lived through by others than oneself. Our world of wide-range, high-speed, low-cost mass media has acquired – for the first time in human history – adequate facilities to put training in empathy on a global basis … The mass media produce a multiplier effect, via empathy, because they reduce the costs of social change – both economic and psychic costs. This is why the mass media have, over the centuries of their development, so enlarged the rate and scale of social change that scholars speak of an 'acceleration of history.' … Today it is no longer necessary to emigrate to a different country, or even to migrate to the city in one's own country, in order to gain some experience of the strange new world represented by modernity. Increasingly, in the villages and hamlets of the world, the mass media are bringing 'strange new worlds' into the traditional environment of rural people.[22]

He argues that vicarious experience has enhanced the knowledge of humankind through communications media, and that humankind has the potential to raise the level of development via that communication. This radical change may have profound consequences for a traditional society, has he points out – that their traditional teachings may not have the same role that they had before. However,

what Lerner fails to realize is that traditional teachings are not static. Many are dynamic and should be able to adapt from one time and place to another – the fundamental truths of the world do not change from one generation to the next, even though the technological milieu might.

Other theorists, particularly those from the developing world, have demonstrated that in the modern age of mass communication through telegraph, telephone, radio, television, and now the Internet, that such communicative tools are vital to shaping and determining a nation's social, economic and political discourse. Dr. P.C. Joshi, a mathematics professor in India at the Indian Institute of Technology, has recently argued as well that modern communication must serve as a means to societal development.

> In a large and diverse country the communication system must function as a responsive and responsible system, sensitive to this diversity. It must give scope to all sections of the people to articulate their needs and concerns and to creative persons to contribute towards shaping policy and making programmes … The Right to Information, thus, becomes as fundamental as the right to food, to shelter and to employment. The poor themselves are becoming aware that the removal of their information poverty has become a powerful constraint on the alleviation of their material poverty.[23]

For as Joshi argues, lower classes need information about weather, manufacturing techniques, agricultural techniques, about market prices, about nearly anything that one can imagine in order to survive. Lower classes in developing societies are becoming acutely aware that "knowledge is power." He goes onto explain that in particular, audio-visual means of communication that do not have a skill-set minimum (as a newspaper requires literacy) are particularly effective in forming linkages between scientific knowledge and the masses. In addition, such communication, ideally should go two ways, both top-down, and bottom-up (in terms of on the socio-economic ladder). Beyond that, horizontal linkages across various classes and sectors are important as well for establishing a body of knowledge and information transfer. The notion is that once the information is diffuse, that people's skill sets will increase, and that the overall ability of the society will, over time, increase. As such, this will lead to broader and more comprehensive development.

However, Joshi seems to overlook the fact that many of these forms of communication that he refers to, such as radio and television, require large amounts of infrastructure and technological devices in order to be able to send a message back to the origin. While a government might possess a radio transmitter, but

a farmer in a rural area probably does not. As such, real two-way dialogue from the bottom-up is unlikely. Regardless, the overall notion that communication can provide a positive impetus for development is an important one – particularly when it comes from a nation of the global South.

However, there exists a powerful criticism to the arguments of both Lerner and Joshi, one that comes from the research of Stanford University sociology professor Everett Rogers. He has shown that the role of mass communication was not as widespread in promoting development as had been thought by scholars like Lerner, saying that communication had typically been only one-way, and that communication from the social and economic periphery to the core was nearly impossible. Thus, what had been thought of by the linear model toward development à la Rostow, and the corresponding theories of the effects of communication à la Lerner is now moot. His research in Colombia show that "the role of mass communication in facilitating development was often indirect and only contributory, rather than direct and powerful."[24]

In a later study, Rogers again attacked the notion of the impact of mass media on national development. He found that mass media was unlikely to report new innovations, techniques or other changes that would impact local development.

> When individuals in developing nations who had adopted an innovations like a weed spray, a new crop variety, or family planning, were asked the sources/channels through which they had learned about the new idea, *the mass media were almost never reported*. Interpersonal channels with peers totally predominated in diffusing the innovation.[25]

Therefore, the debate as to the role of mass communication in a developing society is still ongoing. Rogers argues further that while mass communications does have the potential to make dramatic change in the area of development, it must adapt newfound structural changes. He articulates these as follows:

> 1) providing technical information about development problems and possibilities, and about development problems and possibilities, and about appropriate innovations, in answer to local requests, and,
>
> 2) circulating information about the self-development accomplishments of local groups so that other such groups may profit from others' experience and perhaps be challenged to achieve a similar performance.[26]

It would seem that educating and encouraging local people to take advantage of new techniques would

be in the spirit of Lerner's "multiplier" effect, but would be done in a much more widespread and useful fashion. The need for a self-reinforcing mechanism is needed, and not merely one that just disseminates information and leaves it at that. The information must flow from top to bottom, bottom to top, side to side, and in every direction such that a maximum feedback loop can be created.

Another important aspect of modern-day development is the use of information technology (IT), or the totality of information-based economic activity. Moreover, Indian computer scientist professor at the Banaras Hindu University, Varanasi, Dr. Yogendra P. Dubey has argued that the combination of new technology and new information are the impetus behind human advancement. "New information is the fuel, technology is the steam, and the economy is the locomotive which pulls the train of human progress (perhaps occasionally pushes it backwards)."[27]

Dubey's arguments are not that technology can merely be applied at will like a magic seed, but that they are a necessary and vital part of a larger and "holistic approach" towards development. He elaborates that a new paradigm of development is needed for modern developing societies. Primarily, the development strategy must come from within, taking into account local resources, indigenous capabilities, and innate socio-cultural values. In addition, Dubey proposes that technology in general should be "need driven" and not "technology driven."[28] Given that all people require various amounts of information, regardless of whether or not they are rural farmers or wealthy international bankers, appropriate tools geared towards the needs of all people is needed.

The summation of such technologies that allow for advanced informational and communications capacities are encapsulated in the term "information and communications technologies" (ICT), a popular term in existing modern literature. Usually , ICTs are divided into three major categories: Computing, Communications, and Internet-enabled communications and computing[29]. For the purposes of this paper, the acronym ICT will mostly focus on Internet-based technologies, which require a baseline of computing and telecommunications infrastructure and skills – in other words, the Internet is not a technology that stands on its own, it is dependent on other things (computers, telephone lines, data transmission cables) to function.

As the world enters the 21st century, humanity is only at the early phases of what many have called "The Information Age." Since the development of the Internet in the 1970s and 1980s, culminating with its widespread use in the developed world[30] by the mid 1990s. However, much of the developing world, particularly those in sub-Saharan Africa, are not able to participate in the much-talked about "new economy" because they lack these technologies. The Internet is the latest (and most awesome) form of widespread communication technology that exists to date. No other technology can provide a cheaper and faster way of complex communication to such a large audience.

It should be noted that the fact that ICT has only existed in its fully-deployed form in the developed world for nearly a decade, and has only begun to touch the developing world in recent years, there does not yet exist a large body of literature pertaining to the effects of ICT in such countries. Coupled with the fact that data on rates of Internet usage, Internet connectivity speed, et cetera are changing rapidly in the developing world, and even more rapidly in the developed world, particularly the United States, accurate and recent statistics are often hard to come by.

As the Asian Development Bank wrote in a recent working paper:

> The Internet (including the World Wide Web) is one of the most important technologies to affect not only communications but also computerization. The Internet provides a new communications medium that allows activities such as e-mail or chat lists for group communications. Yet, it also breaks down boundaries between all forms of communication – new and old – by allowing multiple modes of communication … The Internet provides people with access to more and better information. It also facilitates new ways of representing information (e.g., multimedia), structuring information (hyperlinks), and creating information (collaborative and distance work). Unlike other media that treat users as passive recipients, the Internet is an active media for communication and demands more sophisticated thinking and logical skills than any other.[31]

The Internet is the ultimate feedback loop that communications researchers have been looking for. It is a low-cost technology that allows multiple channels of information to be exchanged in a manner conducive to proper development. Given that the Internet represents a fundamental paradigm shift[32] in world communications technologies, it becomes necessary to evaluate the ability of the Internet to spur economic development. Furthermore, given that researching the effects of the Internet on the entire developing world, which the World Bank estimated[33] in 2000 to be 1.2 billion people (as defined by

earning less than $1 US per day, measured in purchasing power parity terms), would be nearly impossible, a much more feasible solution would be to take one particular developing country and to examine this situation through the lens of that country.

For this thesis, I have chosen to select the West African nation of Senegal, where I lived from October 2002 to May 2003. Senegal is among the few cases among developing nations, that has seen political and economic stability on the African sub-continent since post World War II independence from its colonizing power (France, in 1960). Its transfer of power from one régime to the next has not spurned bloodshed or upheaval, unlike some of its other African counterparts, like Somalia or the Democratic Republic of the Congo.

Therefore, this thesis will attempt to answer the following three questions, using Senegal as a case study:

• Why is the Internet relevant to developing nations, specifically Senegal, and how can it assist development?

• What has Senegal done to reach the stage that it has? Where will it go from here?

• How can the hurdles to ICT that are present in Senegal and throughout the developing world be overcome?

My research will allow readers to begin understanding what Internet deployment looks like in a developing society, what practical purposes people have for it, and what civil society and government are doing together to improve the overall quality of service. By making the Internet more relevant to developing societies, it can be shown how notions of development are changing given a 21st century technological context.

This section will provide a review of the existing literature that exists concerning the Internet and its relationship to socio-economic development. Each piece of literature is important for understanding a facet of the technological and developmental question. I will argue that each of these approaches have

not dealt with the situation of the Internet in the developing world in a complete context. My thesis, which seeks to take a specific case of a developing country (Senegal) encountering the Internet, combined with broad theoretical development frameworks, and examples of firsthand experience and primary source material, will allow development in the modern context to be better understood.

One of the main works that concerns itself with the larger theoretical issues of technology and African development is by Sidiki Diakité, a professor at the University of Abidjan in Côte d'Ivoire. In his 1994 book, *Technocracy and the African Question of Development* he examines the theoretical underpinnings of technological change and how it impacts social development as it pertains to Africa. While he does use the phrase "Africa" in the title, and some of the work does talk about Africa, the bulk of his work talks in very abstract theoretical terms. He does make references to his predecessors, such as Ellul and Roqueplo, French social theorists who have written extensively about technology and *la technique* in contemporary society.

In a section entitled "For a 'multidimensional' development according to a collective strategy of mastery of technologies", Diakité addresses that technology is not value-neutral, and that the technologies that are adopted by a a particular society will be forced to encompass those values that it takes in.

> The transfer of technology cannot be reduced to the transmission of a technical engine considered as a simple neutral instrument, but as part of a transfer of a discourse and of a milieu, of an organized 'structure'. Given that modern technology comprises not only an ensemble of relative disciplines to the application and the materialization of scientific knowledge but also to the processes that encompass machines, the tools and the relationships of productions that they implicate ; its transfer implicates on one hand, a theoretical face (assimilation, appropriation, interference of symbolic and technical systems … etc.) and on the other hand an applied face (the intensity of problems posed by the 'technicization' of African societies implicates the necessity (and the modalities) of a community strategy of development.)[34]

Diakité's main argument is that technology cannot be viewed as a lone item that can merely bring along with it economic change, that it is part of a larger system which puts enormous requirements on the new environment on which it is placed. So in the case of the arrival of more modern technology like the Internet, Diakité would argue, that it requires that the new technology be able to be used and understood by its local constituents, but also that it can create a situation which could further stratify the existing

environment. This argument is one that has been brought up by those who argued that the implications of technology into a developing society will only reinforce and further stratify that society. However, no theorist or research has been able to convincingly show this to date. This argument seems to exist in pure theory rather than any established practice.

Diakité's work though, stands as an example of the kind of literature which only concerns itself with broad theoretical concepts, such as the neutrality of technology, and its effects when implementing itself into a society. This does not address Africa, and does not address the specifities of Senegal. This type of work tends to be much more philosophical than practical in nature, and as such lacks any real concrete and pragmatic examples of what can be done to prevent the types of issues that are warned against, regardless of whether the reader agrees with them or not. While it is nonetheless important for the reader to have a general understanding of these ideas, it is much easier to write about these brought theories than to actually have practical applications for them.

Diakité is not the only African author to write extensively about the benefits of ICT as a stimulating force for development. Another main work by an African writer, John Afele, a Ghanaian (who currently teaches plant agriculture at the University of Guelph in Canada) who wrote a book in 2003 called *Digital Bridges: Developing Countries in the Knowledge Economy* in which he talks about the benefits to developing nations, particularly those in sub-Saharan Africa about the advantages of adapting ICT and how it helps development.

Very much like Diakité, Afele can be understood as a social theorist who argues a great deal about the general benefits of ICT and its role in catalyzing development. His work, even though it is much more recent than Diakité's work, only refers to broad outlines of theories which discuss how such technologies could have a positive outcome effect upon the societies where it is introduced.

> IT [Information technology] therefore could annul the general and overstated assumption that poor nations lacked expertise … Local experts could also lend to enhancing development outcomes, but they would have to consider themselves as resourceful and capable of contributing to understanding of local development themes. The full participation of the local intellectual in conceptualizing the knowledge needs of local communities could reveal the real challenges in the operational domain and increase the cultural and relevance of technology.[35]

Afele writes about how the presence of technology could be used to fully link connect local elites and empower them to train the masses, and furthermore would incite a "brain gain" -- a reverse effect of the known "brain drain" that much of the developing world experiences whereby the intellectual and technical elite are enticed to leave for the developed world, thereby stripping their native land of people that have the capacity to build up the social, political, and economic infrastructures. Afele backs up his theoretical claims much along the same lines as Diakité, using other theorists, however he does use some modern evidence as cited in press reports and speeches given at modern communications technology conferences and meetings. While interesting, this does not give the complete picture that it should, being able to use the background theoretical framework for understanding communications technology and its benefits, but along with how that can translate into tangible benefits.

While there is a lack of a large body of work pertaining to information and communications technologies (ICT) in Senegal, the main works that have been done tend to be of a high caliber. I will first review the general literature and its major flaws, which are that while it presents a broad understanding of the specifics of Senegal, but lacks a review of particular approaches that have been taken to resolve some of its connectivity issues. This is useful for providing a macro-level understanding of what has been occurring, pointing out large trends, statistics, government policies which do not always illustrate the full picture. While their contribution is important and vital for the purposes of better understanding ICT as it applies to Senegal, however they tend to leave out micro-level specificities which may illustrate how or why macro-level plans do or do not work.

The major piece of work detailing the Senegalese situation comes from the main authority of Senegalese Internet history and analysis from inside Senegal, Professor Olivier Sagna. Sagna, who teaches at the Université Cheikh Anta Diop in Dakar, the capital city, has done extensive work on Internet in Senegal, including multiple essays and a major dossier for the United Nations Research Institute for Social Development (UNRISD) entitled: "Information and Communication Technologies and Social Development in Senegal: An Overview" (August 2000). This work provides a great deal of insight unto the ICT landscape in Senegal, and draws upon a great deal of primary source material.

Sagna's work provides and excellent history of the Internet in Senegal, and has argued effectively why it is important. He also sets down a lay of the land of the Internet applying to various sectors of Senegalese society, namely, in the public sector, in the business world, as it applies to governance, as it applies to health, et cetera. It provides a scant review of important Senegalese developments such as telecenters, their role in providing access, in addition to entities (governmental or non-governmental) which play a large role in providing access and educating and promoting that access. He touches on groups such as the Senegalese chapter of the Internet Society, of two important ICT-focused Senegalese NGOs, OSIRIS and CRESP, but does not really explain specifically what they have done to foster ICT in Senegal.

His work is vital to understanding the Internet in Senegal, and one must wrestle with his ideas before undertaking any sort of project pertaining to the Internet in Senegal. However, the main problem with his work is that it is just that – a set of background and history information. It touches upon specificities but does not illustrate or analyze them. The other problem is that some of his information is out of date. His project was published in August 2000, which means that his most recent information comes from late 1999 and early 2000. The Internet is a rapidly developing medium, and even during my experience there from October 2002 to May 2003, there were several important things which have occurred since I left the country. Sagna's work tends to provide a great deal of context, and not enough current and practical examples of ICT use in Senegal.

Another main work that comes from inside of Senegal was another general report released two years after Sagna's dossier, also sponsored and published by UNRISD. Entitled “New Information and Communications Technologies: Challenges and Opportunities for the Senegalese Economy”, this paper was written by Gaye Daffé and Mamadou Dansokho, who both teach at the Université Cheikh Anta Diop in Dakar.

Like Sagna, Daffé and Dansokho's work remains very general and provides a broad and general understanding of the Internet in Senegal. While still valuable, it does not build on the existing literature, it merely repackages what had been written about before. It does refer to other Western development

literature, such as Walt Rostow[36], and discusses their relevance in the Senegalese context.

> In his approach to stages of growth, Rostow suggest that the importance of telecommunications goes hand in hand with the intensification and growing complexity of the changes provoked by the expansion of industrial production. The development of industrial activities certainly entails a greater flow of information, making telecommunications the indispensable channel and support structure for economic agents involved in such activities. Thus, Rostow's approach is in line with the classical model of economic development, in which growth is based on the dynamic of capital accumulation that accompanies technological progress.[37]

While this is important to prove that telecommunications are the "indispensable channel and support structure for economic agents," Daffé and Dansokho do not provide any criticisms of Rostow's work as some other theorists like Rogers have shown. This approach is useful for providing one approach to the argument that an improvement in ICT in Senegal is indeed in their interest, and that some government actions as they show later on are indeed economically beneficial to developing countries, like Senegal. However, just like Sagna's work, it lacks a clear presentation of specific cases in Senegal which would better illustrate what has been going on. In addition, it fails to mention some of the new developments that have happened within the last few years, like a clear profile of an Internet-enabled telecenter, or the role of civil society in the promotion and discussion of the Internet in Senegal. It too provides too much rhetoric, and does not illustrate specificities that other groups, such as NGOs, might play in this process.

Other, and more recent research seems to have the opposite problem. They lack broad context, and only narrowly describes a particular slice of Senegalese ICT life. Two prime examples of this are a work that focuses on ICT's effects on Senegal's second largest city, and religious focal point, Touba, and also another that focuses on the the Saint-Louis-based Pésinet, a local project to use ICT in regards to preventive medical analysis and consultation.

In yet another local Senegalese research project published by UNRISD, researcher Cheikh Gueye illustrates the role of ICT in his dossier entitled "The Challenge of NICTs and Their Role in Urban Change: The Case of Touba" published in May 2002. Touba, as Gueye illustrates, through economic forces that have come about via the Islamic sect, the Mourides, who create and run the city, have been using ICT to assist in the development of the city itself, and in the preaching of its religious message to

the greater world.

The Mourides were founded in 1888 by Cheikh Ahmadou Bamba, a leader of a mystic Islamic religious brotherhood. Touba has grown to become the second largest city in Senegal, with over half a million residents. While most of these people are religious followers, it is no doubt that many have followed in the wake to take advantage of the commercial opportunities that it provides. The Mourides themselves are known for their commercial activity throughout the country, and use Touba as an ideological hub for such activities.[38]

In this work, Gueye tends to focus on the role of telephony (the collection of telephone infrastructure and services) and computers, much more so than the effects of the Internet, and even then, the discussions of such technology do not come until the end of his paper. His work, which are useful for providing a fascinating analysis of religious effects on urban growth and achievement, do not set the ICT developments in a larger context ; they lack the broad-scale understanding that work like Sagna's or Daffé and Dansokho's have in overabundance.

One poignant example of this is when he provides the quotation of Dame Ndiaye, the "self-taught founder and leader" of a Mouride *dahira* (a sub-group within Mouridism) called *Matlaboul Fawzaïni*[39]

> 'When God sent the Prophet, it was to inform us. Cheikh Ahmadou Bamba has produced 7 tons of writings to provide us with information. Initially, the information that forms the heart of our credo was distilled 4 times a year. Moreover, the General Assembly is always a high point in communication. We have a permanent office, central offices, and cells equipped with cutting-edge information technology tools, namely, the computer, equipped with Internet access and e-mail. Each cell must experience what we experience. The key word is speed…Given that this was a new technology, we didn't want to be left behind.'[40]

This quote does provide an interesting case for religious figures using ICTs to communicate with each other within their *dahira*, noting that they find "speed" to be of utmost importance. Particularly when these *dahiras*, as shown in other parts of Gueye's work, are involved in international financial transactions, using ICT to achieve this facilitates this and makes their dissemination of information that is relevant to them much easier to be achieved. However, Gueye does not step back and describe how this came to be, or why it is relatively easier for a Senegalese member of a *dahira* to have cost-effective

and reliable Internet access vis-à-vis their counterpart in Gabon or Sudan. Nor does he describe any type of theoretical context to show why this is a more effective method of informational communication – something that both Sagna and Daffé and Dansokho achieve very well with their long and extensive analysis on how it can be an effective tool for development.

In addition, nowhere is it mentioned if the "Case of Touba" accurately reflects ICT use in other parts of the country. Is it just that because there are elite who can take advantage of ICTs? With a combination of the contextual setting for ICT in Senegal, we could see Touba as an episode, or as a role-model for providing local content to its target local population. However, without the Sagna-like political and historical context, such analysis is imposisble from such a limited frame of reference.

The final example of academic research that has been done, focused on ICT in Senegal is the most recent, and also one of the few examined in this set of reviewed literature that is not done by indigenous African researchers. This work, published in August 2003 by a pair of business students at the University of Michigan and University of North Carolina Schools of Business, details the work of two projects in the northern Senegalese city of Saint-Louis that are sponsored by *Afrique Initiatives*, a Brussels-based corporation that sponsors African local small business development.

Luis Castro and Sharon Smith, the authors of "What Works, Afrique Initiatives -- Attempts at Combining Social Purpose and Sustainable Business : Offering IT-based Business and Healthcare services in Senegal" profile two different types of projects.

One, called Pésinet, involves the periodic weighing of newborn children, which are statistically computed over the Internet, and then local doctors can pre-emptively determine if a child has a weight deficiency and therefore is unhealthy. The other, known as Saint Louis Net, which is not quite as developed, seeks to provide local information, such as weather forecasts geared to fishermen over the Internet at a very cheap price.

This research, while detailing and formidably analyzing these local projects, again, like the work of Gueye, fails to consider the broader themes of ICT in Senegal. It comes to the conclusion that Pésinet

does work, and that Saint Louis Net does not. While it does provide a very scant history and context of ICT in Senegal, it does not do it justice and does not really explain how and why these programs do or do not work given the state of Senegalese ICT. Their research tends to focus on the feasibility of these projects as business models, which although the goal of their research, could be far strengthened to use these as models of local ICT projects that do or don't work, and to discuss how some of the same problems that plague these projects (such as lack of literacy, for example) also affect the rest of the country for the same reasons.

Therefore, given that the little literature that does exist is not sufficient, as it does not address the specifics of Senegal, nor place them in a broader context, further and more current research is needed both to find out what the latest activities of Internet deployment, use, and advocacy are in Senegal. My study hopes to expand the body of literature of the use of ICT in developing countries and how it can play an important role in development.

Methodology & Research Strategy:

From October 2002 to May 2003, I was on a study abroad program through the University of Wisconsin, Madison in Saint-Louis, Senegal, at the Université Gaston Berger. One of the requirements for that program was that we complete a substantial and original body of research on some topic relating to Senegal or Senegalese life. Given my interest in ICT, I chose to delve into the status of ICT in Senegal and how it can help development. Upon the completion of the draft of my work in May, I knew that I wanted to expand upon this body of work such that I could use it for my honors PEIS thesis here at UC Berkeley.

My primary source material came mostly from first-hand interviews, conducted in French, in Senegal during my time there. I met with various people who are somehow connected with ICT in Senegal in some way, including the Minister of Technology of Senegal, a leading Senegalese academic who studies ICT, and a Dakar-based cybercafé owner. All interviews were conducted one-on-one, with no intermediary or translator, and were recorded to Mini-Disc with the consent and acknowledgement of the subjects. The English translations that I have provided in the body of my work are all my own unless otherwise noted. All direct quotations are taken from direct interviews unless otherwise noted.

The benefits to using interviews as source material are beneficial because they allow the person being interviewed to express themselves in their own words and to tell the story as they see it, from their eyes as a Senegalese. It is the best way learn information from someone – provided that they are willing to tell you accurate information.

One of the potential pitfalls of using interviews is that the subject may simply be parroting answers, or may be composing answers that they think the interviewer "wants to hear," regardless of their truth. However, the information that I was asking my subjects was in no way sensitive, and could not be used to damage them or their reputation in the future and therefore, I have no reason to believe that the answers that I received were not truthful or were not believed to be true at the moment that they were stated. If I received an answer that seemed somewhat incredulous, like Blaise Rodriguez' (a Dakar

cybercafé owner) claim that all the kids of Dakar know how to use the Internet, I would confirm it with another source. In that case, his claim was refuted by Olivier Sagna, a Senegalese academic and expert on Senegalese ICT. I also did my best to allow the subjects to speak on their own by asking value-neutral questions.

I conducted a total number of ten interviews, each totaling nearly one hour in length. While this may seem like a small sample size, combined with other primary source documents and my own observations, I believe that I have more than enough material to be able to accurately portray and describe the status of the Internet in Senegal and how it aids development. I did not seek to get specific data about time spent on the Internet, or various activities that Senegalese did on the Internet. Given that this type of data changes extremely rapidly and would be far too difficult for me to collect, I was more interested in the macro-level, and spoke with various professionals about their opinions with the current state of affairs. Other non-interview primary source material are documents that I was either given firsthand, downloaded off of the Web, or obtained them from the UC Berkeley University Library.

I. Introduction

> Information technology is not a magic formula that is going to solve all our problems. But it is a powerful force that can and must be harnessed to our global mission of peace and development.
>
> Kofi Annan[41]
>
> Seventh Secretary-General of the United Nations
>
> November 5, 2002

Information technology, or more accurately, information and communications technology (ICT) should not be confused with any all-encompassing solution. It is not a "magic formula" by any stretch of the imagination, and anyone who thinks that is fooling themself. But under the right conditions, the Internet can take hold firmly and be used as a real tool for development.

In the nations of the so-called "developing world," ICT isn't always a number one priority, and rightfully so. Political stability, economic development, hunger, disease, and even the end of war cannot be solved simply by a few networked computers. In fact, many developing nations must overcome these much more basic principles before they can begin to incorporate ICT into any future vision for their country. Any ICT strategy that has been implemented must be done so after certain conditions are met, such as political stability, a certain level of economic activity, and an active and interested civil society.

The case of ICT in Senegal is an interesting one, as these conditions have been met. While still low on the United Nations list of Human Development Index (156[42], whereas the United States is 7[43]) and the Technology Achievement Index[44] (0.158, whereas the United States is 0.733), it has done many things right. Since independence from France in 1960, Senegal has known no major political upheaval, no major internal or external armed conflict, has had peaceful transitions to local democracy. Almost half a century has passed since independence, and Senegal still has a great deal of untapped potential. As Mamadou Gaye, the director of CRESP, a Dakar-based Senegalese ICT-focused NGO, put it in a 2003 interview, "Senegal missed the first two Industrial Revolutions. It better not miss the Information

Revolution."[45]

Missing the Information Revolution would in fact, be devastating to Senegal, or any developing country. As the gap between rich and poor, have and have-nots, and the digital divide grows wider, the ideal solution is to use ICT as its own end, but rather a means -- a force to be "harnessed," as Secretary-General Annan says, to increase development.

As Olivier Sagna, the leading Senegalese ICT academic, notes, it is important to overcome popular belief that ICT is irrelevant in Senegal, that it is merely a toy with no useful purpose.

> Two sometimes contradictory factors -- the urgency of finding lasting solutions to problems of education, health, and food self-sufficiency for the majority of the population; and the understandable desire to be part of global advances by investing in technologies that may be seen a useless, or even indecent luxury – would appear to leave the African countries with a dilemma. Nevertheless, in weighing the pros and cons, there are those who believe that Africa should be connected and incorporate this technology in order to overcome the existing gap between the information-poor and the information-rich. While acknowledging that connecting to the information superhighway carries or increasing the inequalities between rich and poor countries, and, within countries, between rich and poor, it is believed that neglecting to do so would constitute a further obstacle to economic progress and social development.[46]

Of course, if the majority of people do not have access to this technology, because it is concentrated in one part of the country (which it is), or concentrated mostly amongst one demographic (which it is), or because it is expensive (becoming less and less true) -- a sudden influx of ICT infrastructure will do no good.

But rather, if the local people see, realize, and execute ICT and help it make their lives better, than ICT has done its job. Technology, while a catalyst, should not be considered as the only catalyst for a developing nation. For technology's effectiveness to be realized, we need not only an academic perspective, but more importantly, a local argument from the people themselves – the techno-savvy community of Senegal. The goal of this paper will be to provide an illustration as to the current status of the Internet in Senegal, to show how the beginnings of ICT can aid development, and also to provide a discussion of the present hurdles facing technology deployment in Senegal.

1) What is ICT? What are its benefits and caveats?

ICT, for the purposes of this paper, as articulated previously, encompasses all Internet-based, and Internet-related technologies. The Internet, or "Inter-network", is a means to connect various small regional networks and make them interoperable with one another. It developed as a research experiment by the United States Department of Defense in 1969, and with the invention of the World Wide Web in the early 1990s, blossomed into the ubiquitous tool that has spread throughout every nation. This paper will focus on the use of the World Wide Web, and email in Senegal, and will describe the various entities involved in its use and promotion.

The United States Agency for International Development (USAID) began a program in 1995 called the Leland Initiative, which sought to bring Internet access to sub-Saharan Africa. On their Web site, they discuss the raw power that the Internet can bring to all peoples.

> The Internet is emerging as a low cost pathway that allows information to be more accessible, transferable and manageable; ready access to information is becoming the catalyst that transforms economic and social structures around the world and supports fast-paced sustainable development. Even as African countries move toward more open economies and societies, there remain formidable constraints on sustainable development in such areas as the environment, disease prevention, literacy and private sector development. Africa needs access to the powerful information and communication tools of the Internet in order to obtain the resources and efficiency essential for sustainable development.[47]

The Internet has brought immense changes to the developed world, particularly to the United States, and Africa, particularly sub-Saharan Africa needs such advanced forms of ICT to advance in the world.

As Congressman Edward Royce (R-CA) said in a Congressional hearing in 2001:

> The international community is increasingly focused on this digital divide, being particularly aware that IT is a significant factor in attracting foreign investment and fueling economic growth. The World Bank reported that the information revolution offers Africa a dramatic opportunity to leapfrog into the future, breaking out of decades of stagnation or decline. It warned, though, that Africa must seize this opportunity quickly. If African countries cannot take advantage of the information revolution and surf this great wave of technological change, they may be crushed by it. That is their report. The concern is that without information technology tools, Africa will be unable to expand or even maintain its already very low level of engagement with the world marketplace. Africa also risks foregoing the advantages information technology brings to confronting educational and health and governance and other challenges.[48]

A more tangible example of the advantages of ICT is the power of extremely quick and low-cost

communication. For example, a Senegalese woman calling New York from Dakar to correspond with her daughter living there will be charged 265 FCFA [49] ($0.50 US[50])per minute (for calls after 8 pm)[51]. This translates into 15,900 CFA ($30.01 US) per hour -- and if she were making this call even once a week for an hour each time, it would cost her a total of 63,600 CFA ($120.07 US) per month. Now, to spend that same hour writing an email to her daughter in a cybercafé, would cost her around 2000 CFA ($3.77 US) for the entire month -- a fraction of what it would cost to telephone. This simple personal communication can also be translated to intra and inter-business communication as well. One could imagine the entire gamut of communication, ranging from ordering new products, to communicating with internal employees spread out over a large geographic area.

In addition to increased communication between entities, the dissemination of information is also an important part that should not be overlooked. Indeed, it is the first component of the acronym ICT -- Information. The beauty (and also the horror) of the Internet, is that it allows anyone and everyone to publish whatever they want.

One newer type of Web page is known as a weblog, or "blog." A blog is a regularly-updated site that provides opinions, thoughts, essays, jokes, links to other blogs, or whatever the blogger feels is relevant. Blogs have shown to play a role in provoking thoughtful online discussion about the issues of the day. Sometimes, they even have been able to influence national media and national mainstream discussion – American blogs stirred up such an uproar in 2002 about Sen. Trent Lott's racist remark at Sen. Strom Thurmond's 100th birthday celebration, that some say ultimately led to his dismissal as Senate majority leader.[52]

Translating this situation over to the Senegalese context, in theory, blogs could play the role of stimulating the government to provide more information about a national disaster. While the Senegalese mainstream press has been releasing information that the government isn't letting on all that it knows about how many actually died in the capsizing of *Le Joola*, the Senegalese ferry that went down in September 2002, independent web-based media (such as www.indymedia.org) or blogs would be another way to counter the information monopoly that the government seems to have. (Indeed, on

February 3, 2003, the government revised their official death toll from 1,153 to 1,800.)

Some, though, have do not see the world as optimistically as some technophiles would have us believe. Many concerns have been presented in relation to connecting the developing world (South) to the developed world (North), some will argue that this will only add fuel to the fire of the Digital Divide. Such arguments have been presented as early as 1996, when, the online edition of *Le Monde Diplomatique*, a French weekly newspaper which focuses on international politics, had a forum on their website entitled *Internet Nord-Sud*. There, Internet users from around the world went back and forth on the problems with Internet deployment in the South, and what potential benefits and consequences it would have. Many there argued that as the Internet was being deployed in Africa for the first time, that it would do nothing but create further social problems, and would further enfranchise the established elite with simply another tool.

To date, I am not aware of no one within Senegal who views the Internet as potentially harmful to the nation. But, there are those that view ICT as a mixed bag, but still leaning towards the harmful view. One recent example (2000) of this is by Gordon Wilson and Richard Heeks, academics from The Open University and the University of Manchester, respectively. Wilson and Heeks articulate that there are three major kinds of opportunity costs that require a critique of the optimistic outlook that many ICT supporters might espouse. These include "development opportunity costs," "information system and technology opportunity costs" and "factoral opportunity costs."[53]

In their argument of "development opportunity costs," they cite a Panos Institute study that recounts "more than 50 major initiatives aimed at increasing Internet connectivity in Africa alone."[54] Their argument is that because government and non-government organizations are investing finite amounts of money, that there is an opportunity cost of investing in ICT, which, as they argue, comes at an expense to other necessities like "water, food, land, power, production technology, money and skills in the development process."[55] However, they do not cite any instance where any "'IT fetishist'" claims that investing in these new technologies is somehow superior to or more vital to a developing nation than these other technologies such as water and food. While there are those who may give ICT more credit

than it is due, it would be foolish of any serious researcher or policymaker to argue that ICT is inherently more important than these other vital resources. Wilson and Heeks, therefore, are creating a false syllogism. They say that just because a government spends money on ICT, and that there is a finite of money to be spent, that therefore they are taking away from other programs, such as water and food. I am not aware of any policymaker, government organization, or NGO that is advocating spending time and money on ICT instead of these other things – often the ICT initiatives are done in conjunction with other programs, and not instead of. If one were to follow the full logic of Wilson and Heeks, the conclusion could be made that similar improvements in agricultural technology are a drain on other investments. It has been demonstrated fairly convincingly that the Internet is among the best and most cost effective means of communication available to humankind today, and to not attempt to ensure that some are not left behind would be foolhardy and unfortunate.

Their second point argues that the Internet represents such a tiny fraction of use, that it is insignificant, and that furthermore that older media (radio, television and newspapers) have "capacity, interactivity and ownership limitations that the IT does not."[56] Internet penetration rates are significantly lower than penetration rates of any of those other media, Internet access across the African sub-continent is still in its nascent stages, and is growing at a phenomenal rate. Recent data from the Irish Internet research firm Nua show that many sub-Saharan African countries have experienced rapid growth in Internet connectivity rates. From December 1999 to December 2000, Sierra Leone grew by 1000%, Sudan by nearly 200%, Swaziland by nearly 400%, Zimbabwe by nearly 300% and Burundi by 300%.[57] Comparing World Wide Web to 10 years after the debut of television might be a more accurate comparison. Just because a new communications technology has not reached the level that the other have does not stifle its ability to act as a powerful means of communication.

Wilson and Heeks further their argument by saying that the reason that the traditional media do not get as much attention as ICT does is that "they are just not 'sexy' enough to capture decision-makers attention. Even telephones have slipped down the visibility league tables because of this."[58] Again, this line of thinking is not substantiated at all – the authors did not provide a definition of the term "sexy." If

by "sexy," the authors mean that ICT has a certain appeal that these traditional media do not, then they are absolutely right. ICT represents a fundamental change in the way that information is disseminated. Beyond that, new kinds of Internet technologies are being made available every six to 18 months. With the exception of satellite television and satellite radio, there has yet to be a substantial shift in the way that these media have operated since their inception. Again, as stated earlier, the reason why telephones have slipped in this domain is that email is a far faster and cheaper means of communication.

Wilson and Heeks' final argument that "factoral opportunity costs" detract from political, economic and social factors that underline development[59] is also absurd. No one is suggesting that political, economic and social factors be neglected in favor of technical development. It is much more likely that the discussions of development, from its various aspects, enhance the overall discussion rather than detracting from it. They go onto say that such "'development'" allows reinforcement of the elites' power at the expense of the lower classes. Wilson and Heeks are not the only ones to make this argument. The Senegalese government and civil society both have been taking an active role to ensure the democratization of Internet use and are making sure that its benefits are reaped by everyone.

While taking these concerns into consideration, there are caveats one must be aware of during Internet deployment in the developing world. It is quite possible that such technologies could serve to further stratify a developing society, as some authors have speculated.

> While the issues around democratizing access to the information society are dependent on wider socio-economic and socio-political concerns, if left unchecked, the information economy will overwhelmingly be urban-biased, catering for the affluent segment of society. It can be argued that the advent of ICTS is creating two very broad socials groups in society: 'the information rich' and 'the information poor', of which the latter group would overwhelmingly be dominated by rural and low-income communities.[60]

As early as 1989 the Senegalese government itself recognized this exact problem during its planning stages for ICT adoption within the country. In a government policy paper, it articulated this view:

> ...the progress of information technologies will most likely promote the dissemination of Western cultural models and values, and will thus hasten the decline of traditional values, primarily in urban settings and among young people (i.e., in the dominant urban culture)... But the risk is great that these technologies will benefit only a privileged

> minority (with access and skills), accentuating inequalities in a dual, splintered society with a privileged minority, while the masses are excluded from growth.[61]

While the arguments seem to have been acknowledged that the Internet could pose social problems to Senegal and other developing nations, no one has yet been able to show demonstratively that it has indeed had a detrimental effect. Indeed, the simple economic difference as a cheap and amazingly powerful communication tool is hard to overlook, and it is one that without it, would only do more to keep Senegal underdeveloped.

As recently as March 2003, the US State Department, USAID, the Peace Corps, and others have come together to create the "Digital Freedom Initiative", a join private-public pilot program with the following three goals:

> • Placing volunteers in small business to share business knowledge and technology expertise;
>
> • Promoting pro-growth regulatory and legal structures to enhance business competitiveness; and
>
> • Leveraging existing technology and communications infrastructure in new ways to help entrepreneurs and small business better compete in both the regional and global marketplace.[62]

In fact, it is the coupling of ICT and other additional factors -- and not ICT alone -- that will bear real progress. As stated in "The Development Divide in a Digital Age" by a UNRISD researcher: "Although broadening access to new information and communications technologies is often a *necessary* step in improving the climate for progress in Third World settings, it is almost never a *sufficient* one.[63]"

Similar conclusions have come from inside of Senegal, as Mamadou Gaye asserted[64], "[The Internet] is not a tool of luxury, it is a tool of work.", and that "Africa needs its tools" to advance in the world.

2) Senegal: A Historical Context

Senegal is a West African country that has seen political and economic stability and relative prosperity since independence and is on its way to becoming a leader in sub-Saharan Africa. However, before examining contemporary Senegal, it is important to provide a brief profile and history of the country.

Currently, Senegal has a population of 10.5 million people, and is comprised of six major indigenous ethnic groups, the Wolof, the Pulaar/Fulani, the Sereer, the Jola, the Mandinka, and the Soninké. It also has small Lebanese, Asian, European and American communities in the capital city, Dakar.[65] The Empire of Ghana (8th to 11th centuries, C.E.), the Tukrur empire, the Empire of Mali (12th - 14th centuries, C.E.), and Jolof Empire all captured and fought over various parts of the Senegalese territory over the last 13 centuries. During this time (beginning in the 11th century, C.E.) most of the Senegalese population became converted to Islam, and currently 94 percent of the population is Muslim.[66]

The Portuguese, headed by Denis Dias, landed at the main peninsula in 1444, which they named "Capo Verde" (Green Cape) where Dakar now stands, and at the island now known as Gorée Island, which became a major slave-trading hub just off the coast of Dakar.[67] For the next four centuries, various European powers including the Dutch, English and French traded slaves and other goods along the Senegalese coast. The city of Saint-Louis was founded in 1659 at the mouth of the River Senegal, which now marks part of the the Mauritanian-Senegalese border. This city would remain the seat of French power in West Africa until 1902, when it was replaced by Dakar (founded in 1857), the current capital of Senegal. During the 19th century the French begin to formally colonize the interior of the country, and to fight with the Wolof Empire, particularly in the Cayor province, which connects the land mass between Saint-Louis in the north and Dakar on Cap-Vert.[68]

During the 19th century, French military forces were met with great resistance to their incursions, particularly from Senegalese fighters like "El Hadji" Omar Saidou Tall, Lat-Dior Diop, and Alboury Ndiaye. Tall, a Pulaar from the Fouta Toro region of southern Senegal, and a member of the Tidiane Islamic brotherhood, captured territory throughout southern and eastern Senegal in order to establish a religious empire. He fought with French authorities, expanding eastward at Medina (1857) and northward at Matam (1859). He continued to fight with the French until he died, as a free man, in 1898.[69] Lat-Dior Diop, after being incensed at the French colonial government's efforts to construct a railroad between Saint-Louis and Dakar in 1879 and to begin forced cultivation of peanuts in Cayor, incited a revolt against the French from 1882-1883. He was executed by French soldiers in 1886.

Alboury Ndiaye was king of the Jolof Empire in Cayor at the time, and when Diop was chased out by the French, he sought refuge with Ndiaye. But Ndiaye too was chased out of Cayor by 1890 and died in 1893.

At the Berlin Conference in 1885, most of West Africa was ceded to the French as "Afrique Occidentale Française" (AOF, or French West Africa), including all of what is now Senegal. A brief battle was fought at Dakar during World War II, as the AOF was under control of the Vichy government in France, when the English, Free French, and Australians bombed the city and attacked from the sea.

Senegal remained a French colony until 1960, when it became an independent country, with Leopold Sedar Senghor as its first President. Senghor served as President from 1960 to 1980. His Prime Minister, Abdou Diouf, served as his successor and then was re-elected until 2000, when he was defeated by Abdoulaye Wade, marking the end of the reign of the Socialist Party. The peaceful transition of power from one President to another and from one party to another is not something to be taken for granted in sub-Saharan Africa, which has experienced a great deal of upheaval in the last half century.

Since independence, Senegal has had minor violent skirmishes with its northern neighbor, Mauritania (1989) and with its southern and separatist region, Casamance (on and off since 1983), but overall has been a stable country compared with some of its other sub-Saharan counterparts, like Nigeria, Guinea-Bissau, Rwanda, the former Zaïre, and Somalia who have experienced a combination of civil war, military rule, coup d'états, famine, drought, and other disasters. Senegal has experienced a peaceful transition of power and has had not experienced large-scale or great misfortunes in recent history.

In the last 10 years, it has experienced annual GDP growth of five percent from 1995 – 2002[70], and has achieved a purchasing power parity per capita of $1,500.[71] By comparison to other nations on the sub-continent, South Africa has a purchasing power parity per capita of $10,000, Nigeria $900, Ethiopia $700, Ghana $2,000, and The Gambia $1,800. Senegal, therefore, is on the higher end of things, particularly within West Africa.

The combination of their relative political and economic prosperity therefore put Senegal in a unique

position via-à-vis their neighbors.

3) Why study ICT in Senegal?

Senegal is an interesting case of a developing nation that is approaching a stage of achieving a critical stage whereby the combination of political stability, a sufficient amount of level of economic activity, and of government and civil action are combining at levels to be able to make widespread Internet access feasible, and therefore, a necessary but not sufficient means toward economic development.

Senegal has been at the vanguard of Internet deployment since it first came to Senegal in 1989. Other African nations have progressively been coming online, with Ethiopia in 1992[72], Nigeria, Malawi, Ghana, Mali, Burkina Faso, Côte d'Ivoire, Cameroon, Madagascar, and Guinea all joined in 1993, and Benin arrived in 1995. Today in 2004, all African nations have "Full IP" Internet access.

The United States government has recognized Senegal's commitment to ICT, and for that reason has started the Digital Freedom Initiative in 2003. In the "Digital Freedom Initiative Senegal Program Design Summary," this commitment is outlined:

> Most importantly, Senegal has demonstrated a strong commitment at the highest political level to fostering the development and utilization of information and communication technologies for economic and social development. President Abdoulaye Wade chairs the NEPAD [New Economic Partnership for African Development] 'ICT for Development' Committee and Senegal has recognize the importance of promoting competition in the telecommunications sector. Senegal is also in the process of liberalizing its telecommunications policy and regulatory regime. It privatized Sonatel, the national telephone company, in 1997 and launched a quasi-independent regulatory agency in 2002. It has announced plans to introduce national network competition in 2004. In addition, it has an ambitious vision for E-Government services, establishing the Directorate d'Information de l'Etat.[73]

In short, Senegal has created an environment where Internet growth is ripe for deployment and therefore, it has an opportunity to further its own economic and social development.

II. Telecommunications History & Economic Effects

1) "The Velocity of the Electrical Impulse"

> The fastest mail express, or the swiftest ocean ship, are as naught compared with the velocity of the electrical impulse which annihilates any terrestrial dimension.
>
> Capt. George Squier, U.S. Army Signal Corps, 1901[74]

Just as communications technology played an important role for military, commercial and personal uses at the dawn of the 20th century, it has similar possibilities (albeit via different means) at the dawn of the 21st century. When Squier spoke 102 years ago, he was referring to telegraph and telephone technologies, but his quote could just as easily apply today to information and communications technologies (ICT).

The goal of this chapter is to provide a history of communications technology from the 19th century, with the advent of the telegraph (1832), to the present day use of ICTs and to show how they can help economic development. These modern communication tools, like their predecessors two centuries prior, play a significant role in acting as a strong component of the engine of economic development and production. In the present day, the use of the Internet in the developing world, particularly in sub-Saharan Africa can play a substantial and crucial, but not all-encompassing role on the road to economic development.

Through the examination of Senegalese government policies and non-governmental circumstances, Senegal's relative success in Internet deployment can be better understood. Furthermore, it can be shown how this aids development, and what aspects are retarding the achievement of its full potential. By studying this one case, we can draw conclusions upon how international ICT policy can be improved upon to aid developing countries.

Throughout history, the velocity at which information can travel has been one of the biggest limiting

factors for industrial and economic activity and development. Indeed up until the Industrial Revolution in England, economic activity in Europe was largely stagnant. But with the advent of two major communications technologies in the 19th century, the telegraph and the telephone, information could now travel "faster than people could, faster than any mode of transportation."[75] Before, information had to be hand carried by ship, by horse, or by foot to its destination. By 1876, and the invention of the telephone, information transfer became even simpler – it did not require encoding and decoding from Morse code at each end – both parties could talk to each other in whatever language they wanted, in real-time.

As the communications technologies became more reliable, cheaper, and more widespread, there were consequences on a global scale that had never been seen in history. As Juliann Emmons Allison, a political science professor at UC Riverside points out, the communications developments of the 19th century had drastic effects on the commercial and economic activities of Europe.

> Like improvements in transportation, communications technologies increase the scope and scale of commercial enterprises. A message that previously would have taken a month could be sent in less than a week once the overland cable from Karachi, Pakistan, to Europe was completed in 1865; the time was further shortened in 1870 with the completion of a Bombay to London cable (Jones 1987, 103). The trans-Atlantic cable was completed in 1866, cutting the time between the ordering and the receipt of goods almost in half. Inventory requirements were reduced, and middlemen were bypassed as orders could be sent directly from wholesalers to manufacturers (Jones 1987, 104-106). Communication technologies not only facilitate growth in international trade and investment, but also made possible central control of multilocational enterprises. In 1900, the House of Rothschild had branches in Frankfurt, Vienna, Paris, and London in daily contact with each other (Kennedy 1993, 50). The communications revolution thus led to a managerial revolution that transformed the nature of productive enterprise.[76]

Thus, it can be inferred from these historical facts that as the communications ability and infrastructure grew more widespread and cheaper, that the economic viability and profitability of the corporations and firms that took advantage of them increased as well. The European firms were able to make more money, and their economies were able to develop further, bringing more goods and services to market. This moment in economic history created a distinct paradigm shift, different from any other that had come before it. Eventually, all business transactions would be mediated through these early telecommunications technologies as they were simply the best way to do business. Instead of relying on

slow and time-delayed communications to reach their destination, managerial pressure could be applied from outside its destination location.

By the 1920s, with the advent of wireless radio technology, the receiver or transmitter could be mobile. This allowed for such technology to be used on things like ships and airplanes. Not only did this have an effect on how businesses could communicate with their own networks, but it also provided a means for foreign governments to control their colonial and military outposts from remote control locations.

The monetary value of the exchange of information also can be applied to the post-World War II era, where many countries in the world began to develop economically on their own feet. In this case, the advancements that have been made in communications technology can allow some countries to advance quicker than they have ever before. By the 1980s, the newly industrialized countries of Southeast Asia, also known as the "Asian Tigers" (South Korea, Singapore, Hong Kong, and Taiwan) have become the prime examples of the advantages of being a late developer[77], as Krueger points out.

> Modern communications technology must, too, be regarded as a substantial net plus, even in countries where high tech is always purchased regardless of the benefit-cost calculus. In part this is because the link to the rest of the world is potentially so valuable; in part, however, the availability of low-cost communications has undoubtedly saved enough resources to more than offset whatever waste there has been.[78]

Ideally, by connecting oneself to the rest of the world and allowing information to freely flow into the country and spread about it, the instructions and requirements for economic efficiency will move about to create the most benefit at the least cost – in the classic Adam Smith tradition.

The self-investment by the Asian Tigers has no doubt aided their economic success. South Korea's commitment to broadband technology has put them ahead of the United States and Japan for deployment of high-speed Internet connections. While the full effects of this are yet to be realized – the broad availability and quality of bandwidth will most likely have positive effects on the South Korean economy. As *The New York Times* wrote in 2003 about South Korea's new program:

> With a hefty push from the government,South Korea's telecommunications providers have built the world's most comprehensive Internet network, supplying affordable and reliable access that far surpasses what is available in the United States, even in those homes that have their own broadband setup. And now that most of the nation is online at

> high speeds, South Koreans are shifting more of their analog lives to their computers, where they watch soap operas, attend virtual test preparation schools, sing karaoke and, most of all, play games. By embracing broadband so heartily, Koreans have turned their country into a test case for the visionaries who, just a few years ago, imagined a future of nearly infinite digital possibilities.[79]

Thus by adapting this new technology, it would seem possible that South Korea 's annual GDP per capita growth rate of 7.85 percent[80] is linked to this massive and ubiquitous high-speed bandwidth.

In the 21st century, being "networked" means not being connected by telegraph, telephone, or radio – it means being connected by the Internet. For the Internet is the latest, fastest and cheapest form of international and instantaneous communication. Just as the information travels faster, the economic benefits can become greater through the use of these technologies.

2) E Pluribus Unum

Despite many of the economic results of today's Internet, the Internet has its roots in government research. The Internet, which is a collection of inter-connected computer networks, began in 1969 as the ARPANet, the precursor to the Internet[81]. At that time, the Department of Defense's research arm, the Advanced Research Projects Agency (ARPA), began creating an early experiment to network various computers across the country.[82]

One of the big innovations that the ARPANet took advantage of is something known as "packet switching," which was developed in the early 1960s. Packet switching can be explained as what happens when some form of electronic communication (email or a Web page, for example) is transferred between two nodes, or endpoints, the communication is broken up into "packets", or smaller chunks of data which can then be transferred more easily. Then once all of the packets reach the other end, they reconstitute themselves to form the original message. Various electronic devices known as "routers" determine the best path at any given time for any given packet. The advantage to this is that messages are transferred at the most quick and efficient way possible at any given time, and that congestion on the network is difficult, because the network will adapt if one path is blocked. When the ARPANet first began there were four nodes, one at UCLA, one at UCSB, one at the University of Utah, and one at the

Stanford Research Institute in Menlo Park, CA – today, every device connected to the Internet is a node ; there are millions.[83]

By 1972, electronic mail was demonstrated for the first time at the International Computer Communication Conference[84] in Washington D.C., and from there, the momentum could not be stopped. Various other kinds of computer networks began to spring up around the world, many with scholastic research focuses, to allow researchers and scientists the ability to pool their information and research. A couple examples of these networks are the academic networks JANET in Britain and the CSNET in the United States. But one of the early problems was that these networks were not able to communicate with one another – hence the need for something to connect one network to another – an Inter-network, or Internet. So, by 1983, a common standard was established for linking one network to another through a protocol known as TCP/IP (Transmission Control Protocol/Internet Protocol).

Despite this new standard for computers to transfer data between themselves, there lacked a clear and easy-to-use way to transfer and view different file and data types. The ones that did exist, such as Anonymous FTP (File Transfer Protocol) and Gopher were not very good for easy-to-use and widespread information.

In 1989, Tim Berners-Lee, a Swiss scientist working at CERN, the European Centre for Nuclear Research just outside Geneva, Switzerland developed what has become one of the most popular and most useful components of the Internet – the World Wide Web. Berners-Lee wanted a simple way for particle physicists to share information across networks, so he created two very useful inventions: the URL and HTML[85].

The URL, or "Uniform Resource Locator", is the formal name of a Web address. It allows for users to type in easy-to-remember addresses (such as www.berkeley.edu) into a Web browser and have the computer on the other end communicate a particular file (usually a Web page) to the remote user. HTML, or "Hyper-Text Markup Language" is a simple programming language that allowed for various things to be defined within the document (such as font size, color, et cetera) and also has the ability to

link to other HTML documents (aka "Web pages"). The collectivity of web pages constitutes what we now call the World Wide Web.

By the mid-1990s, businesses began to migrate online, and various online-only retailers, such as Amazon.com and eBay.com began to sell goods and services entirely over the Internet. Since then, they and other traditional retailers have been able to capture the low-cost and powerful capabilities of Internet technology.

Email and the World Wide Web are the two most useful components of the Internet today and are also among the foremost components of Information and Communications Technologies. Their development and ubiquity has been a boon to the creation of the Information Age of the 21st Century. However, it is important to recall that ICTs also incorporate other types of technologies which play an important role in understanding their use and place in the new "digital" world – this would include satellites, personal computers, laptop computers, facsimile (fax), cellular phones, VoIP (Voice over IP), and Wi-Fi (Wireless Fidelity) technologies. (However, again, for the purposes of clarity, ICTs as referred to in this paper are focused on the ensemble of Internet-related technologies, focusing on, but not limited to email and the World Wide Web.)

Since the early 1990s, there has been a term that has been used to describe those without access to such technologies – the "Digital Divide." This term illustrates the significant difference between those who can take advantage of the new technologies and those who cannot.[86] It is similar, in some ways, to those in Europe, who were priced out of the telephone for awhile, as it was too expensive – it was a tool of luxury. But after awhile, the telephone became as prevalent as any other household utility. It is likely that the Internet will take the same path – but the realization must come, as it did for those early users of the telephone, that it is a tool of necessity and a tool of work, and not a tool of luxury.

In a 2002 discussion paper, The World Bank identified four major reasons why ICT can encourage economic activity and can reduce poverty . The World Bank asserts that ICTs promote the following: "*integration of isolated communities into the global economy," "productivity gains, efficiency and*

growth," "the delivery of public services," and say that ICTs are *"particularly important for rural and isolated communities."*[87]

The world has reached a new level of international electronic communications technologies with the invention of the Internet and its deployment to every continent on the globe. The World Bank points out that there seems to be a correlation between a strong telecommunications industry and foreign direct investment (FDI).[88] This is indeed logical, as the presence of strong ICT makes it easier for modern companies that would rely on similar infrastructure in their home countries in the North can make their investments in the South work in a similar way.

The presence of ICTs in a developing country allows for higher productivity and efficiency. Their data show[89] that there also seems to be a strong correlation between telecom sector revenues as a percentage of GDP and the annual income per capita growth rate of the poor. Countries that have invested heavily in ICT, such as South Korea, India, Turkey, Malaysia and New Zealand are the leaders in this category.

The World Bank also asserts that government services can be rendered more effectively and efficiently with the presence of online government forms and applications and electronic, secure, and online bureaucratic and monetary transactions. They also point out that with government information available online for anyone with an Internet connection to see it, it makes public services more widespread – even to those in remote areas of the country – this could include, for example, the electronic filing of government documents, saving the citizen and the government time and money.[90]

Another benefit that the World Bank illustrates is that isolated citizens will be able to obtain accurate market information about the goods that they have to sell, as well as those that they wish to buy, making such a transaction more equitable and profit-making for all parties concerned. As Robert J. Saunders, another World Bank author discusses, the absence of ICT in such a situation creates imbalanced economic situations.

> In the absence of an accessible and reliable telecommunication service such activities suffer a variety of inefficiencies, including the creation of markets in which a few information-rich individuals are able to gain significant advantage over the majority of those who are information poor.[91]

This goes against the traditional "perfect information" assumption of the Adam Smith utopian liberal economic world, which is supposed to maximize economic benefit to all parties by determining a price equilibrium along a supply-demand model. It is conceivable that without a widespread and cheap medium to disseminate economic information, that those with the information will have a severe advantage over the masses that do not have it. This disrupts the traditional liberal Smithian economic model, and creates a small economic pie, and not a larger one. Therefore, ICT can have profound economic effects on a society.

3) "…the growth of 'Internautes" needs…"

An "accessible and reliable telecommunication service" is precisely what Senegal has been attempting to create since it first took notice of the Internet in the late 1980s and early 1990s.

International telecommunications history in Senegal begins in the mid 19th century, when the first Senegalese telegraph line was laid between the then French colonial capital, Saint-Louis, and the town of Gandiole, 10 miles away. In 1862, the Saint-Louis - Gorée (former slave-trading island off the coast of Dakar) line was complete by the French authorities, and joined with the telegraph network to France via Saint-Louis and Spain. This primitive form of data transfer was, in its day, the fastest way to move a message across the continent, let alone across Senegal. By the 1920s, this wired telegraph system had been replaced with a wireless (via radio) system to transfer messages between France, its colonial outposts, military bases, administrative centers, and offshore ships[92].

The first true data packet line though, did not come until over 60 years later, until 1988, when the first node of the RIO network came to Senegal. RIO, a French acronym for *Réseau intertropical d'ordinateurs* (Intertropical Computer Network) was a network started by a French NGO called OSTROM (now called IRD, or Institute of Research for Development), which wanted a more efficient way to communicate from its head office in Paris to its field offices around the world, and to be able to link their researchers in the field to other researchers in the scientific community. This was a primitive network, meaning it was limited to simple text-based exchanges, instead of the fancier and more

graphical interface that we are used to today.

The first RIO node was set up at the CRODT (*Centre de Recherches Océanographiques de Dakar-Thiaroye* or the Dakar-Thiaroye Oceanographic Research Center) where all communication with the global Internet passed through a router in Montpellier, in the south of France.[93]

By 1992, the second Internet node inside Senegal was connected to yet another network, Fidonet/Greennet and the third, in the same year at the NGO ENDA Tiers-Monde. Like the CRODT node, those computers had to communicate with an external router (this time in London) to be able to exchange email with the global Internet. By this point, there were approximately 400 users between the two connections at ENDA and at OSTROM.

The Internet, still in its infancy, and limited to pre-Web functions, purely text-based email, telnet, file transfer protocol (FTP) et cetera. By 1992, the ".sn" top-level domain (TLD) name went live, managed by OSTROM, and the ENSUT (*Ecole Nationale Superieure Universitaire de Technologie*, later renamed the *Ecole Superieure Polytechnique*).

Being relegated to only a small internal network, and then with a few connections to the outer Internet piggybacked off of a local X.25 network connection, Senegal got its big break in 1996, when the government finally connected to a "backbone" of the Internet via an MCI 64 Kbps (kilobits per second) connection to the United States. One year later, this was tripled, and included two similar connections to Canada. Six months later the Canadian connections were upped to one Mbps (megabit per second) and finally to two in 1999[94].

By 2000, Senegal was linked to the underwater Atlantis II cable, which allowed a connection of 34 Mbps (megabits per second), creating a combined national bandwidth of 36 Mbps, making it the fastest connection in West Africa at the time.[95] In the October 2003 issue of BATIK, a Dakar-based online newsletter about ICT news in Senegal, reported[96] that Sonatel had upped the national bandwidth all the way to 310 Mbps – making it the second-highest on the continent, only second to South Africa, according to Sonatel.

> This important bandwidth announcement makes the Internet network of Senegal makes it Africa's most important, after South Africa's network. The available capacity compared to that which is used allows us to have a good maneuvering margin. We anticipate the growth of 'Internautes" needs and the diversification of their uses on the Internet.[97]

But Senegal's great innovation for local Internet access is not the fact that it has good international bandwidth – rather, it is the implementation of free-market "telecenters" to bring the access directly to the consumer. This method frees up Sonatel from the burden of orchestrating nation-wide points of access, and allows the market to come in and set a price.

Back in 1992, something happened which would change the scene of telecommunications in Senegal forever. Sonatel (*Societé Nationale des Télécommunications*), the Senegalese telecom company, allowed private telecenters to be opened. As most people in Senegal do not have a phone in their home, they must use public facilities – a small room, where for a fee, phone calls can be made and received. Prior to 1992, this had been run exclusively by Sonatel[98].

Opening up what had been only run by a public entity to the private sector had a stunning effect nationwide. By 2000, teledensity (or the percentage of the population that has access to a telephone) had jumped nearly 400 percent, from 6 telephones per 1,000 people to 24 per 1,000 people[99]. By 2000, nearly 65 percent of the national population could now access a telephone[100].

While telecenters are not unique to Senegal, its telecenters are among the most frequently cited as among the most successful ways to make public Internet access available, particularly in rural areas. According to an article from the Internet Society (ISOC) in 2000, Senegal was estimated to have over 9,000 telecenters – the highest in Africa[101]. However, perhaps only a tenth of them have computer and Internet services, according to Sagna[102]. While it is important to acknowledge that most of the telecenters are in the urban areas, there are a fair number of telecenters in rural areas, based on the personal experience of this author. Every rural area that I visited across the country, I estimate that there would be at least one telecenter within a five kilometer radius of anywhere that I visited.

In other countries on the sub-continent, there are telecenter-like businesses that have been met with varied success, in places like Ghana, Uganda, Kenya, and Mozambique. Peter Benjamin, a professor at

Wits University in South Africa, has recognized two major types of telecenters across the sub-continent, "small, private sector telecenters," and "bigger, donor-funded telecenters." Most of the telecenters in Senegal tend to belong to the first category, which explains why they have been so successful – their owners have a stake in the success of the business. In 2000, they generated a monthly revenue of $200 per phone line.[103]

In Kenya, (mostly centered in Nairobi) there is a telecenter type model, known locally as an "E-Touch Center, which offer free email addresses, but charge seven shillings ($0.09 US) for Internet usage and nearly $0.50 US per message received. According to Benjamin, this puts Internet and email access outside the reach of most Kenyans, but it has been successful for some businesses and NGOs.[104] Benjamin also notes that telecenters in Uganda and Mozambique, while they have been successful in their initial forays into Internet connectivity, they seem to require constant donations from outside the country, and thus, are unsustainable over the long term.

One of the biggest benefits to having local telecenters is that they are locally financed, self-sufficient, create jobs, and provide a service of cheap and local public Internet access. The World Bank cites telecenters as one of many possible solutions to the Internet access gap problem. However, they recommend the following must be considered in order to foster the sustainable development of local telecenters:

• regulatory initiatives to remove barriers to entry by private sector service providers and to encourage both the rollout of affordable and suitable quality Internet service outside the main urban centers, and the use of appropriate technologies such as wireless or VSATs[105] by the access providers;

• bottom-up development approach, in which small business such as phone and office service shops are encouraged to develop an advanced ICT component in response to market opportunities, perhaps with the inducement of micro-loans for investment in PCs and Internet access; and

• business-community partnerships under appropriate conditions, with international donor or NGO assistance, complementing rather than competing with successful small phone shop and telecenter business.[106]

Since the liberalization of the market, the calling rates dropped almost 30percent on average. When telecenters first opened in 1993, the per unit (units are defined differently according to the destination of the call – a unit might equal three minutes locally, but only one minute internationally) the cost for the

consumer was around 100 CFA ($0.19 US[107]). Since then, most telecenters have dropped their prices to close to 75 CFA ($0.14 US) per unit, with some even at 65 CFA ($0.12 US) per unit – hovering close to what they pay themselves for the access at 60 CFA ($0.11 US) per unit. The massive increase of the number of telecenters, particularly in Dakar, has seen some been forced to close, as they are no longer as profitable as they used to be. Sonatel has since imposed a six month moratorium on the creation of any new telecenters[108] -- it would seem as though they were too successful. However, it is also important to acknowledge that: "At the moment, almost all MCTs [Multi-purpose Community Telecenters] combine public involvement with 'an eye' towards eventual commercial sustainability or profitability."[109]

4) La Societé Nationale des Télécommunications

Understanding the history of Senegalese telecommunications and how they play a role in affecting today's ICT consequences for Senegal, one must also examine the government corporation that started it all, and that regulates all Senegalese Internet access – Sonatel.

In 1985, Sonatel (the French acronym for the "National Telecommunications Company") was founded[110]. They became the official regulator of Senegalese telephony, and by 1996, they were also Senegal's first Internet Service Provider (ISP) and Sonatel's first client was the Presidency of Senegal[111]. By the end of 1997, there were between 3,000 and 4,000 subscribers. The first dial-up subscribers payed 7,000 CFA ($12.80 US) per month, which provided a single email address and 10 hours of connectivity, in addition to 1200 CFA ($2.19 US) per hour of connection at the peak times and 600 CFA ($1.10 US) at the less popular times.

In January 1999, the "Full IP" hit Senegal, meaning that the entire country was able to support full Internet access. National backbones were installed, including an OC3 (155 Mbps) line connecting all the secondary cities, and not just the capital, Dakar. Despite rate augmentation the previous year, Sonatel introduced flat-rate Internet access at 10,000 CFA ($18.27 US) per month.

During this period, the Senegalese government had a policy of trying to increase telecommunications use with their 1996 "Policy Statement on the Development of Senegalese Telecommunications

(1996-2000)", which provided several objectives for Senegalese telecommunications by the year 2000. This document was a follow-up to their 1989 paper: "Prospective Study: Senegal 2015" that articulated that ICTs would spur economic and social development.

By the year 2000, their policy statement outlined that telecommunications' share of GDP should rise from 2.4 percent to 3.5 percent, that teledensity (the number of telephone lines per a certain number of people) should triple to 2.5 lines per 100 people, or a total of 250,000 lines nationally, to ensure that everyone in the country was within five kilometers of a telephone, and to promote the national telecommunications industry.[112]

In late 1995, following a local Dakar seminar of intellectuals and business people, arrived at the conclusion that the privatization of Sonatel would be better for the country's telecommunications' landscape. This would allow for better, cheaper, and more widespread service than the government monopoly could provide. Withing two months, new legislation was approved by the Senegalese parliament which achieved two major objectives:

- all telecommunications services, including telex, telegraph, telephony, Internet access and pack-based transmission will be held in monopoly until 2006.
- free competition for value-added services (meaning, in a telecenter-type situation)[113]

In addition to being privatized, shares of Sonatel were sold to the public beginning in December 1997, with a subsidiary of France Télécom purchasing over 40 percent of Sonatel. Nearly 25 percent of the shares are owned by the Senegalese government, 10 percent by Sonatel employees, and the rest are held by private investors. [114]

In short, this meant that while the state-owned monopoly was no longer controlled by the Senegalese government, it would maintain a monopoly on the telecommunications market for nearly 10 years (which will be shortened to seven). The state monopoly should not be thought of as a monopoly and private market combination – the monopoly was preserved, it just changed ownership from being controlled entirely by the state, to being a truly private corporation accountable to private investors. While they did provide something of a private market solution as manifested through the explosion of

telecenters, Sonatel was still the only company that could provide access to their phone lines.

One key aspect that makes the Senegalese government noteworthy in terms of using ICT to aid development is their proactive role, and their attempts at planning to expand telecommunications to everyone in the country by taking advantage of the private sector through the use of telecenters. By 2000, nearly 65 percent of the national population could now access a telephone[115] , mostly due to the role that telecenters have played in making telephone access cheaper and more diffuse throughout the country.

In addition, their use of proactive legislation, such as the 1989 ("Prospective Study: Senegal 2015") and the 1996 ("Policy Statement on the Development of Senegalese Telecommunications (1996-2000") policies has certainly made an impact. Their actions would indicate that they are indeed committed to ensuring that social development can occur through proper legislation. These studies and laws articulate that ICTs will spur economic and social development, and that the government is interested in ensuring that the deployment of such technology is fair, and has the highest quality to cost ratio possible.

Another component of the 1996 policy that is also worth mentioning is import tariffs on computer and telematic products were reduced to zero, and taxes reduced from 26 percent to 5 percent. At the same time, peripherals (such as printers and scanners) had their taxes reduced from 61 percent to 55 percent and accompanying electrical material from 73 percent to 55 percent. All in all, prices were reduced a total of 15 percent.[116]

III. Internet Usage

The aim of this chapter will seek to understand how Senegalese Internet users remain *branchés* (connected) and what exactly it is that they do with the Internet. How much are Senegalese users similar or different from Internet users in the global North, or the developed world? Does what they do with the Internet help in the development of their society? This section will be used to address the how and why of those questions.

1) "Benn heure, ñaata la?"[117]

The liberalization of the telecom sector and the rapid increase in Internet connectivity coinciding at the same time lead to the first cybercafé[118] in all of West Africa, Métissacana, which opened on July 3, 1996 in Dakar. When it opened, Métissacana had 14 computers and an assortment of beverages and office facilities, users surfed the Net in the heart of downtown Dakar for 2000 CFA ($3.68). Despite the fact that at that price, which was still out of reach of most Senegalese, the early presence of public Internet access is not something that can be taken lightly. Given that most people do not have phone lines[119], much less computers at home, public Internet access is a much more viable option for Senegal.

For a time, until telecenters with computers connected to the Internet really started to flourish, it was the Internet-access powerhouse of Dakar. However, by July 2002, Métissacana had shut its doors as a cybercafé in order to protest what it called the "abuse of monopoly" by Sonatel and to underscore "the lax efforts by the State in this sector." Métissacana now says that it will focus on being a pan-African home/business Internet Service Provider.[120]

Since then, there has been a rapid increase of public Internet access across all of Senegal, with the average cost in a cybercafé dropping each year. While the exact number of cybercafés in the country is unknown, it is quite likely that the number is roughly around 100 - 200. With teledensity (or the percentage of the population that has access to a telephone) as low as it is, and with the minute segment of the population who is literate, who have access to a computer and a phone line, Internet access is not something that is even mildly present in the secondary cities or in rural areas.

Specific figures on the geographic distribution of cybercafés (and Internet connections) in the country are unavailable as well, but it is clear that Internet penetration, like telephone penetration, is almost exclusively limited to the Dakar area. Coupled with a higher standard of living and higher literacy rates as compared with the rest of the country, this is not surprising.

As in most places in the world, Internet connectivity was first adopted and best mastered by the most educated sector of the population – which in Senegal, besides the technocratic elite, is the youth, the university and the high school age crowd. Sadly, no official data has been collected on the exact number of Internet users, nor on their demographic and age breakdown. However, Olivier Sagna estimated in 2002 that in all of Senegal, there are around 11,000 Internet users – or 0.112 percent of the entire population of 9.8 million (which has since grown to 10.6 million)[121]. However, OSIRIS, a Senegalese NGO (*Observatoire des Systèmes d'Informations, des Réseaux et des Inforoutes au Sénégal* or the Observatory on Information Systems, Networks, and Information Superhighways in Senegal) has said that nearly one percent of the population is online.[122] This figure was confirmed by Nua.com, a leading source based in Ireland for Internet statistics and demographics. Their numbers show that in December 2001, 0.94 percent of the Senegalese population had access to the Internet[123], up from 0.40 percent a year prior. Given that these figures are from over two years ago, it is safe to assume that this number has only increased. When compared to their immediate neighbor's, Senegal's numbers are quite high.

Nua.com's figures show that in December 2001, Senegal had near the highest percentage of users in a national population in West Africa. Guinea had 0.19 percent percent, Guinea Bissau had 0.3 percent, Mali had 0.26 percent, The Gambia had 1.24 percent, Sierra Leone had 0.38 percent, Burkina Faso had 0.2 percent. The only countries on the sub-continent higher than Senegal according to Nua.com as of December 2001 are South Africa (7.03 percent), Namibia (2.47 percent), Kenya (1.61 percent), Swaziland (1.25 percent), The Gambia (1.24 percent), Gabon (1.24 percent) and Togo (0.95 percent). The typically wealthier African island nations also were ahead of Senegal in this category. They include Seychelles (11.24 percent), Sao Tomé & Principe (5.28 percent), Capo Verde (2.94 percent) and Ile de la Réunion (1.39 percent).

In Dakar (the capital city, with a population of 2.6 million[124]) alone, one cybercafé owner, Blaise Rodriguez, estimated in November 2002 that there are at least 50 cybercafés in the Dakar area, if not more.[125] In the northwest of the country, in Saint-Louis (the sixth largest city in the country with a population of 174,000[126]), there are three in the city (including two on the island of Saint-Louis, the focal point of the city), and one on the mainland and two on the university campus, 11 kilometers away. (There are only two universities in all of Senegal, one in Dakar, the Université Cheikh Anta Diop, and one in Saint-Louis, Université Gaston Berger.)[127]

Tambacounda, the largest city in eastern Senegal (and 10th largest overall with a population of 79,200[128]), has only three cybercafés, most of which are just small telecenters with a handful of computers each sharing a modem connection – and as of December 2002, charges around 2000 CFA per hour, four times the current market rate in Dakar. Ziguinchor, the largest city in the Casamance (and 4th largest overall with a population of 244,000[129]), the southwest region of Senegal, which borders the Gambia to the north and Guinea-Bissau to the south, boasts a small handful of cybercafés, all which are within easy reach of the tourist areas. The first, run by *Sud-Informatique* (www.sudinfo.sn), opened in 1997.

Most cybercafés in Senegal are not cybercafés in the sense of how they were first conceived in the United States and Europe (the first cybercafé in the world began in London in 1994[130], aptly named "Cyberia") – that is, they are not accompanied by a list of various kinds of coffee that can be ordered while checking email. Rather, there are a small number of computer -- usually a dozen or less -- which make up the bulk of what would otherwise just be a telecenter. Some even provide additional services, like photocopying and faxing – but most rely on computers and telephone calls for the bulk of their income.

Rodriguez is a portly middle-aged and middle-class Senegalese man from Carabane, an island near Ziguinchor in the River Casamance. He has one such telecenter, in the Karack neighborhood of Dakar, a short walk from Africa Consultants International's "Baobab Center", where many American students take classes while in Dakar. Carving out the space from his own home, Rodriguez opened up a

computer learning center in June 1999. His cybercafé provided a haven for not only American students, but local Senegalese as well. From my own personal experience, his cybercafé was usually at or near capacity.

By 2000 Rodriguez realized that more people were interested in using the Internet than they were in learning about how to use applications like Microsoft Word or Excel. Rodriguez added three extra computers, for a total of eight, which all shared one modem connection, and he charged 1500 CFA for one hour of Internet access. He said:

As Sonatel was charging us 1800 CFA per hour on, of course, one machine, when you had two people (each at 1500 CFA per hour), you were doing well. But by the end of 2000, that's when cybercafés really prospered. Everyone had a cybercafé.[131]

While Rodriguez's claim that "everyone had a cybercafé" may be a little exaggerated, it is true that the Senegalese government did make it easier for people to open up cybercafés by eliminating the importation taxes on computer material. Coupled with the reduction in telecommunications costs, and the lowering of taxes, more cybercafés opened up in the Dakar area. In fact, a second cybercafé opened up not a 15 minute walk from Rodriguez' own café not long after it was launched.

By the end of 2000, Rodriguez says, he began charging 1000 CFA ($1.89 US) per hour, and March 2001, he had cut his prices to 700 CFA ($1.32 US) per hour to compete with this other nearby cybercafé. As he said:

I should say that the raising and lowering of prices had to do with the cybercafé[132] in Sacré-Coeur[133], They were playing with the prices. After he opened at 1500 CFA, and then dropped to 1000 CFA and finally to 500 CFA, all the customers went to him. We were forced to drop to 500 CFA as well. And after the end of 2001, as that was coinciding with Senegal's qualification for the World Cup – he dropped further to 250 CFA. We all had to follow him and to set our prices at 300 CFA. So you can say that since 2000, cybercafés in Dakar have all been between 500 and 300 CFA. The most expensive will charge 500 CFA, and the least expensive at 300 CFA – but there aren't any more 1000 CFA cybercafés in Dakar.[134]

Even at 500 CFA ($0.94 US) per hour, the Internet became very affordable -- even the middle and upper lower classes living in Dakar. Other everyday essential items have similar costs in Dakar – for example, public transportation (100 CFA), a newspaper (100 CFA), a pack of cookies (300 CFA), a sandwich (400 CFA), a 1.5 L bottle of soda (500 CFA), a 1.5 L bottle of mineral water (300 – 800

CFA), a plate of food at a local eatery catering to locals (500 CFA). Again, as Rodriguez notes, the free market has had a dramatic effect on the affordability of Internet access, particularly amongst the youth of Dakar. He states:

> (The low rate) of 300 CFA has made it possible for all youth to know how to use the Internet … today it is rare to see a kid who doesn't know how to use the Internet. You can find someone who doesn't know how to use a computer – meaning he doesn't know how to use Word or Excel, but it's hard to find someone who doesn't know how to use the Internet.[135]

However, this assertion may be inflated, even for Dakar, according to Olivier Sagna, a professor at the Université Cheikh Anta Diop in Dakar who has done extensive research on the Internet in Senegal. Sagna points out that the bulk of the users are in fact, youth, and not that all youth really know how to use the Internet.

> That is, of course, exaggerated. In Dakar, there are two million inhabitants. There is a large number who live in great poverty, there are a lot of people to whom the Internet means nothing. Indeed, in some urban neighborhoods, in neighborhoods where the middle classes live, we see more and more youth – sadly, there aren't any viable statistics on this subject – but there is a large number of youth who completely master the Internet. What is certain, and what perhaps this cybercafé owner meant by that remark is that in cybercafés, there is a large majority of users who are youth. That, we can say, if did statistics on youth, represent perhaps 70 to 80 percent (of users), maybe more. But that doesn't mean that the majority of youth have access to this tool. That youth represent the majority of cybercafé users – without a doubt – but to say that the majority of youth use the Internet – no. They're still a minority.[136]

Regardless of the actual, specific number of Internet users in the country, it is probably not far from the truth that most of them are indeed youth, based on a cursory glance into any cybercafé anywhere in the country, and that most of those connected youth are in Dakar.

Senegal, like most other countries, suffer from a large urban-rural divide when it comes to Internet deployment. The larger cities (often the capital city) tends to be the locus for Internet access and has been since connectivity first came to the country. Access tends to be cheaper, better, and more widespread in larger cities like Dakar rather than in smaller towns like Medina Gounaas. This phenomenon has been seen in many other cities across the subcontinent.

With the international bandwidth reaching 310 Mbps, those not on a dial-[up connection generally have comparable connections to broadband connections in the United States. Certainly at the two universities, Cheikh Anta Diop in Dakar, and Gaston Berger in Saint-Louis, who each have a high-speed 1 Mbps

connection, speed is not a problem. However, the Internet, while available to most university students through on or off-campus private connections, has not at all been integrated into the curriculum. Students are not instructed in Internet research, and use it primarily for personal correspondence and their own entertainment – in Senegal it has yet to see large-scale educational purposes.

Many of the cybercafés throughout the country have relatively good quality and fast connections, either ISDN or a dedicated digital line which is sold directly to the telecenter from Sonatel. Given the high cost of telecommunications and computer equipment, home Internet access is limited to an even more select few.

Michael Jensen, a South African consultant who has written on and spoken extensively about the Internet in Africa, has illustrated this precise problem – the expensive nature of Internet access. In addition, he touches upon an issue that will be explored further in this chapter, the relevancy of the Internet to an average African citizen. He writes:

> As a result most Africans have never even made a phone call, let alone surfed the Web. There are only about 100,000 dial-up Internet accounts for 750 million people (excluding South Africa) and because Internet Service Providers are usually concentrated in the capital cities, even if there is a computer available, it is usually a prohibitively expensive long distance call to the Internet. At the same time, most of the available information on the Internet is oriented toward Western and urban populations, with few applications relevant to the average person in Africa.[137]

As both Sagna and Jensen have pointed out, the Internet tends to mean very little for most Africans. At the same time, however, there are countries that are rapidly changing this landscape, and Senegal is among the leaders of this movement. Senegal alone more than doubled their Internet penetration rate (Internet users divided by the total population) from December 2000 to December 2001. Both Mali and Malawi tripled their Internet penetration rates in that same time frame, while Rwanda quadrupled theirs.[138]

Therefore, a proper examination of this problem is necessary in order to come to a more complete scenario and to achieve a more workable solution.

2) From Niger to Nelly[139]: User Profiles

Like in most places in the world, Internet connectivity is first adopted and best mastered by the most educated sector of the population – which in Senegal is the sliver of the technocratic elite at the top, those that run NGOs and/or advise the government on technological policy (like Sagna and Top).

Except for access points offered in the university environment, the clientèle of these cybercafés is composed primarily of foreign residents and travelers, individuals of some means, and young people from financially well-off families, for whom surfing the net at a cybercafé is a 'must.' In addition to this phenomenon or fad, the resource is also being used by 'average' Senegalese to communicate, with increasing frequency and at lower cost, with family members abroad, as well as by small-scale economic agents, for whom the Internet is gradually replacing the telephone and fax.[140]

In addition, as Sagna points out, the "average Senegalese" are taking advantage of the Internet – these are primarily youth, (high school and older) and university-aged people.

Sadly, no official data has been collected on the exact number of Internet users, nor on their demographic and age breakdown. But a cursory glance into any cybercafé anywhere in the country confirms this – most users are either of the high school or university age, or are relatively wealthy men (almost always) who conduct business via the Internet or have some practical interest in it. These youth are not necessarily using the Internet to conduct high-financial business transactions, but for much more ordinary and pedestrian activities – ones that would resonate with any average American Internet user.

A quick glance at any Senegalese cybercafé sheds some light onto some of the activities that "Internautes" take part in. Not surprisingly, overwhelmingly, these are email and chatting, but also some users use it to download pornography, as well as music and find out information about their favorite American rap stars. Lane Smith, the coordinator of the Leland Initiative at USAID, confirms this observation.[141]

There has been little formal research done in the way of profiling the kinds of Web sites are frequented by African Internet users. The only such study that I am aware of is an August 2003 study carried out by the Cyber Café Operators Association of Kenya and the Kenyan research firm Archway Technology Management Ltd. Their data reveal that Web-based email is the most popular activity (59 percent of logged time was spent using Web-based email, such as hotmail.com or mail.yahoo.com. The next largest category (12 percent) was viewing "lifestyle" Web sites, which "includes dating sites, entertainment,

music, health, communities and sports.[142] Less than five percent of sites logged was in business categories ("covering news and advertisements, academic course, learning opportunities and technical information."). The main conclusion of the study was that there remains a lack of local relevant content: "Of all the users, 30 percent has never experienced a rewarding, exciting or memorable experience on the Web. The conclusion is that there is untapped potential for networking among the Kenyan people."[143]

While no official research has been done on the specifics of what kinds of Web sites are frequented by Senegalese Internet users, it is the anecdotal opinion of this author that the conclusions from the Kenyan study are likely to be similar in the Senegalese context. As far as email is concerned, Senegalese Internet users tend to stick to free francophone web-based services, such as mail.yahoo.fr or www.caramail.com. The people that they email are either their friends in other parts of the country, the world, or even their classmates – very much like American users. The curious ones, who move beyond the known world of email exchanges move into the unknown world of real-time chat exchanges. This means that as they type they can interact with other francophone Internet users, mostly from France, but also in other parts of Senegal, as well as greater francophone Africa, places like Mauritania, Burkina Faso, or Niger. This service provides an interesting diversion to their normal activities, allowing them to find out somewhat how things operate outside Senegal.

These chat sessions take place in a very informal and exploratory setting, much in the same way that American teenagers spend a great deal of time talking through America Online Instant Messenger or MSN Messenger to connect with their friends and others their age in Anglophone chatrooms focused on the US and Canada. Some go beyond platonic conversations and actively seek out a cyber-relationship, often looking for a potential mate. Whether or not local Senegalese actually believe that they will provoke a real relationship which translates itself beyond cyberspace, it provides some sort of entertaining diversion. Many connect through francophone dating websites to strike up conversations with members of the opposite sex.

Blaise Rodriguez identifies[144] the most common activity in his cybercafé as being Internet chatting, especially amongst girls, on amour.fr or recontre.fr, all French-run singles-themed websites. Others will

often chat via the CaraMail website, run by Lycos, as the interface is in French.

Yet another activity that proves popular with Senegalese Internet users, much like their American counterparts, is downloading music – particularly American rap music, which is very popular in Senegal. Considering that most users do not have a home computer on which to listen to the music at their leisure, most Senegalese do not maintain a large mp3 library of songs, and instead must enjoy the music within the confines of the Internet café. Another thing that they do is to view streaming music videos of their favorite songs. Given that cable and satellite television is somewhat of a luxury and is the only means by which a music video could be viewed, the Internet provides a unique fountain of entertainment – all for an affordable price of a few hundred CFA.

Yet if these are the activities that most Senegalese are partaking in when they go online, how can this help development? How can a teenager in Ziguinchor who is chatting with another teenager in Conakry raise the level of economic activity in their two countries? It is precisely this problem that current Internet use must address. Ordinary people, even if they knew how to use the Internet, do not see the relevance of it in their daily lives – it provides them with no economic benefit. Those who use it, or who even promote it, are considered by some to be "adventurers"[145] or "dreamers", according to Mamadou Gaye, the head of CRESP, a Dakar-based Senegalese ICT-focused NGO.

Without a significant percentage of the population regularly use the Internet, this technology becomes useless to Senegal and thus loses much of its potential impetus towards social and economic development. Thus, this section will be used to show what some of the more practical uses of the Internet in Senegal look like.

3) "What do you mean you're the teachers?": Current Practical Uses of the Internet in Senegal

Nonetheless, even if the Internet is still only being used by a technocratic elite which require the rare trinity of a connection, a computer, and technical know-how, there still have been some fascinating localized applications of information and communications technologies, many of which can be used as tools for social development.

Such local projects include the "Multimedia Caravan", which traveled around Senegal in 2002, introducing and training people to ICT. This was a joint venture with the local Dakar-based Senegalese NGOs, CRESP and OSIRIS -- traveled throughout the Senegalese countryside, introducing people to Internet technology in a trailer filled with computers and telecommunications equipment. They made a particular effort to center their education campaigning throughout the rural areas of the Senegalese countryside and to show them what it could be used for.

Here, a farmer was able to learn better farming techniques, and a marabout was able to hold a teleconference with his constituents across the country. Continuing with their strong penchant for organization and economic activity, the Mourides of Touba have created a relative economic and technological powerhouse for Senegal, giving some private sector counterweight to the results of public action in Dakar. Finally, the use of ICT in a simple version of telemedicine in the hospital of Senegal's fourth city – Saint-Louis. These three examples illustrate firsthand what the Internet can do for Senegal.

According to Mamadou Gaye, the head of CRESP, who led the Multimedia Caravan project, said that one of the best results of this technology was for a Senegalese farmer who was hired as part of the support staff, merely to help move and set up the computers – and not an anticipated target of the Caravan.

Gaye said[146] how one day, while he was giving a workshop on using the Internet, and as he usually does, he asked those who would not be taking part in the activity to leave. But those who usually left, the drivers, the guards, and those without any specific technical know-how, remained.

"We're the teachers now," they said.

"What do you mean, you're the teachers?" asked Gaye.

"We've been trained, and now we'll teach others," they answered.

This group, said Gaye, who no one had thought that perhaps they should be formally taught, were actually paying attention during all of the lessons – to the amazement of the organizers of the Multimedia

Caravan. Initially, they had erroneously believed that the Internet was not for everyone, that it was only for those who had actively come to seek it out. They had not considered that even those that they had employed to do menial tasks would be interested in the Internet as well.

Gaye continued:

> And so it was they who taught. So by the end of the tour, everyone knew how to use the Internet. There was one of our guards who said: 'When I'm not doing this, I'm a farmer, I raise chickens and things. Here's what I discovered on the Internet – while surfing, I found out a way to increase my crop yield, and I know how to do that now.' So it's a question of information. He was just a guard. We needed him to move the computers from one place to another, and at night he didn't do anything, but he used his free time to learn about Internet research, to be trained and introduced to the Internet. You don't need university degrees to know how to use a computer.[147]

Simple amounts of information, disseminated at near negligible cost, can go a long way in the day-to-day lives of someone like a Senegalese farmer, who is a guard to supplement his income. While this may be an anomaly, that a literate farmer happened to be in the right place at the right time, it is possible that this could occur with accelerating frequency. Multiplied ten times, or a hundred times in the country, year after year, how many more yield increases could he and others like him have?

In that interview, Gaye makes a strong point, which is that "You don't need university degrees to know how to use a computer." Just because the technology itself is somewhat complex, does not mean that every person who wants to use it has to understand how it works. Previous technologies, such as the telephone, and the television, do not require a large set of technical skills in order to use them. Similarly with the Internet – all that is required is literacy and some basic knowledge of how to use a hyperlink. The advantage to having a technology like the Internet, is that it allows for two-way interaction – it is an active medium. Unlike television or radio, it provides avenues through which users can communicate with one another. The Internet is a place that people go to when they want to learn and they want to turn their brain on, not to sit back and absorb the information that is passively transmitted to them.

One example of a type of two-way communication that is only available through the Internet is videoconferencing – an electronic medium which provides real-time audio and video transmissions between two people. During the progression of the Multimedia Caravan, videoconferencing was used

between an Islamic marabout with his followers in another part of the country.

Marabouts, known in other parts of the Islamic world as "imams", are highly respected and very important Islamic clerics. In the more religious circles of the society, they are the focal point of religious daily life. Even for the moderately religious, to interact with a marabout is something of great importance. They hold the same sort of charismatic personified reverence that a high-level Catholic cardinal might carry to his constituents.

According to Gaye[148], a certain Dakar marabout regularly made a trip out to a Ndioum, a Pulaar village in southern Senegal, but coincidentally, when the Multimedia Caravan was in his village, he was too ill to brave the dilapidated roads to get across the country. Instead, Gaye and the rest of the Multimedia Caravan set up a live video-conference, with the marabout at the Sonatel studio in Dakar, and their own equipment on the other end. "They were in the village, and the marabout was in Dakar, and the people were able to greet and ask live questions to the marabout. Voilà, the time was cut shorter, they did their conference and the marabout didn't even have to go anywhere,"[149] says Mamadou Gaye.

Thus the people of the village of Ndioum could see, even if they didn't understand how the technology operated, they could see how this technology could be interesting and useful to them, in their own specific milieu. While this particular application may not have broad-reaching relevancy in the context of social development, it is an interesting case to note as it shapes something very specific to Senegal – the marabout and brotherhood version of Islam – and makes the technology applicable to that situation. In fact, one of the best documented cases of information and communication technologies being molded to fit a specific local context can be found in the religious city of Touba.

Founded in 1888 by Cheikh Ahmadou Bamba, a leader of a mystic Islamic religious brotherhood, the Mourides, Touba has grown to become the second largest city in Senegal, with over half a million residents. While most of these people are religious followers, it is no doubt that many have followed in the wake to take advantage of the commercial opportunities that it provides. The Mourides themselves are known for their commercial activity throughout the country, and use Touba as an ideological hub for

such activities.[150]

In his dossier sponsored by UNRISD (United Nations Research Institute for Social Development), Cheikh Gueye compiled an interesting case on how ICT has affected the city of Touba, in his 2002 work "Strategies and the Role of ICTs in Urban Growth: The Case of Touba"[151]. There, he outlines how Touba has seen an explosive expansion of its populous, in some ways, growing more than Dakar. It draws many people who flock to it much in the same way many Jews "return" to Jerusalem – many of whom are merchants and businesspeople.[152]

In addition to the economic explosion, and in many ways as a crucial element of it, there has been an outburst of ICT in Touba. Another UNRISD researcher, Cynthia Hewitt de Alcantára has identified three significant aspects which have fueled this prominent change. As she writes:

> In the region of Touba, Senegal, for example, three factors strong out- migration to international destinations, a highly developed informal commercial sector, and widespread membership in Mouride religious brotherhoods have combined to create favourable conditions for the spread of information technologies over large areas and within even relatively poorer social strata … Finally, the religious brotherhoods, which receive income from migrants, need Web sites and radio programmes to deliver their message of faith across the world. The high level of organization of all three groups, and close connections among them, have stimulated the local information economy, in which mobile phones are so widely available that their price is lower than in most developed countries, technicians manufacture spare parts for these phones and build parabolic antennas from scratch, and state-of-the-art computers are not difficult to find (Gueye, 2001).[153]

Such a tight-knit community with economic resources, technical know-how and a practical use for ICT, as is the case with the Mourides of Touba, is a prime example of how ICT can be used to stimulate a local economy to the level where high-quality and high-value technologically advanced goods and services can be readily bought and sold. Given that the Mourides are prone to adapting new technologies to broadcast their message of piety and hard work, it is not surprising to see the success that they have achieved all on their own.

Indeed, this kind of active participation in adopting new technologies and applying them to a local context is something that is done most notably with an already educated and highly organized sector of Senegalese society. Being literate in at least French (and often Arabic) – languages that already have a wide range of online and technical materials -- allows the merchants to be part of a much more highly

developed than their non-educated counterparts. The role of the Mourides in adopting and promoting technology is a hopeful case for ICT development in Senegal, and illustrates how indeed with the combination of the right education and business tools, that economic growth can occur. As *The New York Times* wrote in 2002 about Touba's Mourides, and one school that they have started to send out future entrepreneurs.

> 'We saw that most of our graduates went into business,' Mr. Mbacke said. 'We think that if they learn how to use computers, or if they learn another language, like English, it would help them in their business. Learning only the Koran is not enough for business nowadays, although, of course, the Koran contains everything.'
>
> The Mourides have become known as small-time international businessmen, conspicuous on the streets of Paris, Rome and especially New York, where they peddle fake Rolexes or operate stores selling goods from a vast network of suppliers. In West Africa they are famous for their entrepreneurship as much as for their moderate, essentially African, vision of Islam.[154]

It is also interesting to note that these dynamic changes happened completely in the private sector – that isn't to say that the public sector could be boosting and actively promoting the use of ICT in business, government, and everyday life, but that the local private sector should not be overlooked. As Gueye writes: "As other indicators will prove, it is more and more the private civil society which provides for advancement and innovations in a context where the state is weak."[155]

However, not all places have the inherent dynamism, capital, or organization that the Mourides have. Sometimes, a helping hand can come from the private sector – even if it comes from outside Senegal. Started by Alcatel, the French telecommunications company, and Afrique Initiatives, a Belgian company interested in small business development in Africa, used ICT to perform local basic medical research to anticipate infant health problems in Saint-Louis, Senegal's northern regional capital.

The project, known as "Pésinet", is fundamentally quite simple. Given the lack of local medical staff in Saint-Louis, one per 10,000[156], no single doctor can keep a proper watchful eye over all patients. Therefore, a proxy for symptoms of illness is needed. According to Castro and Smith, Pésinet acts as a:

> preventative measure against the common ailments that afflict the low-income children of Saint-Louis. These include malnutrition, malaria, and other childhood illnesses. Pésinet's service is intended to reduce the incidence of these illnesses during the critical period of childhood development, from birth to five years of age.[157]

Babies are weighed twice weekly in families homes, and the information is put into an online database so that the doctor can monitor if the weight curves are abnormal. Doctors receive daily updates of the weight curves via email and if any of the children's weights are abnormal, the doctor requests a consultation with the mother and child.[158]

As Michel Mavros, the founder of Métissacana, says, Pésinet can be used as a prime example of aiding development in Senegal.

> The Internet is a complementary tool, it's something more that allows everyone develop – Pésinet, for example, contributed to fight against infant mortality. For us, that's development.[159]

Despite the good intentions of Pésinet, it will require continued support from Afrique Initiative, as it is not designed to be self-sustainable. [160]

Thus, as can be observed with the Multimedia Caravan, the local Islamic applications of ICT, as well as simple preventative medicine that uses ICT, indeed Senegal has done many things right when it comes to Internet technology. Indeed, with monetary and equipment aid from abroad, but more importantly, locally conceived and produced initiatives have shown that ICT is Senegal can be used to aid social development, both in the public and private sectors.

The key, of course, is to have the local technocratic elite pushing the use of such technologies to aid economic and social development. Locally constructed and produced initiatives will have the best chance of succeeding and aiding Senegal, or any other developing nation to help itself properly conceive of the ways in which information and communication technology can be applied to a local context.

There are other examples of ICT toward development projects in other regions of the sub-continent. In Mali, Senegal's neighbor to the east, an American non-governmental non-profit organization, Geekcorps, is working to connect Malian rural community radio stations via wireless (802.11b, or Wi-Fi) Internet connections so that they can share radio programming. According to the program manager of Geekcorps, Gina Dario, many Malian radio stations have little access to up-to-date health and education information, and often they are left with reading decades-old French textbooks over the

airwaves.[161] Not only is this information not current, but it is in French. Like in Senegal, while and official language, French is not spoken by the majority of the population and therefore the information is probably not accessible to most of the population.

Language aside, Geekcorps plans on using radio stations near to community learning and information centers that have Internet connections already as base stations. In addition, they will also create a "Shared Audio Server," which will act as a repository for local radio programs that can be syndicated across the country. Geekcorps then plans to attach a Wi-Fi antenna to send the Internet signal over several kilometers to the next radio station. Then the more remote station can not only share the Internet connection, but can access the Audio Server over the Internet, therefore enabling them to have better and more relevant content.[162] The combination of existing communications infrastructure with new information and communications technologies in order to allow more useful information to be transmitted to the listening audience, and the empowerment of local radio broadcasters to make and syndicate their work, allows for real development to take place. Geekcorps aims to leave self-sustaining projects wherever they go, and this is one that indeed seems like it could be continued after the volunteers have left the country.

Besides Malian community radio, the example of the Multimedia Caravan and the Mourides' use of ICT are striking ones – they involve local non-governmental actors rapidly adopting such technology and encouraging their peers to follow suit. As such, they increasingly make the relevance of seemingly lofty gadgetry accessible to those who need it most. It is important to further examine who exactly those non-governmental actors are and what actions the government has or has not been taking to promote ICT in Senegal.

IV. The Role of Civil Society and Government in ICT Deployment in Senegal

1) Non-Governmental Organizations: CRESP and OSIRIS

As in any society, there are organizations and various technophiles, better known as "early-adopters," who adopt and promote new technologies far before they become completely mainstream. Senegal is no different. These non-governmental organizations illustrate the groundwork that has been laid which can foster further Internet usage and development. Their presence creates an environment where Senegalese can be educated by their peers, and the government does not have to pay for it. In addition, they can serve as a resource to other "early-adopters" and can act as a support community. These early-adopters (which can be both individuals and organizations), coupled with the deliberate actions of the government to foster Internet-development, deployment, and use often provide the impetus for future government change and local grassroots education. Through the examination of the ICT sector of Senegalese civil society that concerns itself with ICT issues, and their relationship with the government, it can be observed that each sets of entities have been instrumental in further ICT development. There are two major non-governmental organizations, CRESP and OSIRIS, both founded in Senegal, in addition to the Senegalese chapter of the Internet Society (ISOC), who see the benefits of Internet technology and actively promote it, and try to come up with more improved and localized applications for it. Government, especially in the developing world, has an important role in the promotion of new technologies. To its credit, the government of Senegal has done a lot to promote ICT nationally – indeed they have done a lot of things correctly, which can account for many of the success stories in Senegal – but there is a long way to go.

a) CRESP

CRESP Senegal, (*Le Centre de Ressources pour l'Emergence Social Participative)* or the "Resource Center for Participative Social Emergence", was founded in Dakar in 1999, and is affiliated with its American sister organization, the "Center for Religion, Ethics, and Social Policy", based in Ithaca, New York at Cornell University. It is run primarily by two Senegalese, Mamadou Gaye and Ismael Diallo,

and one American, Marian Zeitlan.

CRESP currently receives funding from many educational institutions, local and international non-profit organizations and government aid funds, including the Kalamazoo College Study Abroad Program (with Africa Consultants International), UNICEF, The World Bank (through the Norwegian Government Fiduciary Fund), the Durland Library at Cornell University, the Global Ecovillages Network.[163]According to their website (http://www.cresp.sn), their first specific objective is to "promote the participation of people in local contexts to development through the use of new information and communication technologies."[164]

Among their main projects are developing Web sites (called "*Système d'Information Populaire*" (SIP) or, a Popular Information System) for Senegalese small towns and communities, especially the area of Dakar, called Yoff, where CRESP is based. The idea is that it provides as a resource both for locals and foreigners who want to interact with the town. The objective of the SIP, taken from their site is as follows:

> To create in each local community of Senegal, Information System and Decision- Making management capabilities as well as the development of Web pages. SIP data also serves simultaneously the needs of local officials, those of citizenry and their partners everywhere in the world.[165]

In more simplified terms, a SIP is merely a home page or portal site for a particular city. In the US, most major cities, and many smaller towns have home pages as well. It provides an easy and cost-effective way to disseminate statistical information (population size, land era, et cetera), business information and tourist information about the community.

One good example of a SIP is the town of Medina (population 96,202), which is part of greater Dakar. The site provides a history of the town, a portrait of the city government, and even a link to email the mayor. It also has a directory of local businesses by sector (tailors, restaurants, mattress vendors, fruit sellers, medical clinics, bakeries, jewelry stores, telecenters) with addresses, the owner's name, and sometimes a phone number.

While this type of local municipal service may seem banal and ordinary when compared to many

American government Web sites, where one can do everything from pay for traffic tickets to renew library books, the information that is available on Medina's SIP illustrates the nascent stage of ICT in Senegal. However, when compared to the fact that without an online resource such as this, much of this information would be impossible if not extremely difficult for the average person to obtain. Therefore, more widespread use of such a service could prove to be very significant.

As the World Bank has said[166], two of the goals of ICT in a developing environment like the town of Medina are to provide "*integration of isolated communities into the global economy," "productivity gains, efficiency and growth,"* and *"the delivery of public services."*By providing both practical and commercial information about the town of Medina on a Web site, this public service could conceivably be a boon to local economic development.

Based on the fact that only one percent of Senegal's population is online[167], one can assume that these developments do not mean much to the average person. However, by establishing this resource and this ideal of what the community could do if more people had the means and desires to use the Internet (because it contained material that was relevant to their community,) then perhaps, as the World Bank hypothesizes, development could follow.

b) OSIRIS

CRESP has another organization which also acts to use and display the benefits of ICT in Senegal, an organization known as OSIRIS (*Observatoire des Systèmes d'Informations, des Réseaux et des Inforoutes au Sénégal* or the Observatory on Information Systems, Networks, and Information Superhighways in Senegal). OSIRIS, unlike CRESP, tends to be the prime advocacy organization that promotes the use of ICTs, their deployment, their regulation and corresponding legislation. These two organizations work in tandem, CRESP using the technology to show what it can do, and OSIRIS making sure that it is the best type of service available and that its relevance and use is understood both by policy-makers and by the general populous.

From their Web site, OSIRIS has five major objectives:

• To contribute to the development of the Information Society by emphasizing on the recommendations of the African Society Initiative to the Information Era adopted by the Economic Commission of the United Nations for Africa.

• To promote the use and appropriation of information and communication technologies.

• To archive all initiatives relating to information and communication technologies and to encourage synergies

• to inform policy-makers of different sectors and ordinary citizens about the opportunities and benefits linked to information and communication technologies

• to favor international cooperation in general and sub-regional in particular in the domain of information and communications technologies.[168]

OSIRIS was also one of the prime movers behind the 2002 "Multimedia Caravan" initiative, which took Internet technology into the most remote corners of Senegal, often with astounding results, as discussed earlier. Another of their important tasks is to archive "initiatives relating to information and communication technologies". OSIRIS has archives of everything from international laws and declarations to national politics and texts of national laws related to ICTs and also reprints of recent ICT-related stories in the Senegalese media.

This role as archivist is less important in terms of immediate economic benefits, but it is noteworthy that an organization would take it upon themselves to consolidate relevant legislation. Such an effort establishes OSIRIS as a model that other political advocacy groups could learn to mirror. When other groups inside Senegal start to see how the Internet can help them to seek political goals – in the case of OSIRIS, it is ICT itself, but this could conceivably be applied to any political goal. Therefore, increased use of ICT moving towards governmental transparency is beneficial for all of Senegal, and for any developing nation.

Again, as noted previously, this is more an example of what could be, and is not something that affects a substantial portion of the population. But with increased use of such sites, there could be more effective civil services provided in an e-government type setting.

E-government, or "electronic government," is another positive outcome of using ICT to increase

democratization in a developing country. As Bahavya Lal et al. (2001) point out, ICTs can be set up in such a way to improve the democratic process for all citizens. They identify four major areas where e-government can be beneficial to a society.

> ICTs can be applied to the broad public good – particularly by putting information infrastructure to work within local communities, to improve delivery of local government services, improve access to information that people need in order to function as informed citizens, broaden citizen participation in governance, and stimulate economic and community development.[169]

They go on to cite examples of e-government in South Africa and Tanzania, where citizens have been able to use ICT to ensure that the government serves the citizenry's purposes.

Democracies best function when information can be easily and opened disseminated, particularly when it concerns legislation. As Lal et al have shown, one example of this is of an online database called "Legi-link," (www.legilink.co.za) which provides and records the parliamentary process in South Africa. They act as an archival organization for upcoming legislation, debates and committee meetings.

Another process is the empowerment of minority citizens, and ensuring that the government pays attention to them, thereby increasing democratic participation. Lal et al cite a case where Masai farmers in Tanzania organized and put a video of themselves on the World Wide Web to counter a pending government policy that threatened their land. This ensured that the government heard their voice and made the people "feel less isolated" and that they were "part of a bigger world."[170]

OSIRIS, therefore, has played an important role in being the advocate for ICT in Senegal, but also keeping the society and the technical players apprised of new changes and developments for the national landscape. They maintain a role also as an outsider archival depository to maintain records on relevant ICT legislation. Unlike some African NGOs that seem to exist in name only, for example the Senegalese chapter of ISOC, the Internet Society, OSIRIS actually maintains a constant body of work and attempts to bridge the gap between the private sector, civil society and the government. They remain actively involved in promoting positive change so that more of Senegal can have better access to the Internet.

OSIRIS is so unique, in fact, that Lane Smith, Coordinator of the Leland Initiative at USAID has said

that in his entire career in working with ICT in various parts of sub-Saharan Africa that "I've never seen another OSIRIS in another country."[171] This powerful statement indicates that Senegal has several unique factors, such as an active and effective non-governmental sector which has had profound effects on ensuring the proper development of ICTs in Senegal. OSIRIS has been able to foster discussion unlike anywhere else on the continent.

In addition, others still have cited the example of Olivier Sagna and OSIRIS (Sagna is the Secretary General of OSIRIS) as a prime example of solid leadership during a time of political wavering. Dr. Ernest J. Wilson, III, the director of the Center for International Development and Conflict Management at the University of Maryland made this point before a Congressional hearing in 2001.

> My research around the world leads me to conclude that national leadership is an absolutely critical element in the success or failure of ICT initiatives. I found again and again that in developing nations, precisely because institutions are weak or even absent, then individual leaders or a group of networked leaders can step in to make a huge difference – people like Olivier Sagna in Senegal or [Nii] Quaynor in Ghana.[172]

This point would indicate that a strong non-governmental sector with interested and motivated individuals, such as Olivier Sagna can make a huge difference in the ICT outcome for a given country.

c) BATIK

In addition, OSIRIS is responsible for the email newsletter BATIK, (*Bulletin d'Analyse sur les Technologies de l'Information et de la Communication* or the Analysis on Information Technology and Communication Bulletin) which comes out monthly and is archived in PDF and HTML formats on their site, http://www.osiris.sn. It contains Senegalese ICT news, their opinions on that news, and has a section devoted to current tech-related meetings in Senegal. It is the only locally produced news outlet of its kind in the country. This newsletter is a fascinating resource for reporting on news and creating a dialogue among the major technical players of Senegal, as it has since its first edition in August 1999. While it primarily serves the technical elite of Senegal, it is useful for everyone in the sense that it can serve as a consulting force as well as a voice of hope for those that wish to see the acceleration of Senegal's development with the use of ICTs.

The status and ongoing promotion of the Internet in Senegal has primarily been the responsibility of these NGO actors. Through the Multimedia Caravan, BATIK, and other things sponsored by them, that constant discussion is fostered about the Internet in Senegal, as well as importance and impact on social development.

As Olivier Sagna, the Secretary General of OSIRIS wrote about in the very first issue of BATIK, he grappled with how the Internet can indeed become fully relevant, affordable, and useful to everyone who wants to use it.

> We want to go beyond technicist writings, to vigilantly observe the manner in which a society like ours really behaves itself when it comes into contact with ICTs, and especially how it applies that to daily life, with its handicaps and its advantages, [and how it moves] to its own rhythm and through cultural prisms.[173]

There do exist other online African ICT newsletters, but none seem to have the combination of local flavor, regularity, and being consistently up-to-date as BATIK does. Ethiopia has one called "ICT Focus", but it has not been updated in over 14 months. However, when it was publishing, it did a fairly good job of providing both helpful tips to its readers about computers and the Internet, as well as providing ICT news in Ethiopia. A much better ICT newsletter is "Balancing Act – Africa," which is published in London. They maintain a regularly ICT email newsletter that goes out to 6,600 subscribers all over the world.[174] While this newsletter is very informative and covers a lot of group (the entire continent), the fact that it is written from London often gives it a distanced perspective and does not have a great deal of in-depth local reporting.

d) "*La volonté politique*"

Often, the goal of such newsletters is to provide an advocacy voice to the ICT community – and despite their best efforts, they are often blocked politically. However, many of the leading members of these groups deplore the lack of a strong "*volonté politique*" (political will) which would help bolster their efforts. Mamadou Gaye, one of the co-directors of CRESP, discussed this problem in a 2003 interview, highlighting that much of what has been accomplished in Senegal has been done without the help of the government.

> But if [our work] was accompanied by a political will, then, Senegal would be able to aid other nations in the sub-region. Because there have been people who have worked for a long time in the shadows who are 'adventurers', as they are called . . . We are visionaries, more or less . . . Senegal doesn't have resources, but it does have minds who are working in the shadows with or without the State. With or without the State, they will go back home and talk and talk and talk [about the Internet] . . . Nearly all those who have worked in these domains are people who work in civil society.[175]

Gaye and others will agree that the Senegalese government seems to be in somewhat of a stasis – refusing to strongly commit to ICT, while at the same time not allowing the private sector to step in. The most blatant example of this is Sonatel's retention of a monopoly on telecommunications until mid 2004[176] -- recently pushed forward from the scheduled date of 2006.

Most Senegalese ICT intellectuals claim to know what the problems are, and think that the solutions are obvious. They believe that certain government actions, such as the preservation of the Sonatel monopoly, are severely stunting growth of the Internet in Senegal. As Mamadou Gaye points out -- the technocratic community believes that Senegal can be a leader in Internet deployment, particularly in the developing world.

> In June [2002], all of Senegal was happy because it was the World Cup. Why? Because we were able to compete with the other teams – this is simply because the people who worked on it for Senegal were put in the same conditions as the other nations. Because those who played for the national team, who was able to rival France [the defending World Cup champion], they all played in the French national championship. They had the same infrastructures for years together. So, if we stay along that line of thought, the results that we had during the World Cup, we can have similar results for new technologies. That's how I see things and I know that everyone will benefit because we have something to share with the rest of the world -- what makes up our strength, our culture – through the Internet. We can export it and allow people to see our true face. Because what they see from the outside is what they show on television, and television has its own agenda. But by developing new technologies, you can create your own website, you can develop your own locality, you can put in webcams so that people can see [what the place is like] -- 'Oh, that's what it's like. It's not the jungle, it's not the forest, it's not famine.' That is how people can develop themselves. I believe in it because I have seen results that cannot be neglected.[177]

The results that Gaye is referring to are many of the successes that Senegal has seen over the last few years, such as the Multimedia Caravan, the Mourides in Touba, and Pésinet.

Despite these criticisms, it is in large part due to some crucial initial steps taken by the Senegalese government which have allowed the nascent technology-oriented community to develop as it has. Since as early as the 1980s, telecom-related government policy has been part of a larger ICT understanding – they seemed to have the foresight then to at least have it be a constant component of the national political

discussion. Indeed, they have attempted to foster an emergence of national telecom and information technology.

2) Internally Inconsistent and Inefficient

Senegal has been a true leader in attempting to draw new and exciting technologies to its country, to expand its own possibilities as a nation through those technologies and finally has been willing to show resolve by enacting laws and policies that reflect those goals.

a) "She knows that there's no success like failure…"

The most significant investments and government encouragement of Senegalese telecommunications, unlike most of their other African counterparts, can be reduced to a few major points. As Olivier Sagna notes[178], since the beginning of Internet access, Sonatel has considered the country to be a single zone – meaning that any call for Internet was automatically a local call – the cheapest kind in the country. By lowering the price of dial-up Internet access to be the cheapest that it could possibly be ensures that fewer people will be priced out of their piece of the digital pie. The United States, when it developed Internet access, never ran into this problem as local calls have always been free.

In addition to the price reduction on special digital lines for Internet Service Providers in February 2000[179] (and again in May 2001), and the continual investment in national bandwidth and connection to large international backbones (most recent in November 2003), Sagna also highlights the fact that the Senegalese government has completely eliminated the importation tariffs on computer material has made it much easier for cybercafés to flourish. (However, he also points out that there are still importation tariffs on a great deal of computer-related material, like routers and printers.)

Measures like these have allowed Senegal to "buck the trend"[180] of having the better educated and wealthier areas of Africa (North Africa and South Africa) have a disproportionately more active Internet community.

b) "…and that failure's no success at all."[181]

Unfortunately, Senegal's record has not been completely pristine. While it has taken many steps forward, it has also taken many steps backward. Each step that it takes towards further ICT deployment is more of a lurch or stumble, rather than a firm and confident step. There are four major examples of Senegalese errors in this regard: inconsistent taxes, bureaucratic squabbling and disorganization, the unnecessary prolongation of Sonatel's monopoly and empty rhetoric as manifested through the Technopôle.

Despite the fact that tariffs and taxes for computer equipment coming into Senegal were reduced, taxes on locally manufactured computer goods were imposed at 25 percent, up from zero.[182] Thus, the benefits that the Senegalese government was attempting to impose were being restricted by other actions that it was taking. While the intent of supporting telecommunications growth was there, their actions were not entirely all positive. The actions of the Senegalese government seem to be somewhat haphazard, delayed, and inconsistent with itself – while on the one hand they decrease importation taxes, they increase taxes on locally-produced goods. Similar nebulous action in regards to ICT seems to plague the government in its history and in the present day.

The issue of taxes may also be related to the fact that despite its real rhetoric, it remains internally inconsistent and inefficient in its attempt to provide a clear strategy. As Olivier Sagna, the secretary general of OSIRIS, (a prominent Dakar-based ICT focused NGO), points out, since the country's independence in 1960, there are and have been six different public entities that are supposed to be responsible for the ICT sector, including the National Telecommunications Coordinating Committee (created in 1960), the National Information Technology Commission (created in 1972), the Commission for Informatics Development (aka "DINFO", created in 1987), the Ministry of Communication (created in 1994, which by law[183] handles telecommunications via the Directorate of Postal and Telecommunications Management and Research), the Ministry of Energy, Mines, and Industry ("who oversees the Senior Council for Industries (created in 1998), whose major responsibility is to define strategy for telecommunications clusters[184]"), and finally the Ministry of Commerce and Small-Scale Industries.[185]

In essence, it would seem that the creation of such a multitude of organizations and ministries inside the Senegalese government has been a bureaucratic nightmare, and that not many politicians really understand the whole picture, nor do they possess the political will to see a project through to its full completion. Olivier Sagna has argued that while the government has been talking about ICT for awhile, that there is no cohesive plan to pursue it.

> The roadblock is clearly a lack of awareness of the real strategies by the politicians. It's politically correct to talk of these questions, it shows that you know what's going on, that you're following what's happening. [But] concrete plans are not put into place. This shows that beyond these discourses there is a good number of politicians who hold to the ideas but don't really believe in them.[186]

3) Demonopolization

The third example of such a confused administrative policy is the unnecessary prolongation of Sonatel's monopoly not only over the national telephone industry, but as a consequence of that, over the small but growing Internet industry as well. The law governing Sonatel's monopoly ensured that the status quo would remain until 2006 at the latest, but it was recently announced that the monopoly would be lifted on July 20, 2004.[187] Much of the sub-continent still has national telecommunications monopolies, which are hold-overs from the early post-colonial days. Many countries throughout the 1990s have been in the process of deregulating their monopoly. The logic is that the state cannot provide as an efficient outcome to both local businesses and consumers who need telecommunications services.[188]

Even though Sonatel is a private company, the fact that a subsidiary of France Telecom bought one third of the shares of Sonatel when it went public remains an outrage to many members of the ICT civil society. As Amadou Top, the President of OSIRIS wrote in early 2004:

> This is to remind us that this process was conducted in the most total obscurity, deprived of any good sense, in contempt of the national interest, and completely beyond the interests of Africa … we preferred to let Sonatel become transformed into a private company that is legally Senegalese but of which its capital was mostly held by a foreign state, through the public company France Telecom. What's more is that by according it a monopoly on fixed telephony and as well as international, the Senegalese state permitted for seven years a foreign country to exercise a monopoly on its territory, at the same time that it was forbidding such activity in this manner to its own citizens, in a sector as strategic as telecommunications, a little as if we had gone back to the colonial era![189]

As Top shows in the above citation, Senegal allowed for foreign investors to take a significant portion of its profits – even higher than they would organically be because of its monopoly. Prior to this

announcement, nearly all of the Senegalese technical elite, not surprisingly including Olivier Sagna, lamented the presence of the monopoly, and longed for more and better service that an open free market can provide. Sagna stated:

> There is the monopoly situation of Sonatel, which is a major blocking element which has been holding back prices more than it otherwise would if there had been a free market. It's been blocking the quality of service, and on the technical side, it's limited the deployment of alternative solutions than the ones that are in use today.[190]

More recently, there has been an increased public rhetoric of high-ranking Senegalese officials in their discussion of Internet access, and its importance in the development of their nation. At the February 2003 meeting of the International Telecommunications Union in Geneva, President Abdoulaye Wade recalled the plight of Senegal, and all underdeveloped countries to become part of the digital world. "In the name of all marginalised people of the Third World where we are on the road to being excluded from the digital world, our situation is identical everywhere and our quest is the same."[191]

More importantly is the recent (January 2003) naming of Mohammed Tidiane Seck to the post of "*Ministere de l'Informatique de l'Etat*" (Minister of Technology) -- a move that is considered by many in the technocratic community to be a move that will finally allow for a technically-minded political force to be created, one that moves beyond the seeming empty rhetoric that so many abhor. Seck, until this new post, had been the director of computer science at the University Cheikh Anta Diop of Dakar. He defends the role of the government by noting that the deregulation and monopoly laws have to be respected, and cites new government projects for improving connectivity, and enhancing ICT in schools, particularly secondary and university education – all of which are still in their infant stages.

> You cannot say that there is a lack of political will. Just because we have 'political will' doesn't mean that we can do whatever – that's easy to do. To put things clearly, we have a good network, and good bandwidth that all the other countries of the sub-region want. But that doesn't mean that we're satisfied, it's not enough, we have to go further. The thing that frustrates everyone in Senegal is that everyone wants a very quick opening of the market of Internet service. Today the deregulation is there, there is a de facto monopoly by a historical player, Sonatel – the fact is that it's a transitory situation and that the people don't want to wait – political will cannot justify ignoring the laws, that's not possible.[192]

Seck is referring to the development of the *Agence de Régulations des Télécommunications* (Telecommunications Regulation Agency, or ART) that since 2003 has been involved in preparing for

the deregulation of the Internet access market that Sonatel has had a monopoly on.[193]

The ART is defined in Senegalese law as follows:

> Telecommunications Regulation Agency "ART" : a public legal institution created by the current legal code, endowed with legal character and financial autonomy and is charged, in the interests of the State, to [the upgrading of] old technology, to the application of regulation, and to the development of the promotion of the telecommunications and information technology sectors.[194]

When the Sonatel monopoly is lifted in July 2004, it will be ART that oversees the regulation and licensing of future telecommunications firms. Other countries like Nigeria have had a strong regulatory body since 2001. The state monopolies across the sub-continent are in various stages of the de-monopoly process – beginning with privatization, private regulation and further competition. Sonatel, while technically a private company, has enjoyed the benefits of dominating the local telecommunications services market in all of Senegal since the late 1990s. With more firms providing more services, the idea is that prices will be driven down, and that more firms can compete for more business – thereby allowing everyone to win out.

Lane Smith has said that while Senegalese deregulation has a lot of potential, that a great leader in deregulation has been the Nigerian Communications Commission. He said that the NCC has licensed three cellular carriers to compete in Nigeria, and that they have seen enormous success. When the Nigeria began their regulatory work in 2001, there were only 25,000 analog cellular lines for the entire country. Within 12 months, there were 1.5 million lines – and today they have more than three million lines. Each of the three companies generates $50-100 million per month and that there have been three billion dollars over the last three years of foreign direct investment in Nigeria telecommunications. He is so impressed with the NCC, that he adds: "If we could get half of Africa to do half of what they did, I could just go home … We're looking at a real mixed story and that's why we're focused on the regulatory side that will allow them to regulate a vigorous and competitive private sector."[195]

Beyond regulation, Seck also noted that by the end of 2003, the first part of the government Intranet would be in place – a new system which would have a centralized email system, internal web portals – the initial phase of a Senegalese e-government initiative. He also mentioned government plans to

incorporate an "Educational Network", to allow, using Internet technology, remote teaching and shared resources.[196] While these plans may actually be realized, it is possible that they could go via the route of the ill-fated government-planned "Technopôle" -- which was supposed to be a high-tech business incubator in Dakar.

In December 1996, the Senegalese government approved the creation of the "Technopôle," which was to become a high-tech business incubator, similar to the Multimedia Super Corridor in Malaysia.[197]

The site, a 194.5 hectare (480.4 acres) site along the outskirts of Dakar, near the neighborhood of Yoff and the Dakar International Airport, was meant to combine ICT with agriculture, enterprise, education and research to encourage technological innovation. The Technopôle was to have the following goals:

• reduce the cost of obtaining management, technical, tax, and financial advantages for on-site high-technology enterprises;
• eliminate obstacles to creating networks carrying out innovative work; and
• encourage the development of work involving high value-added technology transfer[198]

As of May 2003, three years after the entire complex was supposed to have been completed, it is nothing more than a large sandy lot on the main highway leading into Dakar.

Thus, while the government has talked a lot about ICT for a long time, they has not taken any significant, tangible steps to further realize ICT penetration in Senegal. The few steps that they have taken have been seized upon by the intellectual civil society (and most often lobbied for, by them) to create a very small, but growing technically-aware middle class. This sector has only begun to taste the potential for telecom in Senegal – and they want more of it.

3) The Present Future

Given that only one percent of the population is actually online, it would seem that bridging this "digital divide" would be of prime importance to the Senegalese government, who seems to be well aware of the benefits of ICT use. The government has laid some of the ground work already, by reducing tariffs, and somewhat opening up their market to open competition of Internet access, and has a viable civil society

that is hungry to have and to promote ICTs in Senegal. So what actions is the government currently taking to improve the ICT situation in the short-term?

Two major developments have come about within the last two years, one coming from inside Senegal, and one from the United States. The first is the idea of "Digital Solidarity," and the second is the "Digital Freedom Initiative" (DFI), respectively. These ideas, in different ways and for different purposes serve the same goal: advancing the use of the Internet in Senegal. Regardless of their approach, their presence indicates a strong commitment to improving their situation.

a) Digital Solidarity

Digital Solidarity is an idea that was first proposed by President Abdoulaye Wade in February 2003 while attending the PrepCom 2 conference hosted by the International Telecommunications Union in Geneva. It calls for states, civil society and the private sector to work together to created a Digital Solidarity Fund. This fund, which would come from the voluntary contributions of individuals when they are buying ICT-related equipment, would go towards bridging the digital divide in both the developed and non-developed world. The Wade Administration has claimed that this venture is unlike any previous ventures before it, because it helps not only developing countries, but rural areas in developed countries as well, and that it simultaneously creates new markets where ICT goods and services can be bought and sold, as well as allowing for improved communication, and therefore, improved economic activity. Thierno Ousmane Sy, the President's Special Counsel for New Technologies, articulated this notion in an interview with the major daily newspaper of Senegal last last year.

> The funds of Digital Solidarity are different because we're bringing in the private sector at the beginning. That means that the private sector knows where the money is going. That also means that for the private sector, it's a win-win situation. If countries that are developing technologically spend their funds on what will allow them to come into the digital serpent, these are new markets for ICT-related enterprises. This is the win-win aspect that makes this program different from everything that has been previously done.[199]

While the idea of Digital Solidarity seems like a good one, thus far, it seems to have gone the way of the Technopole – it is merely an empty shell. There is no explicit mechanism anywhere that has been put

forward as to specify how the money will be collected, how it will be distributed, and who will determine what will be purchased from it. There is a Web site, www.solidaritenumerique.org (*Solidarité Numérique* in French means Digital Solidarity) which does detail some of the general ideas of the proposal, but again, more than a year after the idea was first put forward, there are no concrete plans that have come out of it. Wade has spoken about it since the initial speech, in an op-ed piece in *Le Monde* (the major daily newspaper in France, and arguably the francophone world) in March 2003, and also at the International Telecommunications Union's World Summit of the Information Society in Geneva in December 2003.

However, despite these shortcomings, the fact that the highest political office in all of Senegal is addressing the issues of the Digital Divide and is pushing them forward into international discussions is indicative of the importance not only that ICTs have, but also that Senegal can be a leader in the field, given that they already have strong examples of how ICTs have been useful to them, and that they have a civil society and private sector that is itching for more liberalization so that they can have more diffuse and higher-quality access. Just as Sagna said, "concrete plans are not put into place" -- this quotation seems to sum up the main problems with juxtaposition of the government's actions and rhetoric, that they say a lot of things, but they are not planned well enough and are executed poorly, if at all.

b) Digital Freedom Initiative

The Digital Freedom Initiative (DFI) a US-sponsored effort announced in March 2003, seeks to help develop and assist small businesses with the use of ICT for the purpose of making those businesses more efficient, and thereby profitable. The budget for the DFI is estimated at $6.5 million over the next three years.[200] The DFI receives funding from the Department of Commerce, Department of State, and from USAID. With Senegal as the initial pilot program, in October 2003, the US State Department announced that the DFI would expand to Indonesia and Peru.[201] The DFI is likely to to extend to more nations throughout the world in coming years.

The DFI has the following three goals:

• *Enable Innovation through Volunteer-led Business and Entrepreneur Assistance*. The DFI will place

volunteers from the private sector and NGOs with small businesses and entrepreneurs to assist in growing their business through the application of technology and the transfer of business expertise.

• *Drive Pro-Growth Legal and Regulatory Reform.* The State Department, Commerce, USAID, the Federal Communications Commission (FCC), and other public and private sector organizations will assist DFI countries in developing pro-growth regulatory and legal structures to enhance business competitiveness.

• *Leverage Existing Information and Communications Infrastructure to Promote Economic Growth*. The DFI will identify opportunities to leverage existing infrastructure (e.g., in-country cybercafés and telecenters) to generate information and services (e.g. Financial services, commodity price information, etc.) to help entrepreneurs and small business better compete in both the regional and global market place.[202]

Although the Digital Freedom Initiative was announced over a year ago, it has only been fully operational for only a few months. It has actively been involved in helping small and medium-sized enterprises determine what their ICT needs are. Sometimes this begins with basic things, such as lessons in French or basic accounting lessons – however, Geekcorps is establishing important links with the community to make sure that proper development can occur.

Therefore, the Digital Freedom Initiative seems to have achieved the seeds of some real results thus far. While sustainable development is the goal, and achieving that goal requires the domestic fostering of human and physical capital, it is lamentable that a project like the DFI could not have originated inside of Senegal. However, it does appear to be beneficial so that more projects like this can grow organically from within Senegal in the future.

A 1998 study by the OECD about France's pre-Internet nationwide network, known as the Minitel has reached some conclusions as to how the Minitel, even in an era of relatively primitive computing and networking devices, managed to engage in one of the first widespread forms of electronic commerce, such as purchasing train tickets online. Some of their lessons could be applied for a developing nation such as Senegal attempting to bolster ICT use.

The lesson of an “Interventionist public policy as an aid to development” would be an interesting one only if the regulatory agency was able to forcibly lower the cost of access without decreasing the level of service. In a regulated market this must be done with extreme caution so as not to disrupt the natural competitive market. Another lesson “Lowering entrance barriers to facilitate user access,” remains a very

important point as well. While the technology and the use of the Internet may be beneficial to the people, if they cannot afford it, then all the technology is moot. Therefore, the price of access remains a deciding factor still which is stifling more widespread access.[203]

c) The Leland Initiative

The Leland Initiative, named for Mickey Leland (a Democratic congressman from Texas who assisted with significant aid and relief work to Africa, who died in a plane crash in Ethiopia in 1989), is:

> a five-year $15 million US Government effort to extend full Internet connectivity to twenty or more African countries in order to promote sustainable development. The Leland Initiative (LI) seeks to bring the benefits of the global information revolution to people of Africa, through connection to the Internet and other Global Information Infrastructure (GII) technologies.[204]

Since its inception, it has brought Internet connectivity to 21 countries: Benin, Botswana, Côte d'Ivoire, Eritrea (the most recently connected country, in 2000), Ethiopia, Ghana, Guinea, Guinea Bissau, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Rwanda, Senegal, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. While some of these countries (like Senegal) already had some form of Internet access, the Leland Initiative built on the existing infrastructure.

For some countries, that means working with the host country PT&T (Post, Telephone & Telegraph) and/or private sector to establish a high-speed gateway. For those countries with functioning gateways, the focus may be on increasing access to the gateway, facilitating a vigorous private sector Internet Service Provider (ISP) industry and expanding access to secondary cities and rural nodes.[205]

The Leland Initiative works in tandem with the Digital Freedom Initiative and to date, $2 million has been spent on both programs combined.[206] By comparison, a nearby country that the Leland Initiative has attempted to work with is Guinea Bissau, but due to massive political instability in Guinea Bissau, Internet access has been slow and difficult. To date, the Leland Initiative has spent only $300,000 in Guinea Bissau.[207]

Guinea Bissau, Senegal's neighbor to the south, did not receive independence from Portugal until 1974, remained under dictatorship until 1994, when elections were held for the first time, but by 1998 a civil war had begun subsequent to a military uprising.[208] Since then, a military junta ousted the president in

1999 and in 2003 another coup d'état (but this time, bloodless) took place, replacing the Prime Minister.

In short, it is important to note that one of the important factors in allowing for political and economic changes to occur such that ICT can be used in a positive way is the factor of political stability. In Guinea Bissau, Internet access remains for the most part confined to the capital and even there it is only available in a few places. It is not available at all on the Bijágos island archipelago off the coast of the capital city.[209]

d) Conclusions

The combination of a strong and active civil society, that both takes care of the local application side of ICT as well as the discursive, theoretical, legislative, and advocacy side are what have allowed for the Internet to reach the stage that it has in Senegal. In conjunction with various government actions, which despite their flaws, have overall been very good, these elements promise to create a more dynamic, interactive, and economically viable society.

But the fact that these groups exist and have helped to increase the number of Internet users over the last few years, given that nearly one third of the populations lives below the poverty line, is testament to the richness and the success of the Internet in Senegal. Indeed, rethinking the Internet to fit local contexts and situations (such as the Mourides of Touba have done) is a notable achievement. Some might question why the Senegalese government is not devoting all of its resources to lifting people up out of poverty and fostering development, instead of wasting money on frivolous projects such as keeping the cost of Internet access down – however, ICT is absolutely crucial to reducing poverty. While it is not a sufficient condition for development, it is a necessary one.

The Internet has worked quite well in Senegal, mostly thanks to a few key government decisions, and a very active technocratic elite who foster local discussion and action to push the Internet in Senegal. It is also impossible to neglect that Senegal's economic and political history is one that is hard to duplicate anywhere on the continent. Since independence, they have seen a completely peaceful transition to full and free elections, and most recently, a viable multi-party system.

ICT in Senegal has shown strong rays of strength and hope, but a large wall remains, before Senegal truly can become the leader that it has the potential to be.

V. Focused Response & Remaining Hurdles

Despite all of the fanfare both in and outside of Senegal about its growing current state of the Internet, there is still a small but significant number of hurdles that remain. Nonetheless, Senegal is a particular juncture where they are ready to take full advantage of the Internet to foster economic and political growth and development. When these hurdles can be fully overcome, then ICTs can fully take root and blossom in Senegal.

Senegal's major impediments are the low literacy rate and the prevalence of an oral culture, the lack of local content and local application, and a prohibitively high cost structure – and combined with a lackluster government effort to promote ICT in Senegal.

It is important to note, however, that many of these things (such as investment in simple infrastructure) have little to do with ICT – they have positive externalities. A little bit of education and local structural investment could go a long way. A new improved road would make it possible for new data cables to be laid or repaired, people would have easier access to purchasing computer materials, locals would have an easier time going to a cybercafé. For this reason, it is not surprising that all countries with high Internet penetration have very high levels of literacy and national infrastructure.

These hurdles however, are not insurmountable, but without overcoming these roadblocks, the Internet will remain in the hands of the wealthy and educated – and will reinforce further social stratification – no doubt, as feared by some of the more pessimistic members of the *Le Monde Diplomatique* online forum in the early 1990s.

1) Literacy

a) Languages: "Degg nga toubaab?"[210]

Literacy in Senegal remains quite low. According to the United Nations, only 38.3percent of the population above the age of 15 is literate.[211] (There is some slight disparity among the true value of this figure. The 2003 CIA World Factbook, puts it at 40.2 percent[212] and the National Commission for

UNESCO in Dakar puts it as high as 48.5 percent[213].) The Internet, an highly written medium, would require a much larger percentage of literate people before they can even have the ability to decide whether or not the Internet is worth their while or not. Another major problem with literacy in Senegal, is that starting since French colonial times, all literate people have been taught in French, which is usually students' second or even third language.

In fact, it was mandated by law that schools, public administration, commerce, and legal affairs were conducted in French during the colonial period, from 1830 to 1960.[214] This was part of the French assimilationist policy that existed during that time – but despite their efforts, by 1960, literacy had only reached 10 – 25%. Post-colonialism, the Senegalese government decided to maintain the status quo by preserving the colonial linguistic policy. The first article of the new constitution proclaimed French as Senegal's official language, and would preserve French as the only language of education, administration and of government. Omar Ka, a Senegalese professor at the University of Maryland cites research has shown that the French language is used increasingly with more distant personal relationships, rather than close personal ones.[215] The survey shows that 5 percent of respondents speak French with their parents, 20 percent with their children, 23 percent with a friend, 37 percent with another Senegalese person of unknown origin, 64 percent with a work colleague, 90 percent with another non-Senegalese African, and 92 percent with a hierarchical superior (such as a government official). As Ka writes:

> These numbers eloquently show that French is the language of power and of social distancing, of international communication and of the workplace. By contrast, French is not the language of private life: it is rarely spoken in a family or between friends, domains where Senegalese languages are almost always used.[216]

A modern Senegalese novelist, Boubacar Boris Diop, discusses his recent decision to write in his native Wolof language, a language that has a scant and very recent literary tradition.

I never speak French in everyday life. In the Senegalese society in which I live, that would have absolutely no sense. For me, French is a ceremonial language, my Sunday language, if you will.[217]

Therefore, the French language itself doesn't have the ability (at least not always) to resonate with average Senegalese the way that indigenous languages like Wolof, Pulaar, or Seerer might. Even if we

assume that the primary language of access in Senegal is French, the fact remains that much software and Web sites are developed for English-speaking audiences. According to Global Reach, a marketing communications consulting firm which has monitored online non-English online populations since 1995, English speakers comprise 34.9 percent of the world online population. By comparison, francophones only comprise 3.7 percent of the world online population[218] -- and most of those, however are European francophone populations.

Therefore, there is relatively not that much material available to be consumed by Senegalese Internet users. Many Internet users are likely to have at least rough working knowledge of English – this is of great importance as well, according to Olivier Sagna.

> When people do Internet research, first you have to be literate, second you have to be literate in French, and third you have to have to have a good understanding of English, as there is a large amount of information on the Internet in English.[219]

Literacy in local languages for children has only begun this past academic year, and even then, only in a few pilot programs nationwide. Some effort has been made to have adult literacy classes, most notably in the Wolof and Pulaar speaking communities, but for the most part, literacy occurs exclusively in French.

Arame Fal, one of the leading advocates for Wolof literacy, author and linguist, says that increased Wolof literacy would allow more people to have access to written media, including the Internet.[220] She notes already that people are using Wolof and Pulaar expressions in the discussions forums on www.seneweb.com and the online forums for the *Le Soleil* newspaper – expressions that she says, cannot be expressed in any other way. She also suggested that with an increase in local language literacy, that there would surely be an increase in local language content.

One way that this problem could be remedied, would be to ensure that the Wolof language can adapt to modern life. Fal has done her part to ensure that this takes place. In April 2002, Fal released a lexicon of computer terms, *Baatukayu x@mtéef*, in French, English, and new terms that she has invested for the Wolof language. For example, the word "e-mail" is translated as "e-bataxaal" (e-letter), portal as

"bunt-kër gi" (house-door), and "network" as "lëkkale".[221]

Assuming that these words catch on into the general vocabulary, as some of the French ICT-related words have caught on ("*couriel'* instead of "email", for example) which are more than just direct English borrowings, then local people will have a way to conceive of, discuss and interact with an Internet that speaks their language.

Therefore, the hurdles that remain with regard to the language that is spoken on the Internet is something that needs to be taken into consideration. The development of Internet usage in Senegal must reconcile this problem before Internet access can really take hold.

2) The Oral Tradition

No doubt as a function of not being able to read or write, people are forced to adopt an oral culture. Not only are family histories passed down orally, but simple information is disseminated in this very same manner – even for those who are literate. Some Senegalese people, by their own admission, have not fully developed the habit of reading roadsigns or information panels and opt for asking someone nearby instead. Thus the concept of sitting down in front of a screen to *read* information is not as instinctual as it might be in the West.

Mamadou Gaye cites a prime example of when he and Sérigne Mbaye Diène, the president of the *Association pour la Promotion Economique Culturelle et Sociale de Yoff* (Association for the Economic, Cultural, and Social Promotion of Yoff) were visiting Hong Kong for a conference and they were trying to get directions.

> We have an oral culture. It is very difficult to get this tradition out of your head. I remember one time when were were on a trip, it was my first time out of the country, we were in the Hong Kong airport, and by his cultural training [Top] asked a woman something in English – and the woman didn't even look at him. Two times, no, three times, no – on the fourth time, she told him 'Read the board' -- she just showed it to him. You see how sound is important to us. To us, even if you put up a sign, you won't read it to see what's going on – you'll just come and ask.[222]

Thus even a person who bothers to check his email everyday is not in the habit of checking signs to get information – why would he, when he can merely ask someone?

Some scholars like Jack Goody, a social anthropology professor at St. James College (Cambridge, United Kingdom) have argued that languages have social consequences, as the definitions, denotations and connotations of words and phrases can change from one context to another. As Goody and Watt write:

> The intrinsic nature of oral communication has a considerable effect upon both the content and the transmission of the cultural experience … There can be no reference to 'dictionary definitions', nor can words accumulate the successive layers of historically validated meanings which they acquire in a literary culture. Instead the meaning of each word is ratified in a succession of concrete situations, accompanied by vocal inflexions and physical gestures, all of which combine to particularize both its specific denotation and its accepted connotative usages. [223]

As such, a simple task like asking for directions, becomes a loaded questions, filled with information that is specific to that particular location in time. The information or words used may change, as it is told from one person to another. Therefore, given that such information may change from one person to another instead of being fixed by being written down, it makes sense that a person would ask for information directly rather than seek it out from a posted written sign. This cultural trait is a holdover from the fact that the native languages of Senegal are oral ones – and it is likely that Gaye and Diène's native languages are not ones that they are literate in.

Gaye and others have pointed out that until this cultural norm is changed, that perhaps the technology should adapt to the needs of the people, instead of the people adapting to the technology. In other words, he suggests, why not develop touch-screens where audio information can be stored on web pages? Why not help familiarize people with ICT via media that they are already used to, and that doesn't require additional training to use?

One possible solution, as was suggested[224] by Mohammad Tidiane Seck, would be to use simplified computers, such as the Simputer, created by Indian computer scientists in 2001. In 2004, Simputers were finally available for sale at a price of nearly $240.[225] The Simputer has the ability to surf the Web, to send emails, and to organize finances. Such a computer, with an extremely streamlined version of the free and open source Linux operating system, operates entirely on vocal commands, and can convert text-to-speech – all in the local languages of the people of Bangalore. Seck asked, with literacy so low,

why couldn't we adapt such a technology? The possibilities are certainly worth exploring.

3) Relevancy

Yet another major hurdle, even for the literate minority, is making the Internet relevant to their situation. Even those who can afford Internet access, those who are literate in French, may not fully understand why they should care about the Internet. Indeed, if they are not interested in chatting up other non-Senegalese francophones in dating chatrooms, or finding out other information that comes from the outside world, what difference does it make to them?

Again, to reiterate from the Cyber Café Operators Association of Kenya and the Kenyan research firm Archway Technology Management Ltd. Study in 2003, Kenyans did not have enough online material that was relevant to them. The main conclusion of the study was that there remains a lack of local relevant content: "Of all the users, 30 percent has never experienced a rewarding, exciting or memorable experience on the Web. The conclusion is that there is untapped potential for networking among the Kenyan people."[226]

There is a considerable lack of locally produced and locally consumed Senegalese web sites. From a purely anecdotal perspective, in the United States, where Internet access is prevalent already, it is most practically used to distribute information on a local scale. Online examples of this are Yahoo Maps (maps.yahoo.com), which can provide local detailed maps and driving directions, or an online version of a phone book (www.superpages.com) to look up local businesses.

Sagna reminds us additionally, that using local information, especially between local businesses, is a phenomenon that applies to Senegal as well – and that Internet technology, in its current form, is not helping in this regard at all in Senegal.

> Other things that limit Internet use [in Senegal] are the fact that there isn't enough indigenous content being being developed and put online which is relevant for Senegalese. When you are looking for information, most of the time, the information that you need is about your immediate environment. Of course it's always interesting to be able to check out what is happening elsewhere in the world, but often, concrete problems that a company has, that an administration has to take care of, these are problems that are directly linked to their environment, and to take care of them, you need direct information

> about that environment.[227]

Indeed it would be this free exchange of simple information about a locale – who is selling what and where, which could have massive impacts on social development. Indeed, e-commerce is not built overnight, and surely will not replace traditional brick-and-mortar (or in the case of many places in Senegal, cement-and-thatched-roofs) businesses completely. However, what ICT does have the potential to do is to significantly reduce the cost of inter-business communication.

Of course, it is important to note that these types of massive changes happened slowly in the United States, and surely will happen slowly in Senegal as well – and quite possibly, in fact, more slowly, due to the lack of education, resources, infrastructure, and organization.

4) Pricing

Prices still remain prohibitively high for Internet access and investment in computer-related material – especially in the non-Dakar region. With Sonatel retaining monopoly on telecommunications for another three years, true free market prices will not be achieved until the monopoly is removed. Indeed, according to Amadou Top[228], a black market for new, faster, and easier to deploy Wi-Fi networks has already descended upon Dakar in small, but rapidly growing numbers. New technologies and market approaches are forcibly being stifled just to prop up a national business.

> There is the cost of services, the cost of telecommunications . . . the costs of telecommunications are very high, so that will handicap, of course, [deployment of the Internet in Senegal]. We have a whole range of people who will not have access to the Internet because they cannot afford it. Another thing is the there is a lack of computer material. Most computers are ones that are in businesses, administrations, very few in individual homes – again due to their price. So there are many activities where there ought to be computers, but there aren't, linked to its high cost.[229]

The average price in Senegal for a computer suitable for a cybercafé is about $575, according to Fatimata Seye Sylla, the program director for DFI in Senegal.[230] Other prices from other parts of the sub-continent report similar levels of prices. In Kenya, a cybercafé computer averages for $550 according to Josphat Wachira, the Regional Information and Communications Development Specialist for USAID in Kenya.[231] If the average annual GDP per capita (purchasing power parity) is $1500[232], and

one computer in a cybercafé costs one third of the average annual income, it is no wonder that most computer equipment is still beyond the reach of most Senegalese and most Senegalese business owners. Of course, given that prices in the United States drop incredibly quickly, and probably more quickly in places like Senegal, this information is likely to be out of date within a few months.

The price of computer technology may be coming down, however, a least a little bit. In December 2002, Enda Tiers Monde, a Dakar-based NGO, has established, in cooperation with the national government, the first local computer assembly facility in all of Senegal[233]. While an informal economy has existed for some time of building and assembling computers, a larger and more organized approach can only be helpful to the Internet in Senegal, and the spread of ICT.

VI. Conclusion

1. In the Beginning: Three Questions

When I first began this thesis, I had vague notions of cybercafés and the Internet in Senegal dancing in my head. I could not have conceived of the reality that I encountered on the ground. As I researched and investigated the answers, I have come to realize that my research represents a small slice of the knowledge of ICT in the developing world, and that furthermore, in order to keep pace with the development of more advanced ICT, the research would have to be continued at a near constant rate.

As I delved further into the Internet in Senegal, I laid out three questions for further examination.

• Why is the Internet relevant to developing nations, specifically Senegal, and how can it assist development?

• What has Senegal done to reach the stage that it has? Where will it go from here?

• How can the hurdles to ICT that are present in Senegal and throughout the developing world be overcome?

This final section will attempt to answer those questions – however, after having done all this work, I now have more questions than I do answers. I now realize that there is a great deal of more work to be done than I had foreseen.

a) Why is the Internet relevant to developing nations, specifically Senegal, and how can it assist development?

i) The Power of Communication

I have shown that the Internet is relevant to developing nations due to the fact that it can provide widespread information over extremely rapid and low-cost communications networks. It can allow for communication to occur in real-time and in delayed time, and can be used to share information between

government and citizen, between private individuals, between business and their clientèle and between businesses. Its dramatic explosion in the developed world have seen a near 60 percent usage rate in the United States in only 10 years of the existence of its major popular component, the World Wide Web.[234]

Internet technology in Senegal has shown many examples that can lead to the proper empowerment of all people and therefore the development of the nation. These include the Multimedia Caravan, the Mourides of Touba and the Pésinet project. These projects allow for simple information to be shared with the masses, and for people to expand their knowledge. With the addition of newer projects implemented by organizations like Geekcorps and the Digital Freedom Initiative, and the commitment of the Senegalese government to encouraging a promoting these new changes, it would seem that the Internet in Senegal is on a pace for rapid growth, even if only one percent of the population is online currently.

Recalling Rogers' suggestions to make communications more effective in the developing world, it becomes clear that the Internet has great potential to achieve some of those goals.

> 1) providing technical information about development problems and possibilities, and about development problems and possibilities, and about appropriate innovations, in answer to local requests, and,
>
> 2) circulating information about the self-development accomplishments of local groups so that other such groups may profit from others' experience and perhaps be challenged to achieve a similar performance.[235]

The Internet, in a place like Senegal, can act as the ultimate feedback loop. Online discussions of the issues of the day in online forums such as the ones on *Le Soleil's* site (www.lesoleil.sn) or on seneweb.com can provide the technical information that is sought by local groups who provide development assistance. Communication newsletters like BATIK, Balancing Act, and ICT News in Kenya can act as the means to keep people abreast of the issues and can act as mouthpieces for local organizations like CRESP. Ideally, more groups will be inspired to join the growing movement and will being to see the raw communications power of the Internet and how, when done correctly, can help their local communities.

ii) Information Begets More Information

While the communicative power of the Internet is something that is universal, its ability to be deployed is not. Internet access varies widely even among African states, with South Africa ahead of the rest of the continent. Further comparative research is therefore necessary in order to understand how the Internet takes hold and is effective in a developing nation like Senegal. While Senegal has been a leader in the sub-continent in terms of foresight of planning, privatization, demonopolization and other areas, it has had some deficient areas as well. By comparing the relative advantages and deficiencies of different approaches to Internet access, it might be possible to come up with a set of specific tasks that nations can use to make Internet access more ubiquitous and more effective in their society.

As stated previously, one of the difficult factors in studying something as dynamic as Internet technology is that the technology itself is changing at a highly rapid and sophisticated pace. Given that there are few researchers in developing countries actively studying the effects of this technology, the information that is reported and studied becomes antiquated very quickly. Therefore, perhaps a long-term study to investigate not only to chronicle the history of the technology in a developing nation, but to get an idea of the real number of users and how their usage changes over time as overall usage increases. More specific data of this nature is required to make any sort of informed judgment on the state of the Internet in the developing world.

Looking beyond short-term data accumulation, it is nearly impossible to know what the long-term effects of the Internet in a place like Senegal will be. Many questions come to the fore. If the Internet penetration rate stays the same, then will the elites of Senegal be more fortified in their social standing, or will they be unable to compete internationally? What are the social effects on a traditional/communal society? Can an individualized medium like the Internet co-exist with notions of shared resources? Are some cultures more adept at making this transition than others? How does the long-term experience with the Internet in Senegal compare to the Internet in India, China, or Ecuador?

We may never know the answers to these questions, but they must be asked. Further study is therefore

recommended to undertake the task of accumulating current information as well as pursuing it over the long-term to gain a broader perspective.

b) What has Senegal done to reach the stage that it has? Where will it go from here?

The success of the Internet in Senegal can be reduced to five major factors. However, each of these factors demands further research in order to be fully understood.

• *Senegal has always been politically stable, and has known no major violent internal conflict since independence.*

Senegal has been extremely fortunate to have seen peaceful transitions of power in the post-colonial era. It is reasonable to assume that national politics play a strong role in this, given that states that have been racked by war have the lowest rates of connectivity, like the Democratic Republic of the Congo, Guinea-Bissau, and Somalia. But this is not always completely straightforward. Under the South Africa apartheid regime, the majority black population was brutalized under the minority white rule for decades and yet South Africa has risen to be a leader in Internet access in the ten year old post-apartheid era. South Africa now enjoys the highest international bandwidth and has over seven percent of its population online, the highest of anywhere in Africa.[236]

Given these historical facts, several questions for further research become apparent. What are the causes of such stability? What are the direct technological effects that arise from open and democratic government? Are there examples of stable countries that have not been able to adopt the Internet at a rapid pace? Is there a correlation between democracy and the ability of a society to adopt advanced technology?

• *Senegal has excellent (second fastest on the continent behind South Africa) international bandwidth (310 Mbps). This function of responsible government action and geographic dumb luck -- Senegal happens to be geographically well placed to connect to Atlantis-II, a major Internet backbone cable that runs through the Atlantic Ocean.*

Bandwidth is a major limiting factor for Internet access -- improved access requires better, faster and cheaper bandwidth. It is analogous to a road: the faster goods can travel on the road, the quicker they can arrive at their destination and the quicker the goods can be bought and sold. The quicker that information can be disseminated, people can make more informed decisions about the world in which they live. The Senegalese government has shown, through their constant willingness to upgrade the international bandwidth (the speed at which information can come into Senegal from the outside) via the government telecommunications monopoly Sonatel over the years, even before such large speeds are absolutely necessary shows prescience on their part and their willingness to invest in a technology that may not fully pay off for years down the line. Since Sonatel has been privatized, it has increased the bandwidth much further, to 310 Mbps.

Further research would ask questions like: how difficult is it to get developing nations' political leaders to support something like bandwidth given that they are probably more concerned with much more basic and tangible items such as electrical power, roads, and potable drinking water? Who in Parliament brought the issue forward first? Was the Parliament receptive to the idea? Are there other countries that have been more receptive, such as the South African Parliament? What role does privatization play in providing bandwidth?

• *Since the privatization of Sonatel, the allowing of private day-to-day operations to be controlled in the form of telecenters have dramatically driven down the price of telecommunications, and made Internet access more accessible.*

Telecenters have created a booming telecommunications industry in Senegal, so much so that there is a moratorium on the creation of new ones. Their presence has allowed telephone access to be far more widespread than before, and many of them also are now starting to sell Internet access as well. Their direct competition, particularly in close proximity ensured that prices fell, and that more people could afford access. Sonatel's role in all of this, and its transition from a government monopoly, to a private monopoly and soon-to-be a private competitive firm have made for an interesting history, and therefore much more further inquiry is needed to expand upon the scant information available concerning Sonatel.

Oliver Sagna shares this notion:

> While the vast majority of publicly owned companies, as a result of poor management and lack of profitability, have been either liquidated or privatized, Sonatel is a rare exception. The reasons for the success of Sonatel, which has been well-managed – providing quality infrastructure and service, with high profits that have allowed it to invest while maintaining a relatively low level of debt – are worthy of study.[237]

• *Key government acts, such as considering country as a single zone for Internet access, and the elimination of importation taxes on computer material has made it easier to expand ICT.*

Even though Sonatel is a private company now, the Senegalese government does have the ability to encourage or discourage further access through legislative and executive action. The key decision to make the entire country a single zone for Internet access has ensured that everyone pays the same price for dial-up services. However, this is negated somewhat in a telecenter-type setting, where prices are more a figure of market demand and market competition between telecenters. As a result, prices tend to be higher outside the main cities. But again, further study on the specific government processes and the debates that went forward would be necessary to gain a more complete picture of the political process as it pertains to ICT.

• *Senegal has a very active civil society that promotes the Internet – locally, and they have come up with remarkable local applications of Internet technology.*

The major active Senegalese ICT-focused NGOs, CRESP and OSIRIS have been crucial to the development and awareness-raising of the Internet across the country. Their Multimedia Caravan, where the Internet was brought to the people had unexpected consequences, where people who the program was not geared towards took an active interest in the Internet as well. OSIRIS' BATIK email newsletter has been a source of constant, up-to-date and reliable information about the current state of ICT in Senegal, and their role cannot be ignored.

It would be helpful to find out how many people these organizations have managed to reach, and if key members of Sonatel, the ART, and the Senegalese legislative and executive branches of government read BATIK and are in contact with the members of CRESP and OSIRIS. If that were known, the

linkages between governmental and non-governmental actors could be demonstrated. Similar studies in other developing nations would also be useful to understand how such organizations grow and develop and under what conditions. I would hypothesize that these organizations have been able to be a crucial link between the "Netizens" of Senegal and those in positions of power in government and industry.

c) How can the hurdles to ICT that are present in Senegal and throughout the developing world be overcome?

Consequently, there remain five major obstacles to overcome before the Internet can truly become a "tool" for development in Senegal.

• *The Senegalese technocratic elite (members of OSIRIS and CRESP) maintain that there is a lack of "political will" -- a lot of talk, but little action.*

• *Sonatel retains monopoly until July 2004 – choice of services and cost, as a result, remain limited. Even when the monopoly is lifted, there is no guarantee that there will immediately be competition.*

Mainly, these elites complain about the fact that Sonatel, despite its being a private company, still retains a monopoly on the Internet services market until July 2004. They lament that prices are too high and the quality of services are too low because of the state of monopoly. When the monopoly is lifted later this year, there is no guarantee that the ART will have given licenses to other competitive telecommunications firms – nor how long it will take until there is true competition between at least two firms in Senegal.

When the monopoly is lifted and true competition begins, there will need to be further study to monitor the effects of the competition on prices. Will other firms immediately be able to compete with Sonatel? Will their market share erode over time, or have the dominated the market for so long that new firms cannot gain a foothold? How will the various firms solve problems with existing Sonatel infrastructure of telephone lines and data cables? Will the ART be effective in regulating disputes between new firms and Sonatel?

• *Less than 40 percent of the population is literate, and far fewer are literate in national languages.*

More basic than the issue of market regulation is the simple issue of literacy. The Internet remains a medium dominated by the written word, and furthermore, the written word in two languages not indigenous to Senegal, English and French. A substantial effort needs to be accelerated to provide people with the ability to read, and preferably, to read in their native language. Only with people literate in local languages can there truly be the chance for people in Senegal to see how the Internet is relevant to them in their daily lives.

Further research could be undertaken to investigate the correlation between Internet usage and literacy in the developing world. An interesting case study would be India, and the relationship between literacy and education projects and the rise of the ICT industry there. In addition, the possibility of using ICT to teach national languages also remains a possibility, as Arame Fal has suggested.[238]

• *Computer material and public Internet access remains expensive where available, and are only available to a small percentage of the population.*

As stated before, the Internet is only available to about one percent of the population currently. However, this rate has been growing over the last few years, and many African countries have seen rapid growth in this area over the last few years. While the prices have continued to fall in Senegal, they still are not completely affordable to everyone. It is likely that with increased competition between Sonatel and future firms that costs of access with fall, and with them, the price that consumers pay will also continue to drop.

Continued study in this area, once true competition has been established would be necessary to have a tangible way to examine the effects of competition and how that affects usage rates. Knowing this information, and at what retail price provided the maximum profit to firms and the best deal to consumers would be of extraordinary value to research firms, marketing firms, potential Internet companies in Senegal, and to consumers. Perhaps, if the government wanted to increase usage further, they could provide a subsidy to Internet service providers to artificially decrease the price if necessary.

• *Few wide-scale, simple, cheap, and effective uses of the Internet have been demonstrated – it is still not relevant to a majority of people in their daily lives.*

While there have been some examples of using ICT towards development in Senegal, there have been few that can be sustained independently and over the long term. While there have been some examples in recent years like the Multimedia Caravan, the project has been long completed. This is something of a chicken-and-the-egg problem, as not many people will want to use it if there is nothing for them to do, but the solutions come from more people using the technology. Ideally, if enough people in Senegal use it, they can come up with some useful new permutation of the Internet, such as the World Wide Web or Wi-Fi technology.

Expanded research in this domain, with more examples of sustained ICT for development are crucial. Two of the main government programs, Digital Solidarity and the Digital Freedom Initiative should be continued to me monitored over the next few years. Their success or failure could have large consequences on the Internet in Senegal. In addition a comparative cross-analysis of how the DFI is played out in different countries would allow policy makers and social scientists to gain a better understanding of the conditions where specific developments projects can work and how those projects are or are not specific to that country.

Therefore, the main successes almost balance the hurdles facing further Internet access in Senegal. Only time and further research will demonstrate if Senegal can indeed cross its tipping point that it seems to be approaching.

2) In the Future: More Questions

The conclusion of this thesis is that there remains a great deal of research that is left to be done which would expand upon the consequences of the present situation in Senegal. Other remaining topics include a comprehensive study of Senegalese Internet users. This research would reveal who they are, how old they are, what cities they are in, what kinds of activities they use the Internet for, how they learned to use the Internet, who they correspond with, what kinds of things would they like to see, et cetera. It may

turn out that the majority of users are not interested in improved agricultural techniques, but are more interested in corresponding with their counterparts in other parts of Africa, or are more interested in downloading American and French rap music. It would also be useful to compare this information with Internet users in developed countries as well as developing countries.

Another possible study would be a survey of all the cybercafés in Senegal, so that a firm number can be cited and analyzed. To date, only rough speculative estimates have been given. It would also be useful to know how many are concentrated in the large cities, particularly Dakar, versus the rural areas. A third still would be do analyze the effects of up-and-coming ICT advancements in the developing world, such as Wi-Fi, Wi-Max, and cell phone based Web access. Are these viable and affordable? With detailed information like this, one could expect that a new and more complete picture of the Senegalese Internet situation to emerge. If it turned out that the empirical evidence matches my anecdotal experience, that Internet access tends to be cheaper and more widespread in Dakar, and that most of its users are urban middle-class youth who were looking for American rap music, then efforts could be made through those channels to help those kids pass on their skills. Those demographics should be an area of focus for policymakers and NGOs to find those children, and somehow get them involved in promoting further access to the rest of the population.

But no matter who is using the Internet in Senegal, one thing is clear – it is the most advanced tool to date that combines the creation of information and the ability to communicate that information in an extremely rapid fashion. This unique combination of technologies is a potentially incredible means to foster development, by allowing people to share, connect, and expand their conclusions together in a collaborative effort.

Recalling the definition of development from the Cocoyuc Declaration:

> Development should not be limited to the satisfaction of basic needs … Development includes freedom of expression and impression, the right to give and to receive ideas and stimulus. There is a deep social need to participate in shaping the basis of one's own existence, and to make some contribution to the fashioning of the world's future.[239]

Senegal has been at the forefront of expanding the use of ICT to assist in "the fashioning of the world's

future." It certainly has some distance to go, but it is on the right track. As Amadou Top recently put it, ICT, in some ways, is far more important in the South than it is in the North – it can, and must be, a crucial component towards social development.

> Not only can it [be linked to social development], but I think that more so than in developed countries, we need to use it for social development … the people of the South must see that this is a chance that they have, and until now, they haven't taken advantage of it. From time to time, they say 'You're a futurist, we have to build roads, we have to build wells,' but in my opinion, we don't have the same vision – we don't have the same understanding. It's a question of life or death – today there are no other means to make this leap than to use these technologies to solve our problems.[240]

Literary Addendum:

The following poem[241] was written by François George Barbier-Weisser, now of the French Ministry of Co-operation. I am not certain when it was written, but it seems that from its reprint in "Internet, Afrique et Francophonie" (1996) that it was written when the author was still a college student. The poem does not fit anywhere else in the thesis, but I wanted to include it.

Internet, tam-tam de l'espace
Internet, drum of space

Couplet I:
Depuis quelque temps, une rumeur se répend,
For some time, a rumor has taken hold
Partout,
Everywhere,
Dans les cités U, dans les villes, dans les champs,
In college towns, in cities, in the fields,
Partout,
Everywhere,
Mon tam tam a un rival et le combat est inégal
My drum has a rival, and the fight is unequal
Il se prénomme Cyber, il se nomme Internet
His first name is Cyber, and he calls himself Internet
et il vient de l'espace!
And he comes from space!

Refrain:
Mais est-il super, ce Cyber?

But is it great, this Cyber?

Est-il un rival, est-il un frère?

Is he a rival, is he a brother?

Couplet II:

Comme moi, il réveille le monde

As I do, he wakes up the world

Je tape sur mon tam tam, il tape sur ses ondes

I hit my drum, he hits on waves

Comme moi, il parle toutes les langues

As I do, he speaks all languages

Je résonne à tous vents, il raisonne en tous temps

I echo in all winds, he reasons with all time

Comme moi, il vient de très loin

As I do, he comes from far away

Moi du fonds des âges, lui du fonds de la nuit

Me from the depths of the ages, he from the depths of the night

Refrain:

Mais est-il super, ce Cyber?

But is it great, this Cyber?

Est-il un rival, est-il un frère?

Is he a rival, is he a brother?

Couplet III:

Cyber, dis moi

Cyber, tell me

Sais-tu comme moi faire sauter les enfants? Non, non

Do you know as I do, how to make children jump? No, no

Cyber, dis moi

Cyber, tell me

Sais-tu comme moi faire danser les belles filles? Non, non

Do you know, as I do how to make beautiful girls dance? No, no

Cyber, dis moi

Cyber, tell me

Sais-tu comme moi faire chalouper les grandes-mères? Non, non

Do you know as I do how to make grandmothers row? No, no

Refrain:

Mais est-il super, ce Cyber?

But is it great, this Cyber?

Est-il un rival, est-il un frère?

Is he a rival, is he a brother?

Couplet IV:

Cyber, mon frère, tu es un grand handicapé

Cyber, my brother, you are a big disabled person

Tu as besoin de micros, de cables, d'électricité

You need microchips, cables, and electricity

Moi, vois-tu, je suis nature, je suis léger

Me, you see, I am natural, I am light

Je traîne après moi les cœurs et non pas les claviers

I drag after me hearts and not keyboards

Mais tu fais dialoguer les cultures et j'aime ça

But you make cultures dialogue and I love that

Mais tu fais naviguer les esprits et j'aime ça

But you make spirits navigate and I love that

Refrain:

Mais est-il super, ce Cyber?

But is it great, this Cyber?

Est-il un rival, est-il un frère?

Is he a rival, is he a brother?

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Footnotes:

1The word *toubaab* in Wolof designates a white person, and more specifically, a French person.

2Karl Marx and Friedrich Engels, *The Communist Manifesto,* (New York: Signet, 1998).

3Fredreich Hayek, *The Fortunes of Liberalism: Essays on Austrian Economics and the Ideal of Freedom,* Edited by Peter Klein, (London: Routledge. 1994.)

4Chimere Ikoku, "Human Resources Development for Nigeria's Technological Era: The Need for Novel Pathways,"(Lagos: Paper presented at the Federal Ministry of Science and Technology National Conference on Science and Technology, 1981). As quoted in Chimere Ikoku, "Science, Technology and Africa," (Maiduguri: University of Maiduguri Press, 1996), 13.

5Barbara Ward. "The Cocoyoc Declaration" 1974, <http://www.southcentre.org/publications/conundrum/conundrum-06.htm> (17 April 2004)

6Alain Birou et al., *Towards a Redefinition of Development,* (Oxford : Pergamon Press, 1977), 330, as quoted in Yogendra P. Dubey, "Information Technology and National Development," in *Information Technology and National Development.* Yogendra P. Dubey, V.V. Menon, H.N. Prasad, editors. (Agra: Y.K. Publishers, 1994), 38.

7Walter Rostow, *The Stages of Economic Growth, 2nd Edition,* (London: The Syndics of Cambridge University Press, 1971), 4.

8Ibid.

9Rostow, 7.

10Rostow, 8.

11Ibid.

12Rostow, 9.

13Rostow, 90.

14Johan Galtung, "A Structural Theory of Imperialism," *Journal of Peace Research, Vol. 8, No. 2* (1971): 81.

15Galtung, 83.

16Ibid.

17Galtung, 93.

18Stephen D. Krasner, *Structural conflict: the Third World against global liberalism,* (Berkeley: University of California Press, 1985), 5.

19Krasner, 7.

20Krasner, 12.

21World Bank,"World Bank Group | Data," 2000. <http://www.worldbank.org/data/dev/devgoals.html> (21 April 2004)

22Daniel Lerner, "International Cooperation and Communication," in *Communication and Change in the Developing Countries*. Daniel Lerner and Michael Schramm, editors. (Honolulu: East-West Center Press, 1967), 122.

23P.C. Joshi, *Communication and National Development,* (New Delhi: Anamika Publishers & Distributors Ltd., 2002), 6.

24Everett Rogers, "Communications and Development: The Passing of the Dominant Paradigm," in *Communications and Development: Critical Perspectives,* Everett Rogers, editor. (Beverly Hills: Sage Publications, 1976), 135.

25Rogers, 136.

26Rogers, 141.

27Dubey, 38.

28Dubey, 41.

29M.G. Quibria and Ted Tschang, "Information and Communication Technology and Poverty: An Asian Perspective,"(Tokyo: Asian Development Bank Institute, 2001), 3.

30For the sake of clarity and simplicity, I will define "the developed world" as countries that belong to the Organisation for Economic Co-operation and Development (OECD).

31Quibria and Tschang, 3 - 4.

32Quibria and Tschang, 2.

33World Bank, "Poverty Trends and Voices of the Poor," n.d., <http://www.worldbank.org/poverty/data/trends/trends.pdf> (27 April 2004)

Given that this is a publication by the World Bank, I believe that this online source is trustworthy and credible.

34Sidiki Diakité, *Technocratie et Question Africaine de développment: Rationalité technique et strategies collectives,* (Abidjan: Edition Strateca Diffusion, 1994), 185-186.

35John Afele, *Digital Bridges and Digital Opportunities for Developing Nations,* (Hershey: Idea Group Publishing, 2003), 105-106.

36Rostow.

37Gaye Daffé and Mamadou Dansokho, "New Information and Communication Technologies: Challenges and Opportunities for the Senegalese Economy," Paul Keller, trans. (New York: UNRISD, 2002), 21.

38Cheikh Gueye, "Strategies and the Role of ICTs in Urban Growth: The Case of Touba" Cyrus J. Farivar, trans. (Geneva: UNRISD, 2002), 3.

39In English, this translates to "The Search for the Two Happinesses", implying earthly happiness and happiness in the hereafter.

40Gueye, 3.

41Kofi Annan, "Kofi Annan's IT challenge to Silicon Valley," *News.com,* November 5, 2002. <http://news.com.com/2010-1069-964507.html?tag=lh> (27 April 2004)

42United Nations Development Programme, "Human Development Indicators 2003 – Senegal," 2003, <http://www.undp.org/hdr2003/indicator/cty_f_SEN.html.> (31 January 2004)

43Ibid.

44United Nations Development Programme, "Technology Achievement Index," 2001, <http://hdr.undp.org/reports/global/2001/en/pdf/techindex.pdf> (31 January 2004)

45Mamadou Gaye, "Thoughts on the Internet in Senegal," Interview by Cyrus J. Farivar. Cyrus J. Farivar, trans. (12January 2003)

46Olivier Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," Paul Keller, trans. (Geneva: UNRISD, 2002), 16.

47USAID, "The USAID Leland Initiative Project Description and FAQ," n.d., <http://www.usaid.gov/leland/project.htm#Q.percent20Exactly> (20 April 2004)

48Edward Royce (R-CA), "Bridging the Information Technology Divide in Africa" (House of Representatives Subcommittee on Africa, Committee on International Relations, 107th Congress, Serial No. 107-10, 16 May 2001), 1.

49*Francs Communautaire Française Africaine*, or French African Community Francs. This currency will be henceforth referred to as CFA.

50Market rates on January 31, 2004 where $1.00 US = 529.68 CFA (http://www.xe.com/ucc)

51Christophe Brun, "Telecom & Internet: Senegal," (Dakar: Institut de recherche pour le développment, 2001), 3.

52Noah Shachtman, "Blogs Make the Headlines." *Wired News,* 23 December 2002. <http://www.wired.com/news/culture/0,1284,56978,00.html> (20 April 2004)

53Gordon Wilson and Richard Heeks, "Technology, Poverty and Development," in *Poverty and Development into the 21st Century*. Tim Allen and Alan Thomas, editors, (Glasgow: The Open University, 2000), 419.

54Ibid.

55Ibid.

56Ibid.

57NUA, "Nua Internet How Many Online," March 2001. <http://www.nua.ie/surveys/how_many_online/africa.html> (20 April 2004)

Since 1996, the Irish firm Nua has provided data about Internet connectivity rates. They have been cited by various government organizations and media organizations for providing accurate and useful information and statistics about the Internet. These groups include the United Nations, the U.S. Internet Council, the Australian Bureau of Statistics, The New York Times, The Wall Street Journal, and Wired magazine. For this reason, I believe that their information is trustworthy and credible.

58Wilson and Heeks, 419.

59Ibid.

60Aida Opoku-Menash, "Democratizing Access throughout the Information Society," in *The digital divide in developing countries: towards an information society in Africa,* (Brussels: VUB University Press, 2001), 164.

61Ministry of Planning and Cooperation, "Prospective Study: Sénégal 2015," (Dakar: Government of Senegal, 1989), 34 as quoted in Sagna, 17.

62U.S. Department of Commerce, "Commerce Secretary Launches Public-Private Partnership to Spur Technological Growth in Developing Nations," 2003. <http://www.commerce.gov/opa/press/2003_Releases/March/04_Digital_Freedom_release.html>. (21 April 2004)

63Cynthia Hewitt de Alcantára, "The Development Divide in a Digital Age," (New York: UNRISD, 2001), 18.

64Gaye.

65CIA, "CIA Factbook - Senegal"n.d., <http://cia.gov/cia/publications/factbook/geos/sg.html> (4 April 2004)

The Central Intelligence Agency publishes an online factbook with various statistical and factual information about foreign states. Given that it is a government organization, I believe that their information is trustworthy and credible.

66Ibid.

67Iba Der Thiam and Nadiour Ndiaye, *Histoire du Sénégal et de l'Afrique*, *Deuxième édition revue et corrigée,* Cyrus J. Farivar, trans., (Dakar: Les Nouvelles Editions Africaines, 1976), 69.

68Der Thiam and Ndiaye, 100.

69Der Thiam and Ndiaye, 110.

70CIA

71Ibid.

72NSRC, "NSRC Ethiopia," n.d., <http://www.nsrc.org/db/lookup/ISO=ET> (4 April 2004)

The NSRC, or the Network Startup Resource Center, based at the University of Oregon, is a non-profit organization that has worked since the late 1980s to help "develop and deploy networking technology in various projects throughout Asia/Pacific, Africa, Latin America and the Carribean, the Middle East, and the New Independent States." They maintain a global database of Internet Service Providers and Connectivity Info. Their willingness to present primary source information (such as emails from around the globe) leads me to believe that their information is trustworthy and credible.

73Digital Freedom Initiative, "Digital Freedom Initiative Senegal Program Design Summary," (Washington, D.C.: USAID, 2003)

74Juliann Emmons Allison, "Information and International Politics," in *Technology, Development, and Democracy,* Juliann Emmons Allison, editor. (Albany: State University of New York Press, 2002), 29-30.

75Ibid.

76Allison, 30.

77I define "late developer" as developing economically after other nations have already done so – vis-à-vis Western Europe, and the developed world.

78Anne O. Krueger, "Benefits and Costs of Late Development," in *Favorites of Fortune,* Patrice Higonnet, David S. Landes, and Henry Rosovsky, editors. (Cambridge, MA: Harvard University Press, 1991), 465.

79Ken Belson with Matt Richtel, "U.S. Broadband dream is alive in Korea," *The New York Times.* 5 May 2003.

80World Economic Forum, *Korea.kr,* in "The Global Information Technology Report 2002 – 2003," Sumitra Dutta, Bruno Lanvin and Fiona Paua, editors.(Oxford: Oxford University Press, 2003), 234.

81Paul Freiberger and Michael Swaine, *Fire in the Valley: The Making of the Personal Computer, 2nd Edition*, (New York: McGraw-Hill, 2000), 208.

82Ibid.

83NUA, "Nua Internet How Many Online," May 2002. <http://www.nua.ie/surveys/how_many_online/world.html> (April 12 2004)

84Robert Kahn, "RFC 371," 12 July 1972, <http://www.faqs.org/rfcs/rfc371.html> (3 February 2004)

RFC, or "Request For Comments," is a primary source document that outlines various features of the underlying technology of the Internet. These began in 1969 as proposed protocols that are forwarded to members of the Internet research community.

85Freiberger and Swaine, 408.

86Larry Irving, "Falling Through the Net: Defining the Digital Divide," n.d., <http://www.ntia.doc.gov/ntiahome/fttn99/introduction.html> (12 April 2004)

87Juan Navas-Sabater and Andrew Dymond, Niina Juntunen, *Telecommunications and Information Services for the Poor,* (Washington, D.C.: The World Bank, 2002), 1-3.

88Ibid.

89Ibid.

90Ibid.

91Robert J. Saunders, Jeremy J. Warford and Byron Wellenius, *Telecommunications and Economic Development,* (Baltimore:Johns Hopkins University Press, 1983), 15.

92Sagna, 6.

93Institut de recherche pour le Développment. "Historique de l'Internet Senegal" July 2001, <http://www.ird.sn/intersen/histo.shtml> (20 April 2004)

IRD, or the *Institut de recherche pour le Développment* (Research Institute for Development) is a French NGO that has existed since 1984. They conduct research, training and development projects all across the globe, including in Senegal. They have a site which contains a history of Senegal. Considering that they were one of the first players to provide Internet access in Senegal (verified from other sources), I find their information to be trustworthy and credible.

94Sagna, 16.

95Ibid.

96Olivier Sagna, *BATIK, No. 51.,* October 2003, Cyrus J. Farivar, trans. <http://www.osiris.sn/article694.html> (April 20, 2004)

97Sonatel, "Bande Passante," (Press Release), 29 October 2003. Cyrus J. Farivar, trans. <http://www.sonatel.sn/communike/bande_passante2003.htm.> (20 April 2004)

98Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 42.

99UNDP, "United Nations Human Development Report 2002," 2002, <http://hdr.undp.org/reports/global/2002/en/indicator/indicator.cfm?File=cty_f_SEN.html> (31 Jannuary 2004)

Given that this is the United Nations Development Programme's Human Development Report, I believe that this source is trustworthy and credible.

100*Le Journal de l'Economie*, No. 155, 29 March 1999, as quoted in Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 23.

101Peter Benjamin, "e-OTI: African Experience with Telecenters," November/December 2000. <http://www.isoc.org/oti/articles/1100/benjamin.html>. (21 April 2004)

102Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 43.

103Benjamin.

104Ibid.

105VSAT stands for "Very Small Aperture Transmission." This is a relatively new type of satellite technology that has the advantage of being able to use satellite receivers of one to two meters in diameter – hence the name "very small."

106Navas-Sabater, Dymond and Juntunen, 24

107Market rates on February 4, 2004 where $1.00 US = 523.436 CFA (http://www.xe.com/ucc)

108Daffé and Dansokho.

109Navas-Sabater, Dymond and Juntunen, 23.

110Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 62.

111Institut de recherche pour le Développment.

112Pape Ousmane Sakho, Ministry of the Economy and Finances, "Déclaration de politique de développment du secteur des télécommunications sénégalaises (1996-2000)," March 1996, Cyrus J. Farivar, trans. <http://www.osiris.sn/article205.html> (April 12 2004)

113Law 96-03 ; February 22, 1996. as quoted in Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 26.

114Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 26.

115*Le Journal de l'Economie*, No. 155, 29 March 1999, as quoted in Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 23.

116Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 27.

117A Wolof phrase commonly heard in a cybercafé, meaning "How much for one hour (of Internet)?"

118For clarity I will use the word "cybercafé" to designate a classic cybercafé as well as a telecenter with Internet-enabled computers.

119According to the CIA World Factbook 2003, in 2001 there were over 800,000 landlines and cellular telephone lines for over 10 million people. See CIA.

120Michael Mavros, "Metissacana Press Release," 2 July 2002. Cyrus J. Farivar, trans.

121Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 47.

122This number is taken from dividing the approximate population of Senegal (10,000,000) by the number cited by OSIRIS as the number of Senegalese Internet users, 100,000.

123NUA.

124Stefan Hedlers, "Current Population for Cities and Towns of Senegal," n.d., <http://www.world-gazetteer.com/t/t_sn.htm>. (21 April 2004)

Stefan Hedlers is a German man living near Cologne who has maintained a site about world population figures since 1996.

125Blaise Rodriguez, "Thoughts on the Internet in Senegal," Interview by Cyrus J. Farivar. Cyrus J. Farivar, trans. (1 November 2002)

126Hedlers.

127For clarity, the figures on cybercafés outside Dakar are based on personal experience. This author has been to nearly all of these.

128Hedlers.

129Hedlers.

130Tiscali, "Dictionary of Multimedia and the Internet" n.d., <http://www.tiscali.co.uk/reference/dictionaries/computers/data/m0050103.html>. (9 February 2004)

131Rodriguez.

132 This cybercafe opened in late 1999, but had closed permanently by November 2002

133Another neighborhood north of the city center of Dakar, a 15 minute walk from Karack

134Rodriguez

135Ibid.

136Olivier Sagna, "Thoughts on the Internet in Senegal," Interview by Cyrus J. Farivar. Cyrus J. Farivar, trans. (31 January 2003)

137Michael R. Jensen, "Policies and Strategies for Accelerating Africa's Information Infrastructure Development," in *The digital divide in developing countries: towards an information society in Africa,* Gert Nulens, Nancy Hafkin, Leo Van Audenhove & Bart Cammaerts, editors. (Brussels: VUB University Press, 2001), 113-114.

138NUA

139A current American popular rap star, this author can verify that Nelly's music was played very frequently on the radio and among the youth of Senegal from October 2002 to May 2003, during his tenure in Senegal. The fact that many Senegalese online youth spend their time downloading his and other American pop musician's songs merely that the Internet is another medium where American cultural icons are showcased. Even without the Internet, Nelly and others would still be just as popular – they are broadcast frequently on the radio and on cable television.

140Sagna, "Information and Communications Technologies and Social Development in Senegal: An Overview," 46.

141Lane Smith, "RE: Follow-up questions," 13 April 2004. personal email (13 April 2004)

142Balancing Act ,"Cyber-café users cannot find local content they want, says CCOAK survey,"Issue No. 183 in *Balancing Act News Update – African internet developments,* 28 January 2004, <http://www.balancingact-africa.com/news/back/balancing-act_183.html> (14 April 2004)

143Balancing Act.

144Rodriguez.

145Gaye.

146Ibid.

147Ibid.

148Ibid.

149Ibid.

150Gueye, 3.

151Ibid.

152Gueye, 4.

153de Alcantára, 37.

154Norimitsu Onishi, "Industrious Senegal Muslims Run A 'Vatican'" *The New York Times,*. 2 May 2002, <http://college3.nytimes.com/guests/articles/2002/05/02/1014324.xml> (5 April 2004)

155Gueye, 4.

156Sarbuland Kahn, "Bridging the Digital Divide," *Newslink* 4th Quarter 2001, No. 3.

157Luis Castro and Sharon Smith, "What Works: Afrique Initiatives—Attempts at Combining Social Purpose and Sustainable Business," (Washington, D.C.: World Resources Institute, 2003), 11.

158Ibid.

159Michel Mavros, "Thoughts on the Internet in Senegal," Interview by Cyrus J. Farivar. Cyrus J. Farivar, trans. (20 March 2003)

160Castro and Smith, 4.

161Gina Dario, "Thoughts on the Digital Freedom Initiative," Interview by Cyrus J. Farivar. (12 April 2004)

162Ethan Zuckerman, "Mali Community Radio project: Architecture Sketch – DRAFT, for discussion only," 11 November 2003.

163CRESP, "Partenaires," n.d., <http://www.cresp.sn/partenaires.htm> Cyrus J. Farivar, trans. (13 April 2004)

164CRESP, "CRESP," n.d., <http://www.cresp.sn> Cyrus J. Farivar, trans. (27 March 2004)

165CRESP, "SIUP," n.d., <http://www.siup.sn> Cyrus J. Farivar, trans. (March 5 2004)

166Navas-Sabater Dymond and Juntunen, 1-3.

167This number is taken from dividing the approximate population of Senegal (10,000,000) by the number cited by OSIRIS as the number of Senegalese Internet users, 100,000.

168OSIRIS, "Objectifs," n.d., <http://www.osiris.sn/article4.html> Cyrus J. Farivar, trans. (March 27 2004)

169Bhavya Lal, Gary Gaumer and Salamao Manhica, "Information and Communication Technologies for Improved Governance in Africa," in *The digital divide in developing countries: towards an information society in Africa,* Gert Nulens, Nancy Hafkin, Leo Van Audenhove & Bart Cammaerts, editors. (Brussels: VUB University Press, 2001), 214.

170Lal et al, 217.

171Lane Smith, "Thoughts on the Leland Initiative," Interview by Cyrus J. Farivar. (April 9, 2004)

172"Bridging the Information Technology Divide in Africa" May 16, 2001. House of Representatives Subcommittee on Africa, Committee on International Relations. 107th Congress. Serial No. 107-10. pp. 20.

173Amadou Top, "OSIRIS un lieu d'échange et de discussion," *BATIK*, No. 1. 1 August 1999, <http://www.osiris.sn/article302.html> Cyrus J. Farivar, trans. (5 March 2004)

174Balancing Act,"Balancing Act News Updated – African internet developers," n.d., <http://www.balancingact-africa.com/about.html> (April 26 2004)

175Gaye.

176Amadou Top, "Enfin ! ! !," *BATIK*, No. 54. January 2004, <http://www.osiris.sn/article892.html> Cyrus J. Farivar, trans. (March 5 2004)

177Gaye.

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