

Lessons from ICT Pilot Projects in Rural Haïti for Sustainable Economy with Four Inferred Coefficients for the GNH Index

Serge Miranda, Frantz Verella and Tahar Saiah

PASCAL (French philosopher): on "HAPPINESS"

Happiness is a marvellous thing: the more you give, the more you are left with

French - « Le bonheur est une chose merveilleuse: plus tu en donnes plus il t'en reste »

Creole (Haïti) - Ala yon bèl bagay se kontantman, plis ou bay ladan'l plis ou rete ladan'!!

Russian: Счастье – волшебная вещь: чем больше ты его даришь, тем больше тебе остаётся»

Arabic : السعادة شيء رائع كلما أعطيتها كلما بقيت لك

Spanish - la felicidad es un artículo maravilloso: cuanto más se da, más le queda a uno

Occitan - la felicitat es una chausa meravelhosa: mai ne'n donas, mai te'n rèsta

Your Highness ...determined to send me, Christopher Columbus, to the country of India ... and furthermore directed that I should not proceed by land to the East as is customary, but by a Westerly route, in which direction we have hitherto no certain evidence that anyone has gone.

Christopher COLUMBUS (Entry from his journal on his voyage of 1492).

Introduction

We are living in a world where, in less than 20 years, some drastic changes have occurred around four key factors:

- The end of both Soviet and American super powers with the raise of invisible walls among communities with four key dates: 9/11 (1989) with the end of the Soviet empire, 9/11 (2001) with the rise of invisible walls, 9/19 (2008) with the financial American collapse and 11/4 (2008) with the rise of invisible bridges and the melting pot richness;
- The rise of ICT (*Information Communication and Technology*) around a mobile Internet world platform for free ubiquitous access to information and WEB 2.0 leading to a globalization 2.0 digital future;
- The watershed of Information in some areas of the world;
- The people consciousness of our finite world in terms of traditional energetic resources and of danger of climate change due to ozone layer pollution bringing concern about a future with existing past models vanishing with the fall of the 2 superpowers.

Based upon a 10 years experience in creating solid ICT foundations in Haiti with some pragmatic deployments in poor rural areas, we inferred four key coefficients to be developed in joint multi-disciplinary researches around the GNH index at the Bhutanese and European level. We propose to enrich the GNH index and other European contributions like the one proposed in the Paradiso project (Torrenti, 2008) with the influence of our ICT and Mediterranean rim experience (Caribbean might be considered as the Mediterranean of America).

This paper is organized as follows:

A short summary of the recent paradigm ICT shifts in the last five years which represent a real opportunity for developing countries;

An overview of concrete bottom up approach of ICT in rural areas of Haiti for sustainable economy conducted within a long term-strategy leading to the crucial role of mobile-learning platforms;

A proposal of four inferred coefficients to be developed as a ICT Mediterranean contribution to the GNH or Paradiso Index.

1. A strategic ICT vision in a digital future of Globalization 2.0

1.1. Inform@tion: The new energetic resource of this millennium

We have been living since 1993 (1st commercial WEB site and Cell phone launching in Europe), two successful ICT revolutions of world magnitude: Internet and wireless telecommunications (cell phones) which represent the tip of the iceberg of convergence between computer science, telecommunications and multimedia.

“Information” is the raw resource of this millennium with positive properties (*enriched when shared like happiness as said by Pascal*) making tomorrow managers specialists of abundance and not of scarcity (like oil or cash/finance). Mobile Internet will enable information access ubiquity. We will call it “**mobiquity**”.

We proposed a new formula for information in the ICT future: “**E=MC3**” (Miranda, 2008) to emphasize the fact that:

- Information is becoming a key Energetic resource with
- **M**ultimedia nature (text, picture, video, sound ... are digital),
- **C3** to sum up this convergence era between **C**ommunications, **C**omputing and **C**onsumer Electronics.

The cell phone of the future will be a real computer with Internet going mobile, a camera, a TV set, a payment tool, a key, a remote controller and occasionally a ... telephone (80% of the traffic on a cell phone in Japan by 2010 will be data other than voice cf NTT Docomo Study). The cell phone will host **a portfolio** of personal customized information **mobile services**: the **M-services**.

The mobile digital Web advent alters how we interact not only with computers but with one another. We are inhabiting a world where distance and time no longer matter and where communication becomes virtually instantaneous with potentially a mobile ubiquitous access to information (Friedman, 2005). After “tools” of the agricultural revolution, “machines” of the industry revolution, the world now gets computer “SERVERS” to open a new era of information virtual revolution. New paradigms to integrate a positive and optimistic attitude for our digital future are needed.

1.2 “We will BIP and TAG the future”

We can sum up the salient features of this digital ICT era (Miranda, 2008):

- *Broadband Internet in the pocket* (“BIP”) with the arrival of WIMAX (rev”E” on cell phones) (U5) and other wireless technologies beyond 3G (meshed wifi networks, etc..)
- “tagged” objects with RFID tags (*Radio Frequency Identification*) replacing bar codes and opening the road to tracking objects for developing coffee fair trade in Haiti for instance (see U6); 1000 billion of objects will be tagged by 2020 with each one capable of having an Internet address (with the new IPv6 addressing Internet system enabling each atom of getting and address!). Objects will communicate more than human beings with new expected added-value information services for health and education. A cell phone embedding an NFC (*Near Field Communication*) chip (Miranda, 2008) or (U4) will be able to read these tags and access information concerning the history of associated objects. More than 500 millions of NFC phones will exist in the world by 2011 (U4).

One of the most promising technologies lies with the WEB 2.0 enabling the creation of positive communities (see Wikipedia) to help each other; just let us give our project of “WIKIdeas/WIKImagine” or “Face School” project (Diamond, 2005)

to enable teachers of this planet to share experimental positive practices in developing countries (cleansing, water preservation, health, energy with solar ovens, agricultural experiments, ..). Wikipedia (U3) enables schools with no books to get a free encyclopaedia if they have an Internet access.

1.3 The crucial m-service-centrics ICT view of our digital future

The future belongs to M-services in the areas of health, education, m-government, ecotourism culture and finances (micro-credit, international fund transfer ...) with real opportunities in developing countries and mainly in Haïti as we experienced it.

Wireless information services of the future will be *location-based* and *touch-based* with new contents provided in the 4th screen of human history. Added value services could be pointed out like:

- m-learning (not only for teachers or peasants but also to fight illiteracy with new tools ; see for instance the AL ANDALUS project in Morocco, Haïti and Madagascar with NFC multi-touch virtual smart posters (Fadoua Hajji, 2008, U9) or in IRAN (Fotouhi-Ghazvini, 2008) both for illiterate isolated populations in rural areas ;
- m-alerts in case of flooding or hurricanes; see for example the SIMBI project for Haïti (U8) or the Early Warning System in the Dominican republic (U10).

Due to the widespread dissemination of cell phones in developing and emerging BRIC (Brazil, Russia, India and China) countries with touch-based capabilities opening their use by illiterate, we are aiming at M services - centrics future.

1.4 New world paradigm shifts in the digital future: from 11/9 to 9/11 and 9/19

We have to think, do, live, be the unpredictable. There are four key dates with creative and destructive foundations marking the death of predictability:

- 11/9 (1989): dismantling the Berlin wall posting the end of Russian/Soviet super power ;
- 9/11 (2001): destruction of the World Trade Centre and construction of virtual walls raised among communities
- 9/19 (2008): end of American superpower with the financial world collapse and the beginning of a new era for sustainability.
- 11/4 (2008) with the election of B. Obama, gives a threefold lesson: symbol for melting-pot culture, revival of positive American dream and building of invisible bridges. It marks also the success of ICT Web 2.0 with the great contribution of 3.5 millions of micro campaigners.

2. A long-term ICT vision for economic development of Haiti with the Casa Karibe Nova project

New wireless information technologies with broadband internet and communicating tagged objects thus represent a real chance to boost the reconstruction of the infrastructure of Haiti in every aspect, physical and virtual.

There is an historical opportunity to pair the physical infrastructure reconstruction (electricity, roads, water, sea routes...) with a twin ICT infrastructure with short-term and long term benefits for the whole economy.

The CASA CARIBE NOVA (CCN) project, the *“House of the Information future in the whole Caribbean region”* is based upon strong foundations built during the last 10 years in Haïti and strong partnership with the IT industry. CCN emphasizes the 3 balanced

dimensions of success in tackling new technologies: (added-value information) SERVICES, INFRASTRUCTURE and CONTENT. Such an economic development should reverse the population flow from the overcrowded capital (Port au Prince) to self sufficient and developing rural areas with broadband Internet in the future attracting also doctors and teachers while creating new jobs (call centres, data centres, ..).

Due to the fruitful long-term partnership with a graduate master degree of the University of Nice (France) which has been settled in Port au Prince, the State University of Haiti gets the know-how to master these new ICT technologies at every level in a dynamic manner.

We thus identified three steps.

2.1 Step1 (1998-2008)

A long term investment foundation in Haiti around wireless information technologies with ICT university partnership around MBDS degree.

Implementation of the French MBDS (www.mbds-fr.org, www.youtube.com/mbdsimagine) graduate master degree in Haïti represents the proactive long-term kernel of CCN project. It took 10 years to successfully delocalize MBDS. This MBDS graduate degree is unique in Europe by its relationship with industry which enables to prototype wireless information services of the future under industry contracts

Thus, there exists a real Haitian know-how to master new ICT technologies in Haiti due to such partnership.

Very advanced projects like wireless micro-banking, municipality and hospital management, GIS, etc. were conducted by MBDS Haiti during this period. Solutions Haïti was the local software house partner to deploy the coffee fair trade tracking system in rural Haiti

inaugurated in March 2008: a pilot WIMAX and NFC project was prototyped and deployed in CAP ROUGE close to Jacmel city, an isolated rural Haiti without water and electricity with more than 2000 school boys and girls.

2.2 Step2 (2008-2012)

A portfolio of real life m-services pilot projects in rural Haiti before deployment all over the country.

The Haitian telecommunication regulator (Conatel) decided to financially support the MBDS degree and Solutions Haïti to respectively prototype and deploy a portfolio of wireless information services in rural Haïti in 2008-2009 after the successful inauguration of Cap Rouge tele centre. Let us summarize 2 major achievements: coffee tracking with NFC and Wimax and literacy campaign using ICT.

2.2.1 Coffee tracking for fair trade in Haiti with NFC tags and Wimax

The first application deployed in Cap Rouge tele centre in March 2008 by the Imagine Institute of the university of Nice (France) concerns coffee tracking for fair trade from the local Haitian rural cooperative up to the Malongo factory in Nice (France). We deployed a WIMAX infrastructure (donated by Alcatel Lucent and VOILA an Haitian mobile operator) in Cap Rouge, a secluded rural coffee area, enabling to have high bandwidth Internet in a 20 miles circle around the telecommunication antenna. We used NFC/RFID technology to tag the coffee bags as soon as they leave the peasant cooperative.

This tracking enables first the peasants to be paid as soon as coffee bags are leaving the cooperative. Then Malongo Company can size the appropriate containers in Port of Prince and track the whole local coffee processing in dry and humid collectors. Finally, European customers thru 2D visual tags ("*flashcode*" derived from data matrix standard) could get multimedia information validating

the Haitian origin of the coffee by just taking a picture of the *flashcode* using the camera of their cell phone (free Java applet).

The “BIP” WIMAX facility is used also by two local schools of the area equipped by PC and solar energy (by Solutions Haïti) and a doctor facility.

The tele centre is used to educate teachers and peasants to help them improving their agricultural know how. This running project is visible on a Switzerland TV broadcast at (U6).

2.2.2 Mobile Internet services 2.0 and education for illiterates in Haiti, Morocco and Madagascar

In summer 2008, at MBDS in Morocco, we developed an NFC multi-touch virtual education poster to learn how to read and write in French for illiterates having a cell phone (becoming a *tutor in their pocket*) using short video-clips from celebrities acting as teachers. By touching the virtual posters users can get (on the screen or their phones) the video clips explaining the letters and the words, exercises and personal practice. See (Fadoua Hajji, 2008, U9) for a video.

We proposed a generic literacy project (OMEGA 2.0) at OIF in September 2008 for enabling a complete deployment of AL ANDALUS with two extra features of the project to fight illiteracy:

- Synchronous and asynchronous Open Source platform for remote education in rural areas with WIMAX (both for teachers and peasants);
- A mobile WEB 2.0 site for teachers, (WIKIdeas or “Face Schools”) recording and sharing good practices in developing countries in a bottom up approach (health, education, water preservation ...).

2.2.3 Haiti ICT Lessons

Following the successful WIMAX pilot project in rural Haiti launched in March 2008, decisions were taken by the Minister of Telecommunications of Haïti to provide broadband Internet in the whole country. Haïti decided to create the BIP telecommunication infrastructure with free Internet connexion to schools and public places.

Second lesson, education should represent the kernel domain of major investment to give 50% of the population a future without loosing any generation and avoiding collapse of the country (see (Diamond, 2005) for an historical perspective of Haïti danger to collapse).

The INFORMATION economy requires skills. There is no shortage of work or opportunity in the digital world, just a shortage of skills and ideas. Haiti is rich of intellectual culture and artist creativity with a syncretism religion (voodoo). What is needed is thinking skills, service skills which will fuel the future jobs. No economy can grow a 5% p.a. with a 60% illiteracy rate. Basic literacy plus entrepreneurial skills can create economic sparks! Illiteracy issues could be overcome by video and audio streams as we demonstrated it with virtual NFC multi-touch posters in the AL Andalus project (U9).

ICT Education will concern teachers, peasants and illiterates. Most of the schools do not have books. More than 50% of the population owns a cell phone. Providing M-learning and mobile Internet services is long-term economic development prerequisite. Concerning energy renewable energy will be a primary focus with solar and wind (!) potential. Extending a famous Lenin's sentence concerning Russia in 1924, we might say that **the future of Haiti** will be "*SCHOOLS + Electricity +MOBIQUITY (Mobile internet)*".

Final ICT lesson stems from the present situation of Haïti and the identified potential of ICT with a large portfolio of M-Services: M-

alerts (800 deaths in September this year after 4 hurricanes) of SIMBI project prototyped in 2008 (U8), M-government, M-ecotourism, M-health, M-learning, M- culture (*virtual Caribbean museum with Cuba*), M-payment, M-fund transfer...

As a side effect, broadband Internet paired with education should enable to develop new economic platforms like call centres and data centres anywhere in the country to support the Diasporas activity in the USA and Canada. Finally the country islands and beaches are "raw diamonds" which should be preserved from mass building and mass tourism. There exists a real potential to attract tourists from neighbouring islands (Dominican Republic, Cuba, Jamaica) to make them discover (using their cell phones as teasing tools) **Caribbean authenticity**. Ecotourism has a great potential in this preserved island and should be addressed in a strategic people development framework.

2.3 Step 3 (2012-2020)

A "moon project": A science park in South East Haiti around CASA KARIBE NOVA before 2020.

A Haitian science park around CASA CARIBE NOVA could exist within 10 years. In less than 10 years Haiti should become an ICT country leading the way in the whole Caribbean. ICT could be the pivotal kernel of a balanced global economic development of the country.

3. GNH with two 2 key contributing areas: The Mediterranean (and Caribbean) rims and 4 technical, economic and philosophical proposed coefficients to be studied

We were totally seduced by the appeal of GNH human-centrics index and metaphor putting aside the unique "money" resource to evaluate the well-being of a country; moreover in a world where recent world financial crisis demonstrated it: finance cannot be the neutral reference of progress, happiness or stability.

After looking at poverty and happiness in the digital world, we propose 4 coefficients of prime importance coming from our ICT experience in Haïti. We then propose some vision of a potential Mediterranean rim contribution to the GNH index.

3.1 “Poverty” and Happiness

Paul Collier points out, poverty is actually developing quite rapidly for about eighty percent of the world. The real crisis lies in a group of about 50 failing states, the bottom billion, whose problems defy traditional approaches to alleviating poverty (Collier, 2008).

The “capability factor” proposed by Amartya Sen (Sen, 1981) should apply to information *mobiquity*:

“Poverty is a denial of access to information” said F. Verela in his visionary speech in Haiti during the inauguration of the Casa Karibe Nova project in March 2008; therefore we propose the CUC coefficient. Poverty deals also with economic development and job creation; the CBC coefficient is attached to it. Then ecological concern should exist in a paradigm shift where *prosumers* should buy and waste in a different way: this is proposed thru the CRC coefficient. Finally poverty leads to renunciation and hopeless future; thus we need an intangible coefficient which leads to positive action and it is the CDC youth factor.

3.2 Contribution with Quantitative and qualitative coefficients for a GNH Index: CIC, CBC and CDC

We plan to conduct research on four complementary coefficients which stem from our ICT experience in Haiti: CUC, CBC, CRC and CDC

CUC: Coefficient of information (access) Ubiquity Communication

Information watershed is the symbol of speed and acceleration; ten paradigm shifts are attached to the digital era inflexion point (Gates,

2000). Future focus is on intelligence which does not need expensive physical industrial infrastructure. Meshed Wimax and Wifi networks could provide low cost communication in developing countries with free Internet access to information in school and public places. We are entering the age of the individuals and communities (2.0). Education information system is the primary target in developing and emerging countries: an extra year of complementary education makes 1.3% per capita increase. Internet is both a new continent to be explored in a balanced manner, and a globalization platform for health and education and any service development. Universities represent the first companies of the digital economy.

To “BIP” the digital economy, we need a mobile ubiquitous access to information: any where any time any how; this means the capability of delivering information and education in the cell phone: “*Mobiquity*” is the future. Developing world joins digital ecosystem via mobile phones. Mobiquity could be summarized in a very simple...*question: “TO BE connected or NOT TO BE”?*

CUC coefficient represents this capability. The portfolio and spectrum of M-services available on the cell phone then represents a great potential of people inclusion in our globalization 2.0 digital world. M-learning service will play a centre role to fight illiteracy. .

CBC: Coefficient of Business Creation

We cannot discard real economic indicator in any index evaluating “happiness” in a country. First of all people facing poverty need to survive in front of hunger as 2008 riots in poor countries sadly demonstrated it when food became a matter of financial speculation. We could prevent them by ruling out food speculation at the world level and avoiding some agricultural transformation for short term benefits (for instance agricultural oil) or meat production to meet some new standards of living in BRIC Countries.

Countries grow out of poverty when they create an economic environment that eases people and poor people to start business, create jobs, raise (micro) capital while they do not have necessarily a bank account nor being bankable. In this respect, M-microcredit services could be helpful in a future where “*bank will be in the pocket*” (the cell phone itself).

The real issue is not just employment per se, but increasingly *PRODUCTIVE EMPLOYMENT* that enables living standards to rise.

We then need to point out the CBC coefficient with CBC time and CBC Cost: Using World Bank International Finance Study (IFC) (“*Doing Business in 2004*”), it takes 2 days to start a business in Australia but 203 days to start one in Haiti; no monetary cost to start a new business in Denmark, 5 times income per capita in Cambodia and 13 times in Sierra Leone or Thailand! If we examine Credit History, then every adult in Norway, USA, New Zealand got a credit while only 1 percent of adults in Africa and Serbia.

In this respect, non-existing land property titles represent a crucial issue in Haïti and other poor countries which could be solved with a WEB 2.0 approach (like in a couple of African countries showed it): A location-based map centrics M-service could be easily prototyped and deployed.

CRC: Coefficient of “R’s” Concern: *from the 3 “R’s” to the 5”R’s”*

The Three R’s (*Reduce, Reuse Recycle*) of “*reducing*” waste (and consumption), “*reusing*” and “*recycling*” resources, waste and products is often called the “3Rs. This 3 R’s initiative deals with people ecology concern and more precisely trash or garbage processing through a coordinated mix of practices that includes source reduction, recycling (including composting, bio gas, energy production), and disposal. See WIKIPEDIA for the “waste hierarchy”.

We could enrich the 3R's by two others "R's":

- the 4th R is "RE-THINK" ; we have to rethink the whole consumerism model both in developed and developing countries, to rethink the waste model;
- the 5th one R we propose is "RE-BUILD"; in Haïti or other developing countries; digital economy to build could play a central role to REBUILD the entire economy of the country on long term values with an education and knowledge centrics approach.

CRC coefficient deals with this 4 or 5 "R's"; it represents the consciousness of the limited raw resources capabilities, the world pollution and climate change and needed concern of our planet preservation. ICT like RFID tracking could help along with providing information on CO2 consumption..

"We don't inherit the planet from our parents but borrow it from our children" said L. Senghor a great African poet.

CDC: Coefficient of Dream Collection

Finally, cultural intangible factors are of prime importance (12). Having strong culture and openness enable "to adopt and adapt" from others.

With this CDC coefficient, we would like to stress one important intangible factor among others (strategic vision of political leaders, etc...): the DREAM factor! Society with more DREAMS than MEMORIES, have a future, the same way a teenager has one compared to an old person. Forty years ago, a dreamful visionary speech ("*I have a dream*") by Martin Luther King, opens the road to a major evolution of the American society enabling a black American to become president of the USA 40 years later!

“If you can dream it you can do it”, “The American dream” founding American attractiveness are representatives of this intangible factor. Dream is the mark of life, long term life, longevity. Lack of dreams is a mark of short-term collapse. This is true in personal or collective relationship and a cornerstone of happiness.

Let us correlate in the following figure the 4 ICT indicators with the 4 pillars of GNH:

Note: CUC and CDC are everywhere due to the interrelation between HAPPINESS and INFORMATION and DREAM

GNH Pillars →	Environment Protection	Good Governance	Equitable Socio-economic development	Cultural Promotion
Coefficient ↓				
CUC	Yes (Wikideas)	Yes (m-govt)	Yes (m-tracking for fair trade...)	Yes (m-learning, literacy...)
CBC				Yes
CRC	Yes	Yes		Yes
CDC	Yes	Yes	Yes	Yes

3.3 Islam, Judaism, Christianity and Voodoo vision of “Happiness” and TIME value between Buddhism and Judeo Christianity

The TIME value is linear in the Judeo Christian world while it is cyclical in the Buddhist world, thus leading to different expectations from the future. This is an example of strong differences of value among world cultures. We plan to investigate how the Mediterranean roots could enrich the GHN Index.

Conclusion

Bhutan is a well-known example of a country where a strong political impetus does exist to develop a “*Beyond GDP society*” which is the motto of the Paradiso European project using ICT as a leverage tool.

We proposed 4 key ICT coefficients to contribute both to the GNH index and the Paradiso European project. GNH is rooted in the Buddhist notion that the ultimate purpose of life is inner happiness. Bhutan being a Buddhist country, Bhutan's King felt the responsibility to define development in terms of happiness of its people, rather than in terms of an abstract economic measurement such as GNP.

"Information" has the same property of love and happiness as said Pascal: it cannot be measured and its value comes from SHARING; there is information abundance in the future. We are entering a digital future where information is the raw resource with new promising wireless ICT platforms bringing positive values and invisible bridges. That is why we are definitively optimistic about the future per se which is part of any moral or political framework.

As said in the Paradiso report

ICT in general and "the Future Internet" in particular, can be instrumental in moving forward new societies in which social, economic and environment issues will be addressed with a stronger determination than today in order to avoid major risks of breakdowns of our societal models, and thus ensure a true sustainable future" (Torrenti, 2008)

In the era of globalization 2.0, development is a voluntary process with a top down approach for predictive technology and a bottom up approach for unpredictable m-services (and culture). Creativity for m-services is unlimited.

In a world which needs new foundations and a sound referential positive vision of the future, both GNH and Paradiso represent a global stimulating challenge; it would be a passionate goal for us to proactively contribute to GNH and bring our ICT, European and Mediterranean (including Karibe) culture and experience. The 3 ICT indicators we are proposing represent the 3 strategic dimensions of ... the «*VIRTUAL DZHONG 2.0*» of the digital future for the «e-generation».

References, Bibliography

- Collier, Paul (2008). *The Bottom Billion: Why the Poorest Countries Are Failing and What Can be Done About it*. Oxford University Press
- Diamond, Jared (2005). *Collapse: How Societies Choose to Fail or Survive*. Penguin Books
- Evans, P., Wurster, T.S. (2000). *Blown To Bits: How the New Economics of Information Transforms Strategy*. Harvard Business School Press, Boston, MA.
- Fadoua Hajji, A.Z. Belabyad, et al (2008). AL ANDALUS project on NFC Virtual multi-touch posters for literacy. *MBDS Report*. www.mbds-fr.org
- Fotouhi-Ghazvini, F., Excell, P.S., Robison, D.J. & Moeini, A. (2008). A Psycho-Pedagogical Approach to M-Learning in a Developing-World Context. *International Journal of Mobile Learning and Organisation*, 2, 1
- Fradette, M., & Michaud, S. (1998). *The Power of Corporate kinetics - Create the Self-Adapting, Self-Renewing, Instant-Action Enterprise*. Simon & Schuster.
- Friedman, Thomas (2005). *The World Is Flat: A Brief History of the Twenty-First Century*. New York: Farrar, Strauss and Giroux.
- Gates, Bill (2000). *Business @ the Speed of Thought: Succeeding in the Digital Economy*. New York: Warner Books Inc
- Grove, Andrew (1996). *Only the paranoid survive*. New York: Currency Doubleday
- Gruklke, W. (2001). *10 Lessons from the future: Tomorrow Is a Matter of Choice, Make It Yours*. Financial Times/Prentice Hall. www2.sims.berkeley.edu/research/projects/how-much-info-2003
- Landes, David. (1998). *The wealth and poverty of nations*. London: Abacus
- Lyman, George Peter (2003). *How much information*.
- Miranda, Serge (2008). *The future of ICT m-services and NFC ecosystem*. Smart University, Sophia Antipolis

- Paul, L. (2002). The advantages and disadvantages of using WAP in developing mlearning course.
http://learning.ericsson.net/mlearning2/project_one/wap_article.html.
Last Retrieved December 25, 2005.
- Pine, Il, Gilmore, James, H., & Joseph, B. (2007). *Authenticity: What Consumers Really Want*. Harvard Business School Press.
- Regis McKenna (2002). *Total access*. Boston: Harvard Business School Press.
- Sen, Amartya (1981). *Poverty and famines, an essay on entitlement and deprivation*. Oxford, UK: Clarendon Press/Oxford University Press
- Torrenti, Roger (2008). *The key role of ICT to ensure a sustainable world future*. Paradiso Report August 2008. www.paradiso-FP7.eu

URL and Videos

- U1-Open Social Foundation created in 2008 with Google.
<http://sites.google.com/a/opensocial.org/opensocial/Home>
- U2-www.uis.unesco.org, UNESCO Portal
- U3-www.wikipedia.org
- U4-www.nfcforum.org
- U5-www.wimaxforum.org
- U6-TV Report on fair trade coffee tracking in Haiti (TVSR, Switzerland, <http://www.nouvo.ch/140-3> with Interview of F. Verella and S. Miranda
- U7-TV Report on Internet in a Haitian orphan house (TVSR, Switzerland), <http://www.nouvo.ch/126-3>
- U8-Video presentations of SIMBI project for Flooding S/Hurricane MS alerts in Haïti along with location-based mapping,
www.youtube.com/watch?v=C-iYrEQyAk
- U9-Video presentation of AL ANDALUS project.
www.youtube.com/watch?v=uGeAo6BsK1o
- U10-www.huliq.com/11/69323/improving-dominican-republics-technology-hurricane-detection.

(U8) **Video presentations of SIMBI project** for Flooding S/Hurricane MS alerts in Haïti along with location-based mapping (in French)

<http://www.youtube.com/watch?v=C-iYrEQQyAk> for water captor mapping and alert generation (in French)

(U9) **Video presentation of AL ANDALUS project** (in French)
<http://www.youtube.com/watch?v=uGeAo6BsK1o>

(U10) www.huliq.com/11/69323/improving-dominican-republics-technology-hurricane-detection

