

“Assessing the opportunities and the pertinence of eHealth in developing countries”

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Table of Content

1. Does eHealth have something to offer to developing countries?	4
1.1. Health in developing countries	4
1.2. How can eHealth offer enhancement <i>vis-à-vis</i> the traditional way of addressing health problems?	5
a) Bad physical connections	5
b) Critical shortage and misallocation of health workers	6
2. eHealth activities in developing countries	10
2.1 EC projects	10
a) Directorate General Information Society and Media	10
b) Directorate General Development	11
c) Directorate General EuropeAid/External Relations-RELEX	12
2.2 Non EC projects	13
a) eCare	13
b) eTraining	14
c) eSurveillance	15
d) eGovernance	16
3. Strategic recommendations for eHealth in developing countries	18
3.1 Which kind of eHealth projects should be privileged in developing countries?	18
a) Basic problems and basic solutions	18
b) Privilege multifunction tools and existing technologies	20
3.2. Who should invest in eHealth in developing countries?	21
a) Private companies	21
b) Development agencies	22
3.3. How to proceed in the implementation of projects?	23
a) Analysing the needs and involve the actors	23
b) Paying attention to basic details	24
4. Conclusion	25
5. Bibliography	26
6. Appendices	27

Among the numerous elements contributing to individual's wellbeing, health is arguably one of the most fundamental keystones.¹ In spite of huge progress made in the area of medical research, a large part of the world population is still affected by diseases that can not be addressed, either by lack of scientific knowledge or because of financial constraints. This statement is especially accurate in economically deprived countries where some people do not have access to the most basic medical services. In many places, life expectancy is lower than 45 years whilst it is estimated at about 80 years in the European Union.² Beside the role health plays for human wellbeing, it is also a crucial factor influencing the economic prosperity of a country. In a developmental approach, investing in better healthcare in poor countries seems thus a very judicious choice.

More and more, information and communication technology (ICT) is available and can act as a catalyst for the improvement of health in all parts of the world. Even in poor countries, various initiatives tend to spread the technology among population. Connection is broadened in many municipalities and the prices of mobile phones and computers are cut to very reasonable levels. For instance, the American NGO "One Laptop per Child Association", chaired by Nicholas Negroponte, is trying to produce \$100 computers in order to provide each child with a low-cost, rugged and connected laptop with educational and joyful content.³ Similarly, the Indian government has committed to develop a revolutionary \$10 personal computer before the end of 2009 and to distribute it to millions of pupils in rural areas.⁴ Information technology has a potential role to play for bringing about effectiveness in the widening of healthcare services in deprived regions. European countries, which have an advanced knowledge basis in eHealth, could take advantage of it for coming up with innovative and efficient instruments to address some health issues in developing countries (DC).

This paper constitutes a general exploration of eHealth activities in DC. It is structured along three sections. After a first part analysing the potential of eHealth in addressing problems in developing countries, a second section draws up a non-exhaustive panorama of some practices in these countries. Finally, we end the report with a few personal recommendations regarding the kind of activities to privilege and the best way to implement them.

We conclude that eHealth programmes, at least when they have developmental purposes, should target primary healthcare and avoid complexity and inappropriateness with local needs.

¹ The author is grateful to all the persons who helped him in his work, especially the whole eHealth unit who warmly welcomed him during his 5 months internship. He thanks in particular Ilias Iakovidis and Michael Palmer for their accurate and very friendly support and advices.

² For instance, Sierra Leone, Zambia and Mozambique have an estimated life expectancy of 42 years.
<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,menuPK:476823~pagePK:64165236~piPK:64165141~theSitePK:469372,00.html>.

³ www.laptop.org.

⁴ http://www.lesoir.be/la_vie_du_net/actunet/l-inde-veut-produire-le-pc-a-2009-02-03-687791.shtml.

1. Does eHealth have something to offer to developing countries?

Before entering our analysis *stricto sensu*, we would like to make a preliminary remark on the use of the term "developing country" – we also make use of "Southern countries" – to regroup about a hundred nations around the globe in Sub-Saharan Africa, Asia and Latin America. This categorization is very restrictive and we are utterly aware of that. Within this group, some countries can be considered as economically emerging while others are suffering from endless conflicts without being able to escape extreme poverty. Furthermore, huge discrepancies exist among regions and districts within the same countries. Regarding health conditions, differences between urban and rural areas are often colossal.

Although we use the term "developing countries" for practical reasons, the reader should keep in mind that it does not represent a unique reality.

1.1. Health in developing countries

The importance of more performing healthcare systems in developing countries is a foregone conclusion. Doubtless, the biggest proportion of health problems is concentrated in southern countries and the need for health improvement is far more important there than in European nations. Low income is an obvious explanatory factor of precarious sanitary conditions as it often implies less hygienic standards and neither preventive nor curative treatments of illness. One could also point out a less favourable climate and frequent natural disasters. Finally, political upheavals and conflicts produce very large negative health outcomes because of struggles and *via* population movements, factor of disease spread.

On an economic point of view, healthy households are crucial for the prosperity of a country. A common illustration is the one of HIV/AIDS. It has been proved that the virus, in reaching also the young and productive workforce, is impacting very strongly the African socio-economic development.⁵

Families that have to care for sick members are hampered in their potentially productive initiatives. Mature females have care-giving obligations at children's expenses; these latter lack maternal care and education, leading *in fine* to a reduction of workforce quality. Additionally, households are less eager to invest in the education of their children when illness is widespread and expectations of healthy and relatively long lives are not the norm. According to Sender et al. (2005), the consequence of HIV/AIDS in terms of quality induces clearer negative effects than the aggregative quantitative change in labour supply. It is worthy noting that the effect of the disease is particularly important on women who are, in some countries such as South Africa, three times more likely to be infected by the virus. And in most countries, women are still entirely responsible for what is called the reproductive work i.e. the care of the family.

Some studies attempt to assess quantitatively the costs of disease for countries but we think that this approach does not bring about useful outcomes. In our opinion, it is not relevant to evaluate mathematically what would be the economic gains for a society of someone living twenty more years – because he is not affected by HIV/AIDS for instance – and to extrapolate this to the whole population. Estimating the cost of a life and the productivity gain achieved thanks to a longer life does not seem accurate for a few reasons. Not only are the data in developing countries very unreliable, but also the range of factors at stake and the interrelations between them are so large that it is very difficult to predict anything about how would be the economic situation of a country with a lower burden of disease. The assumptions needed are so restrictive that the estimations are

⁵ See for instance Dixon, McDonald and Roberts (2002).

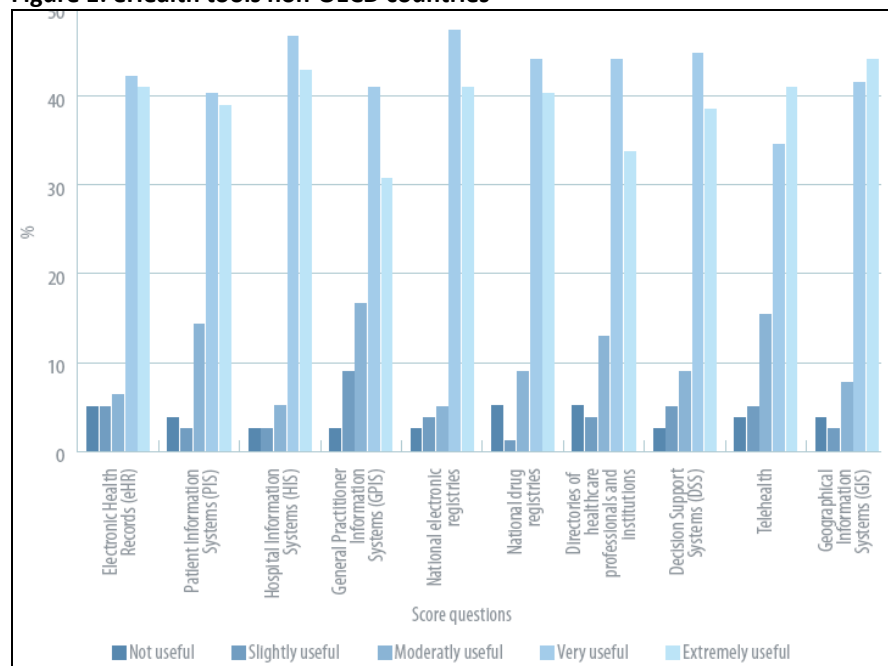
not valuable. For instance, UNAIDS evaluates that their measurement of HIV prevalence should be viewed as having an accuracy of +/- 25% (Sender et al. 2005).

In conclusion, the scale, scope and timing of the impact of diseases on the quantity and quality of labour supplied – and hence on the economic activity of a region – are extremely difficult to estimate, and will certainly be different in each country. However, there should be no doubt that this impact is large and harmful and that healthcare capacity building has to be considered as a priority in national and international policies.

1.2. How can eHealth offer enhancement *vis-à-vis* the traditional way of addressing health problems?

In 2006, the newly created Global Observatory for Health – part of the WHO – carried out a survey on the needs of States regarding eHealth services.⁶ In this context, policy makers, health workers and academics were interviewed in 96 countries about the usefulness of eHealth tools for their nation. The results for developing countries were very eloquent as over 70% of non-OECD countries estimated all eHealth tools as either very or extremely useful (see figure 1).

Figure 1: eHealth tools non-OECD countries



Source: WHO (2006a), p. 13.

Many reasons can be stressed why eHealth technologies could be welcome in developing countries. Besides the arguments often highlighted in order to promote eHealth in European countries, ICT technologies offer opportunities for addressing healthcare problems in the South, mainly in responding to a couple of broad features of most of these countries: bad physical connections and critical shortage of health workers.

a) Bad physical connections

⁶ WHO (2006a).

Most developing countries are lacking well-maintained physical communication infrastructure such as roads or railroads. Moreover, many countries are geographically vast and distances between major cities can be huge. In some cases, such as in Bolivia, Pakistan or Nepal, the relief is steep and unfavourable for building roads. In other countries, desert or dense forest area prevent the development of infrastructure. Another scenario is the conflict area where transport is restricted or dangerous, typically in the Palestinian territories (see case 1).

In all these hypothetical situations, travelling to metropolitan centres can be costly, dangerous and uncomfortable. People living in rural areas are thus somewhat locked and do not benefit from the infrastructure established in the main towns such as schools and universities, hospitals, reliable water supply, internet and mobile phone networks, etc.

For this reason, many people in the countryside are living in extremely precarious conditions, with higher risk of being affected by health problems and lower opportunities to address it. In their paper "Urban-Rural inequality in African Living Standards", Sahn and Stigel (2003) investigate about inequalities regarding wealth, education and health in Sub-Saharan Africa. Appendix I shows their results: for the health criteria, the only negative signs – meaning that urban areas are less favoured than the rural ones – are found in child mortality rate for 5 countries: Benin, Chad, Rwanda, Burundi and Zambia. Beside these specific exceptions, differences computed are very large, leading the authors to the conclusion that: *"Our major finding is that living standards in rural areas are lag far behind those in urban areas. While we expected to observe gaps, we did not anticipate such dramatic spatial differences."* (Sahn and Stifel 2003: 591)

This context creates opportunities for eHealth to provide added value compared to traditional medicine. On the condition that a remote region is connected to a telecommunication network, eHealth programmes can be implemented in isolated areas for bypassing the problems of transport infrastructures. Neither the doctor nor the patient would have to make the exhausting journey to address the medical problem.

Case 1: National Telemedicine Rehabilitation Network

Project description:

The *National Telemedicine Rehabilitation Network* in Palestine was set up in 2006 with the ultimate goal to interconnect the four national rehabilitation centres in Palestine to help them overcome the isolation caused by travel restrictions imposed upon them by the Israeli government.

The network consists of dedicated broadband lines suitable for computer and video transmission, in addition to a computer network. The objective of the project was to allow them to share information and good practices, to build collaboration between the centres and with international parties and to develop common training programmes for rehabilitation staff.

The project has been financed by the Norwegian Ministry of foreign affairs. Its implementation is the outcome of the collaboration between the Norwegian Centre for telemedicine – a WHO Collaborating Centre – and other participants such as the private companies Cisco, Tandberg and Hadara, the local telecommunication partner.

Budget: not available

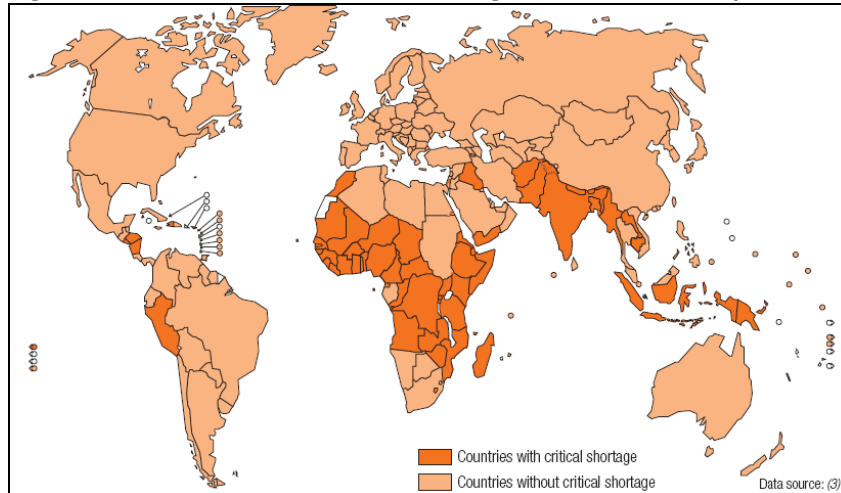
Contact: jan.hugo.olsen@telemed.no

Website: <http://www.telemed.no/national-telemedicine-rehabilitation-network-in-palestine.53475551253.html>.

b) Critical shortage and misallocation of health workers

The WHO estimates that about 4.3 million of health workers are missing around the world, predominantly in Africa and South East Asia (WHO 2006b). As shown by figure 2, poor countries are visibly more affected by the lack of medical manpower for various reasons, *inter alia*, the significant migration of doctors towards richer countries.

Figure 2: countries with a critical shortage of health service providers

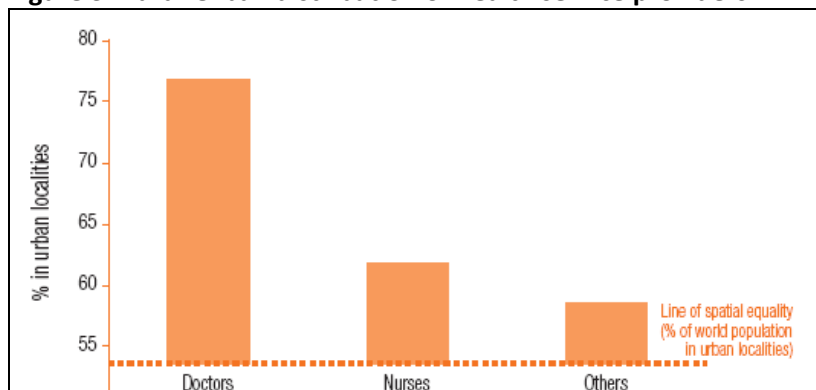


WHO (2006b), p.12.

Although there is a general problem of physician shortage, there are also huge discrepancies within countries between the main city centres and the remote areas. Doctors are reluctant to work in underserved areas for a series of motives: they can not find the comfort available in the main cities, there have less potential patients able to afford paying for health services, they have not at their disposal the satisfactory medical equipment they find in urban places, and, finally, many of them do not want to be locked far from expertise and knowledge centres, with no opportunities to update their competencies.

Statistics are impressive in some places. In Malawi, half of the physicians work in one of the four hospitals situated in the urban areas while 85% of the population is rural (Rosenberg 2008). Figure 3 presents the misallocation of health workers in the world, enlightening that the trend is particularly significant for the doctors: 75% of them are working in urban areas, while the proportion of world urban citizens is just below 55%.

Figure 3: Rural-Urban distribution of health service providers



Source: WHO (2006b), p. 9.

This lack of workers explains the concentration of health problems in rural zones. As pointed out by Sender et al., "there is a general agreement that it will not be feasible, within the next decade, for Africa to achieve a very substantial increase in the number of doctors and professional nurses". (Sender et al. 2005: 45). Therefore, one solution is to use more efficiently the available resources

The role ICT technologies can play to address this doctor constraint is threefold: firstly, eHealth programmes such as telecounselling can "make use" of the doctors living in cities for problems in the countryside. Secondly; distance learning and other related projects can break the isolation of physicians in remote areas and partly remove the disincentives to carry out medical activities there. And thirdly, eHealth can contribute to the support of auxiliary health workers, such as nurses and midwives, able to perform basic medical functions and less likely to emigrate towards cities or richer countries.

Promoting the education of nurses, the eLearning initiative in Kenya (case 2) is one of the most renowned eHealth projects in developing countries. Talking about it, the eHealth coordinator for the WHO, Yunkap Kwankam, said in a recent speech in Kumasi (Ghana):

"This costs about one-tenth of what it would have cost using traditional methods of teaching. And what is most startling is that the training will be completed in five years. Given the current capacity of the traditional system of nursing education in Kenya, it would take 150 – 200 years to accomplish the upgrading of the 22,000 nurses."

Case 2: Kenyan nurses eLearning initiative

Project description:

Kenya is one of these countries that are considerably lacking health workers. Not only are there not sufficient nurses but most of them are poorly qualified, in particular regarding new or re-emerging diseases. For instance, nurses are not trained to manage malaria which is the leading cause of child mortality in Africa. The average Kenyan child contracts malaria 4.5 times per year and more than 3,000 Kenyan children under age five die from malaria every day (doitprobono.org)! The African Medical and Research Foundation (AMREF), in close collaboration with the consulting group Accenture, implemented an innovative electronic training programme that allows upgrading, in a reasonable period of time – between 2005 and 2011 –, about 20.000 nurses from certificate to diploma level, in spite of the very restricted number of nursing instructors. The project has developed four training modules to be delivered by terrestrial technology through more than 100 eLearning centres – reaching nurses in the remotest areas of Kenya and allowing them to follow the courses anytime. This project which cost \$2.9 million to Accenture won in 2007 the ABSA healthcare award rewarding innovative, excellent and sustainable projects across Africa.

Budget: 390.000 Euros set up costs and 345.000 Euros annual running costs (including the time spent by trainee nurses to follow the courses) (PWC 2008).

Contact: petern@amrefhq.org.

Website: <http://www.amref.org/what-we-do/upgrading-20000-nurses-in-kenya>

In conclusion, ICT can help lessening the negative impacts of two aspects constraining healthcare systems in Southern countries i.e. bad physical connections and lack of health workers. However, it seems that elements hindering the implementation and the good running of eHealth applications are numerous. We develop here some key barriers.

- Lack of ICT infrastructure

Electricity, which is a crucial requirement for ICT devices, is unavailable for 75% of Sub-Saharan African inhabitants. In rural areas, this figure increases to an astounding 92% (PWC 2008). In spite of this, ICT users are increasing very quickly in developing countries. Appendices II and III show the positive penetration of mobile phones and internet in the world between 2002 and 2006. In developing countries, mobile phones have expanded impressively in four years: from 4.5% to 20.5% in Africa, from 18.9% to 53.5% in Latin America and from 10.7% to 28.1% in Asia. Regarding internet, although percentages are lower – with Asia and Africa having less than 10% of their population with such a communication access –, the enlargement of the diffusion is still relatively high.

Nevertheless, not only these figures are still far from a total cover, but also most of the phone users are living in city centres and networks are still unavailable or unreliable in most of the regions.

- Dearth of ICT technical know-how

Parallel to the lack of ICT infrastructures, many people in DC are not at all familiar with technological tools. Some countries suffer from a high illiteracy rate and very low primary and secondary school enrolment. Beside low educated people, problems of acquaintance of computer technology are also very present in medical staffs. Similarly to Europe, doctors in main hospital do not always have the technical knowledge or the willingness to learn about new technologies.

- Cultural factor

Acceptation by the actors concerned, of technological change, is a very complex matter of investigation in every human organisation. Management of change is particularly uneasy when it relates to the delicate topic of health. People can be afraid of technology and not trust new techniques. Furthermore, some places in developing countries differ in the way they consider illness and medicine. There can be for instance cultural norms preventing categories of individuals to receive a medical treatment, whatever it is related to gender bias, social status or anything else. Also, religious or supernatural beliefs can sometimes interfere in the domain of healthcare. Briefly, many cultural factors explain the rejection of modern medicine and constitute an obstacle for the implementation of eHealth activities.

Despite this non-exhaustive list of potential obstacles to the good implementation of eHealth programmes, many activities are already carried out in southern countries. The next section tries to provide with a few practical illustrations.

2. eHealth activities in developing countries

Despite the fact that eHealth is a somewhat new phenomenon in developing countries, there exists a wide range of projects in Africa, Asia and Latin America, varying strongly with regard to magnitude, budget, technologies, etc.

In this section, we review some illustrations of eHealth programmes in DC, trying to give the reader a good picture of the diversity of projects. We first look at the European Commission's activities and then at other institutions and companies. In appendix VII, we provide a more exhaustive list of currently run projects.

2.1 EC projects

During our investigations, we found that a shared vision of eHealth for developing countries does not exist within the European Commission. Projects are managed by different entities within the Commission and very few interactions and exchanges exist between them. Hence, we operate a distinction between the different involved Directorates General.

a) Directorate General Information Society and Media⁷

Despite a strong focus towards European citizens, DG INFSO manages few projects related to healthcare management in developing countries. Most of them are supervised by the eHealth unit – H1 – and target Latin American regions. See for instance Mednet (case 4) and @health and Como Estás (appendix VII).

In addition to the projects managed by H1, one project, called BEANISH, has been administered by the New Infrastructure Paradigms and Experimental Facilities unit – F4 (case 3).

Case 3: BEANISH

Project Description:

Started in 2005, Beanish, for *Building Europe Africa Collaborative Network for applying IST in health care sector*, is part of the sixth framework programme of the European Commission.

The goal of the project is basically to build a network between institutions and organisations related to the fight against HIV/AIDS in a few African countries. The interconnection would break isolation between the concerned entities and allow healthcare managers, providers and communities to share knowledge and data. Although the project targets HIV/AIDS, the concept could be easily transposed for the struggle against other diseases.

Practically, BEANISH aimed to build upon an existing network called Health Information Systems Programme – HISP – initiated in 1994 by University of Oslo researchers in collaboration with the University of Western Cape, South Africa. This collaboration had contributed to the development of an open source district based software application (called District Health Information Software – DHIS) that is used nowadays by South Africa and other African countries.

BEANISH developed a version 2 of DHIS in a fully Open Source environment based on JAVA frameworks. This second version of DHIS is currently the official system in India and will be implemented in Sierra Leone, Tanzania and Malawi this year.

⁷ http://ec.europa.eu/dgs/information_society/index_en.htm. Persons involved in international relations include thierry.devarse@ec.europa.eu for ACP countries, Fabio.nassare-de-letosa@ec.europa.eu for Latin America and alvis.ancans@ec.europa.eu for Asia.

Budget: 1.173.856 Euros / 800.000 Euros from the EC
Website: www.hisp.info
Contact: jbreaa@ifi.uio.no

Case 4: Mednet

Project Description:

Mednet is an eCare programme dedicated to the creation of a medical network that addresses the problem of providing healthcare from a distance. In regions of Brazil and Peru, databases will be created in order to store medical information and to get the opportunity of a distance diagnosis. Doctors can constantly keep track of their patient and doctors in remote areas can ask for diagnosis advices. It uses teleconsultation to acquire medical images and to store it. Then, it makes use of Amerhis, a satellite (DVB-RCS) - based communication system developed by ESA and the industry to transfer the information. Currently, all the preliminary requirements have been met and the project should start very soon.

Budget: 2.177.440eur / 1.399.403eur from EC
Website: <http://www.e-mednet.com/>
Contact: isachpaz@igd.fhg.de

b) Directorate General Development⁸

As far as we know, one single eHealth project is currently run under the supervision of the DG Development. The project is part of a wide partnership called Telemedicine Task Force, launched, among other reasons, in reaction to the important Indian investment towards satellite telemedicine in Africa.⁹

Case 5: Telemedicine Task Force

Project description:

In 2006, a workshop was held in Brussels by the EC and ESA focused on the potential of satellite telecommunication technology to strengthen health system in Africa. The telemedicine task force (TTF) was therefore set up with a mandate to elaborate a comprehensive picture of telemedicine opportunities in Africa and to formulate recommendations for future actions.

The TTF is mainly composed of representatives from the African Union Commission, the New Partnership for Africa's development (NEPAD), the World Health Organisation (WHO), the EC and the ESA.

They launched a call for a project piloting the first phase of building an eHealth network for the entire continent. The project should last 18 months and start at the end of 2008. The project should

⁸http://ec.europa.eu/development/index_en.cfm. Two persons are involved in the eHealth area: ondrej.simek@ec.europa.eu and harry.de-backer@ec.europa.eu.

⁹ India started signing since 2005 agreements with a large number of African countries planning to devote \$1 billion in a pan-African eNetwork satellite project, in partnership with the African Union. This should allow India to sell more telecommunication equipments and services to Africa. The project will include the installation of Very Small Aperture Terminal (VSAT) used, *inter alia*, for telemedicine activities in rural areas.

focus on connecting some isolated areas in Sub-Saharan Africa to medical centres of excellence with the aim of providing both education and clinical services. The network being built up for the short term action should form the core of a future large network.

The pilot project has thus a twofold aim:

- Offering continuing professional education *via* satellite to health workers in selected remote areas by scaling up African initiatives thanks to the use of satellite technology.
- For some areas, implement a satellite-based clinical service to support health workers in establishing a communication between these areas and centres of excellence.

Budget: 500.000 Euros

Website: <http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=28163>

Contact: Giorgio.parentemla@esa.int

c) Directorate General EuropeAid/External Relations-RELEX¹⁰

DG AIDCO has supervised eHealth projects in South America and in Asia. In 2001, they launched the @lis programme for a total budget of about 77.5 million Euros (63.5 million from the EC). The programme aimed at reinforcing the partnership between the European Union and Latin America in the field of information technology. eHealth was one of the four areas targeted by the programme. In the first phase of @lis, four projects were directly related to healthcare management. These were all "demonstration projects" and were supposed to become self-sufficient after the financing period. According to the independent assessment realised afterwards by experts from "Gruppo Soges", the four e-health projects got the best assessment out of the 19 projects, with an average of 3.99/5 (European Commission 2008). The projects received particular good marks in relevance, design, effectiveness and impact (see appendix IV). It is also emphasised that some projects, among which HfaLA (see case 6) were success story regarding synergies. Despite this positive assessment, in the second phase of @lis, the budget has been drastically reduced and no more projects are currently related to e-health.

Case 6: Health for all in Latin America (HfaLA)

Project description

The project is related to the reforms that were implemented in many Latin American countries regarding their health care system. As part of this reform, primary care services are increasingly treated through a family-oriented model of health care. A "family Care Team" composed at least of a doctor or a nurse, operates autonomously and is integrated in the local community. This decentralised model seems to be the most pertinent given the large expands of land and the diversity of population characteristic to Latin America rural regions. However, it suffers from the difficulty for the staff to keep up-to-date in terms of professional and managerial skills.

In this context, the goal of the project is to strengthen the capability of Family Care Teams, initially in the regions where the demonstration takes place, and subsequently in whole territory of the participating countries. To achieve this objective, HfaLA will implement and operate eLearning services aimed at the Continuous Professional Development of Family Care Teams in three demonstration sites: Brazil (State of Bahia and Minas Gerais), in Chile (Region of Santiago) and Bolivia

¹⁰ http://ec.europa.eu/europeaid/index_fr.htm and http://ec.europa.eu/dgs/external_relations/index_en.htm. One of the persons in charge of Latin American projects is Antonio.fontelles@ec.europa.eu.

(District of Potosi). These eLearning services will be compatible with the level of communication networks available in the field, learner-centred and aim to be economically sustainable beyond the end of the EU co-funding.

Budget: 2.812.482 Euros / 2.249.986 Euros from EC

Website: <http://www.healthinlatinamerica.org>

Contact: petrangeli@antropologiamedica.it

2.2 Non EC projects

In order to provide the reader with a great variety of projects, this section is structured along the four types of eHealth activities that are utilised in Mitchell (1999): eCare, eLearning, eSurveillance and eGovernance. For each category, we briefly explain what it refers to and we illustrate by one or two concrete cases.

a) eCare

eCare is a very broad category that includes a huge range of services using ICT in order to improve the provision of healthcare to individuals. It can be considered as a synonym of telemedicine considered in a narrow sense. eCare incorporates primarily the access for health workers or patients to expert's advices across distances. It can also consist in a remote monitoring of individuals, in an electronically assisted health assessment, etc.

The provision of remote second opinion is a very widespread use of IT technologies for healthcare in developing countries. Almost every country is part of some telecounselling or teleconsultation programmes, whatever it is already implemented or planned.¹¹ Different kinds of organisations are running small-scale/pilot eCare projects. Communication between the two involved persons can be reached via internet, mobile phone or satellite depending on the availability of technology.

Case 7: Swinfen Charitable Trust

Project description:

The Swinfen Charitable Trust is playing as a link between developing countries hospitals and medical specialists in developed countries. 127 hospitals in the 34 countries were equipped to receive medical advices from more than 400 medical specialists in Europe. Local doctors can send clinical photos, patient's history and other relevant material to the Trust. A web-based messaging system is then used to transfer the case to the most relevant specialists in a wide range of disciplines. The Trust is mainly active in Asia, in particular in Nepal, Bangladesh and Iraq. The communication is done with modem and the local telephone systems. In only one case, it uses solar powered satellite phone. The cost of setting up a telemedical link depends on the large extent on the travel involved and can vary between £250 and £3000. The trust's budget being limited, they claim that their first achievement is the demonstration that cost-effective telemedical support can be provided to doctors in developing countries using relatively simple techniques.

¹¹ We use the terms teleconsultation and telecounselling to refer to a communication between a health worker and respectively a patient and another health worker.

Budget: between 280 and 3350 Euros per link.
Website: <http://www.swinfencharitabletrust.org>
Contact: swinfencharitabletrust@btinternet.com

Case 8: Balistan Health and Education Foundation

Project description:

Balistan is an economically deprived region situated in the northern area of Pakistan. The Balistan Health and Education Foundation has set up, with the technical support of COMSATS – an international technology transfer organisation of Muslim countries – a telehealth facility linking the major hospital in Balistan (Skardu) with the medical specialists available in Islamabad (800km from Skardu). The project required to connect the area via satellite connection to an Internet provider. The service was advertised throughout Baltistan via TV & local radio, and has been utilised by 4000 patients by now.

Its budget, financed by IRDC – a Canadian development organisation – was about \$100.000 to set it up and another \$100.000 for training and running costs for 3 years. By now, the running cost is \$3-\$5 per patient, which can be paid by welfare fund. The main constraint is the \$ 2,000 per month alone for satellite connectivity, which could come down considerably with the use of optic-fibre cable connection. Besides, they are currently exploring the opportunity of mobile phone with in-built camera and GPRS/EDGE connection. Phone connections for 24-hours medical-helpline services is already used for first-aid information, clinical advice to midwives and other para-medics, and linking local transport services in case of emergencies

In addition to this core activity, the Balistan Health and Education Foundation will soon test a prototype developed by Phd's in Islamabad consisting in distant pre-natal examination/monitoring of women living in rural areas. This service would work through sensory equipment handled by local midwives linked through hand-held devices (PDA/smart-mobile phones) to servers at the Gynaecology Department at the district hospital for risk assessment and advice. This specific project is financed by the North American NGO "Human Development Foundation" and by the Ministry of ICT in Pakistan.

Budget: 75000 Euros for setting up and 75000 Euros for 3 years running costs.

Website: <http://www.baltistanhospital.org/>

Contact: bhef@comsats.net.pk and muddassar.farooq@nu.edu.pk for prenatal examination.

b) eTraining

eTraining, the use of ICT technology for sharing and acquiring health knowledge, is also widespread in developing countries. It can take different forms, mainly interactive medical courses from a distance and the access to scientific and medical literature. Other activities include distance scientific conferences, seminars, workshops and live broadcasting of surgical procedures. In most of the cases, the communication is made through internet but there exist projects using mobile phones (see for instance the Dimagi project in Appendix V).

A well-designed eLearning project can bring about advantages in terms of efficiency and cost but most importantly in terms of flexibility. In countries where the health workers are scarce, it is very accurate to offer them the opportunity to study at their place, at their pace and under flexitime scheme.

Beside the illustration of eLearning in Kenya, outlined above (see case 2), another well-known example in Sub-Saharan Africa is the *Réseau en Afrique francophone pour la télémédecine* (case 9).

Case 9: RAFT

Project description:

The RAFT network (*Réseau en Afrique francophone pour la télémédecine*) was begun in 2000 in Mali. Although it provides also telecounselling, its core activity is to allow physicians who are working far from expertise centres, to follow continuous training and access numerical libraries through internet. The network, currently made up of fifteen countries, is quickly expanding and provides training in French, English and soon in Arabic. 70% of the interactive training is a South-South exchange i.e. lessons are produced by African doctors for African doctors. Because of internet availability, the eTraining is mainly targeting main cities hospitals although RAFT has the ambition to interconnect the districts hospitals as well. Every week, up to forty computers are simultaneously connected to the lessons, meaning hundreds to thousands people learning.

For remote areas, pilot projects have been launched – in Mali and Mauritania – with the use of satellite but the costs of the spreading of such technique would require a colossal budget. RAFT has an annual budget of about 200.000 Euros, brought mainly by the City of Geneva and a few private foundations.

Budget: 200.000 Euros per year

Website: <http://raft.hcuge.ch/>

Contact: Antoine.Geissbuhler@hcuge.ch

c) eSurveillance

eSurveillance is mainly working thanks to the use of satellite technology. Satellites can be used to observe meteorological and environmental features that impact the health situation of a specific region. Some disease patterns are closely related to climate conditions, Malaria for instance. Hence, satellite can be of great use to predict the spread of disease, the risk of outbreaks and allow the authorities to take more effective preventive actions. Many examples are available from developing countries: satellites are used in Nigeria to observe the geographical drivers related to Malaria risk in order to enable more effective distribution of health resources to combat the disease (see case 10). Similarly, some African countries use satellite technology to prevent the countries against the invasion of migratory locusts and the underlying devastation of agricultural production. In Europe, ESA and Medes have developed the Satellite for health early warning and for epidemiology (SAFE), aiming at a more efficient response to health disasters thanks to the use of satellite.¹² Although the project has never been implemented in developing countries, it could be an interesting tool for humanitarian affairs.

¹² For more information, see http://www.medes.fr/home_fr/telemedecine/teleepidemiologie/safe.html.

Case 10: Nigeria Malaria Surveillance Programme

Project description:

The National Malaria Control Programme is a vast project managed by the federal ministry of health in Nigeria. Among their numerous actions aiming at halving the burden of malaria by the year 2010, the Ministry is now collaborating with the Nigerian National Space Research and Development Agency to use space technology to evaluate and monitor malaria outbreaks.

The programme uses Nigerian satellite capacity to monitor climate and earth conditions which influence the spread of the disease across Nigeria throughout the year. This satellite information is completed by surveys of infected areas. Linking data on climate, temperature and disease pattern can help provide both real-time and projected understanding of the disease features and enable an efficient use of the resources for the prevention and the fight against this scourge (PWC 2008).

Because the programme is only at an embryonic stage, it is difficult to estimate the budget that represents this monitoring strategy for Nigeria.

Budget: not available

Website: <http://nmcpnigeria.org>

Contact: info@nmcpnigeria.org

d) eGovernance

There has been much recent interest in services that offer to manage individual's healthcare records in electronic form, in particular with the attention media paid to systems such as Microsoft HealthVault and Google Health.¹³ Broadly speaking, eGovernance refers to the gathering and the management of health data in order to improve the coordination of health systems. These latter are often weak in developing countries and ICT can therefore provide beneficial outcomes in terms of healthcare efficiency. In practice, projects of data management are very diverse, from the basic networking/sharing of data (see case 1 or 3) to the implementation of a fully integrated electronic health record –EHR – system (case 12).

Although the use of IT technology is clearly beneficial for the national authorities to address the real problems with the right policies, it is a challenge to find an accurate equilibrium between the benefits and disadvantages of a great centralisation of data.

TRACnet and Dight programmes below (Case 11 and 12) show two very different illustrations of eGovernance.

Case 11: from TRACnet to phone for health

Project description:

TRACnet is an innovative solution built by Voxiva – an American based company - and implemented by TRAC (Treatment and Research AIDS Centre), an institution of the Health Ministry of Rwanda. The system uses mobile phone in order to collect, store, retrieve, display and disseminate critical programme information as well as to manage drug distribution and patient information related to the care and treatment of HIV/AIDS.

¹³ For more information, see www.healthvault.com and www.google.com/health.

The government of Rwanda is leading an ambitious programme of taking charge of the HIV infected people living in the territory. In order to facilitate the management of this huge programme, TRACnet project allows health workers in the field to use mobile phone equipped with a downloadable application to enter health data. Once entered, the data are transferred *via* a packet based mobile connection (GPRS) into a central database. If GPRS is not available, the software can use a SMS data channel to transmit the information. The data is then mapped and analyzed by the system, and is immediately available to health authorities at multiple levels via the web. Health workers are also able to use the system to order medicine, send alerts, download treatment guidelines, training materials and access other appropriate information.

The system has been used during 3 years in Rwanda to manage the country's HIV/AIDS programme. It is now scaling up, under the denomination "phone for health". Phone for health is a \$10 millions public-private partnership that should strengthen health system and fight HIV/AIDS in ten African countries. It is also likely to be extended further in Africa and Asia to address tuberculosis and malaria.

The main partners to the project are Voxiva Inc., PEPFAR, MTN (the leading mobile operator in Africa), the GSM Association's Development Fund (representing more than 700 mobile operators), Motorola, and Accenture Development Partnership.

Budget: 1.6 million Euros for TRACnet and 8 million Euros for phone for health

Website: www.tracnet.rw

Contact: mkraz@umich.edu

Case 12: DIGHT

Project description:

DIGHT (Distributed Information store for Global Healthcare Technology) is a project that started in early 2009. It is designed to build a prototype/demonstrator of an EHR system for the citizens of India that will meet the requirements of scalability (to handle over 1 billion accounts), reliability and security. The system should be performing even in the presence of faults in the network or under the high loads of demand arising in emergency situations. The goal of the project is only to demonstrate that the feasibility of such a system being rolled out would necessitate a much larger follow-up project.

The programme will embrace both open-source technology and open standards to ensure that information is managed and secured in an accountable and transparent manner.

The budget of the project is 4 million Euros on the Swedish side, over 3 years. It is not clear yet what is the part brought by India. The project partners are SICS (Swedish institute of Computer Science) and the Indian Centre for Development of Advanced Computing (C-DAC).

Budget: 4 million Euros on the Swedish side + X million from India (not available yet)

Website: <http://dight.sics.se>

Contact: jdowling@sics.se

Having a better picture of the wide range of activities currently carried out in developing countries, we now turn to the last part of our study in which we attempt to provide the reader with recommendations *vis-à-vis* the implementation of eHealth projects in economically deprived regions of the world.

3. Strategic recommendations for eHealth in developing countries

Investing in eHealth programmes in developing countries, whatever it is from private or public funds, is a demanding activity. Many factors should be considered before launching a project abroad. Along three questions – what, who and how? –, we try to provide the reader with a personal opinion built thanks to discussions shared with field workers and other involved people.

3.1 Which kind of eHealth projects should be privileged in developing countries?

It is impossible to answer the question whether one category of eHealth applications – eCare, eLearning, eSurveillance and eGovernance – should be preferred to the others. Indeed, the answer entirely depends on the specific context of the region involved. Every place has its own needs and obstacles and recommending a particular fool-proof n always preferable activity – a sort of health panacea – would be a great mistake.

The most popular way to compare different candidate programmes is the Cost-Benefits Analysis. This latter can be carried out in a specific region in order to compare the expected outcomes of different potential projects, selecting eventually the one with the greatest outcome. However, this method suffers from many weaknesses and we consider it is not a very convenient analysis, among other reasons because the social impact of projects is very difficult to value monetarily. At the very least, such a study should be completed by an investigation among the stakeholders engaged in the field.

Although projects have to address local needs and to take into account the specific local challenges, some general elements can still be highlighted to encourage a reflection about eHealth in developing countries.

a) Basic problems and basic solutions

The first thing that seems to be crucial to bear in mind is that the very majority of health problems in deprived countries, especially in rural areas, are due to a lack of basic infrastructure and daily habits. Following conversations with fieldworkers, it seems that the solutions addressing most of health problems are simple and economically reasonable compared to some eHealth applications.

In a study of the National Geographic, it appears that most of the problems are related to water, nutrition and environment and that lightly qualified health agents can resolve 80% of the sanitary problems in a village.¹⁴ Curative treatment is not a sustainable solution for poor people and the stress should be firstly placed on preventive medicine. Health problems should be combated at the root, i.e. managing to get the basic preconditions in infrastructure and education.

Regarding infrastructure, the illustration of water is enlightening: as long as potable water is not available in villages, it does not seem opportune to set up an expensive curative system fighting diarrhoea. In Burkina Faso, it is estimated that with a thousand drillings – 9500 Euros per drilling –, most of the population would enjoy access to water.¹⁵ Another example could be related to the need of a sufficient electricity supply to keep fresh products in a refrigerated place.

Beside infrastructures, education plays a major role in the health situation in rural areas. Investing in a primary education for all children produces large outcomes towards a better health. Education – in particular health education and promotion – can raise awareness about the risk of non-hygienic habits and dangerous behaviour such as having free sex; it can lead to changes in the perception some people still have of the medical practices. As long as people consider getting sick as a divine punishment, ICT for health will not produce any expected outcome. In addition, better education can

¹⁴ Rosenberg (2008).

¹⁵ Cerexhe (2009).

lead to a change in the perception of women in society and impact considerably the health situation in remote villages. In many places around the world, gender relations are still shaping the healthcare in an unfavourable way for women. Not only do sick women often not receive any treatment or any care but also power struggles alongside the gender division can lead to disseminate disease, the clearest example being HIV/AIDS which is spread because of sexual aggression or just because of the impossibility for women to impose the use of condoms.

In brief, our recommendation would be to realise that infrastructure targeting primary healthcare and addressing the most urgent needs are to be privileged to white elephant projects using complex and impressive systems which are eventually inadequate. The project should have a limited scope and aim at reasonable but useful goals. Also, education, whether it is targeting physicians, nurses, family members or children, should be considered as an "easy" and efficient way towards a better health situation. Nurses and other health workers within villages are playing a crucial role. Unfortunately, they are scarce and often very unqualified.

This vindication of simple projects does not mean that ICT should not be used and that no eHealth project should be carried out in developing countries. In the previous sections, we have highlighted some programmes that are perfectly compatible with our recommendation. The idea lying behind the eLearning programme "Health for all in Latin America" (case 6) the Kenyan nurses eTraining (case 2) are for instance good illustrations of projects designed to address, without complexity, a crucial need for the countries involved. Beside eLearning projects, other eHealth initiatives are specifically targeting primary health care. It is the case of the project financed in Ghana by the Novartis Foundation in the framework of the Millennium Villages Projects – MVP (case 13).

Case 13: Millennium Villages and mobile telemedicine in Ghana

Project description:

Millennium Village project is a new approach for fighting extreme poverty. The concept is to target the "poorest of the poor, village by village throughout Africa, in partnership with government and other committed stakeholders, providing affordable and science-based solutions to help people lift themselves out of extreme poverty." ¹⁶

Novartis Foundation for Sustainable Development¹⁷ decided to invest in an eHealth pilot project in Bonsaaso, a village cluster selected from the Millennium Villages, in order to increase access to and quality of primary health care for poor people living in this underserved area. In collaboration with Ericsson, Medgate¹⁸ and other organisations, Novartis plans to develop a Telemedical Consultation Centre with specially trained health professionals. Ericsson committed to provide its expertise and technological infrastructure and to firstly develop, with the African operator Zain, full network coverage until fall 2009.

The project combines two approaches: to connect health community workers through mobile phones with their peers for informal and semi-structured counselling (mHealth concept). This will help mobilize the community around the project. The complementary approach, a Telemedical Consultation Centre (TCC concept) will be set up in Kumasi, a large city in Ghana in order to offer a systematic and sustainable high quality teleconsultation services for all health professionals involved along the referral chain, from the village up to tertiary referral centres.

¹⁶ <http://www.unmillenniumproject.org/mv/index.htm>

¹⁷ <http://www.novartisfoundation.org>

¹⁸ Medgate is a company based in Basel (<http://www.medgate.ch>) running the Swiss Centre for Telemedicine, treating up to 2000 teleconsultations a day by telephone, internet, videoconferencing and biodata monitoring.

Particular attention is paid to four crucial elements of sustainability: a) targeting primary health problems, b) developing a self-supporting business model in the long run, c) involving the local communities in the whole project process and d) getting the commitment of the Ghanaian authorities to participate in the implementation and the scaling up of the project.

Website: http://www.millenniumvillages.org/aboutmv/mv_bonsaaso.htm

Contact: martin.denz@medgate.ch

b) Privilege multifunction tools and existing technologies

In the same line as the necessity to privilege simple projects, two other recommendations are related to the choice of the technology used for the programme.

Firstly, it seems that in many cases, money is spent in pilot projects dedicated to test technologies that have already been tested by others and for which it is known that it is working. In addition, it is usual that no budget can be found for the deployment and the programme stays jammed at the pilot phase. Hence, we could recommend taking into consideration the already large number of "good practices" in developing countries in order to avoid trials of similar technologies by different actors. Also, launching pilot projects should not be achieved without a larger business plan which considers at least some tracks for the project to be scaled up in case of pilot success.

Secondly, the tools and networks required for the programme should, as much as possible, offer other daily functionalities. We have seen examples of eHealth programmes based on mobile phones. Others are simply using computers when internet is available. In most of the rural areas, none of these telecommunication services are available and the use of satellite is required. Setting up a satellite communication for a sole telemedicine project will be very costly and hardly sustainable. In the case of satellite telecommunications, it is important to maximize the use of the dish with as many other services as possible.

The pertinence of satellite communication for eHealth use can still be debated. It is not clear whether satellite is a sustainable solution for eHealth applications. Indeed, the cost of such telecommunication is very high even though it seems that it could be reduced drastically in a near future.¹⁹ To have an idea, PWC (2008) estimates the current costs of a ground station between 3000 and 4500 Euros and the cost of a year connection at 3600 Euros for internet access. For short term projects, the use of satellites can be claimed as many areas are totally deprived of any type of connection. However, in this short run, prices of satellite connection are expensive and in the longer term, even reduced, operating costs would always be more expensive than broadband and mobile phone connections. Large operating costs create a risk of non-sustainability and of impossibility to scale up projects. In a certain way, investments in mobile phone or internet networks could be considered as preconditions for sustainable eHealth programmes in deserved regions. For the whole Africa, the World Bank estimates that the extension of the mobile phone network and universal broadband are respectively of \$3.5 billions and \$6 billions.²⁰ These figures are colossal but still, reaching an almost universal access to mobile phone and internet is not unconceivable in the mid-term.

¹⁹ PWC (2008) provides the examples of O3b networks, a new satellite venture, that is planning a constellation of 16 satellites providing internet connectivity to developing countries in Asia and Africa. It plans to charge \$500 per month per Megabit to telecoms operators while this is currently charged \$4000. this should lead to significant reduction of the operating costs of satellite.

²⁰ World Bank (2008), found in PWC (2008).

3.2. Who should invest in eHealth in developing countries?

Many actors could invest in eHealth in developing countries. We mainly distinguish between private technology companies and development organisations such as the cooperation agencies in Europe and other international groups like the WHO, UNAIDS, etc. We also pinpoint a scenario of investment for the European Commission in particular (see in the box below).

a) Private companies

European companies have a strong research base in eHealth and we think that for both ethical and strategic reasons, these technologies should be shared in partnerships with developing countries.

On the ethical point of view, we believe research and development should be framed in order to place the human welfare at the centre of the evolution. Without denying the usefulness of Western-focused research in ICT for health, we think that it is a moral duty to share our knowledge with more deprived parts of the world. The problems we are confronted with in Europe are from a very different scale compared to the burden of disease in developing countries.

On a strategic point of view, there can be mutual benefits arising through cooperation between Europe and developing countries. In our fast-changing world, the traditional occidental markets are permanently shrinking relatively to the world demand. Companies should bear in mind that 81% of the globe population is living in developing countries and, according to United Nations estimates, this figure will raise to 86% in 2050.²¹ Companies can no longer neglect the opportunities that represent these markets.

Still, it seems necessary to differentiate among the regions in the South; a distinction should be made with a criterion of profitability for companies.

On the one hand, some countries in South America and Asia – a few in Sub-Saharan Africa – are characterised by an average income per head which is sufficient for launching projects without any public support. Agfa healthcare evaluates that the eHealth market in Latin America was about \$1.7 million in 2006 (see appendix VI). As people are able to pay for services they judge useful, many kinds of projects can lead to a positive return on investment if they are targeting real needs. In such scenario, companies should have no doubt entering the market as soon as possible because the competition with the United States and emerging markets is already very tough. In particular, China and India are omnipresent in the IT sector. One example among others is the launch by China, in January 2009, of the Venezuelan Satellite "Simon Bolivar" in order to start programmes of education and telemedicine.²²

On the other hand, in most developing countries, citizens do not have sufficient incomes for purchasing eHealth services and social security systems are hardly sufficiently funded for reimbursing them. In this context, eHealth programmes would rather provide a great societal impact than with private returns. The question of investing in eHealth infrastructure becomes here more complicated because private companies will be reluctant to invest in such programme.

Despite the lack of short-term profit opportunities, we still believe European companies could involve in such countries for strategic reasons. Whatever their budget is coming from a corporate social responsibility fund or from a long term strategy budget, companies should invest in eHealth project in the most deprived countries to allow them to enter future large markets and to place a brand, a standard or a technology in a privileged position *vis-à-vis* the competitors. As we said earlier, china and India are already very active in the eHealth sector in developing countries. Without a reaction of European companies, these markets will be lost for the future. Launching programmes

²¹ <http://www.un.org/News/Press/docs/2005/pop918.doc.htm>.

²² <http://edition.cnn.com/2008/TECH/space/10/30/venezuela.satellite/index.html>.

would lead to a future demand for products as well as for technical advices. It can also provide the company with a complementary know-how. For instance, getting experience in eHealth applications in remote areas could provide with a competitive advantage in potential situation of natural catastrophe in Europe. Some companies are also testing new technologies in DC arguing that while European decision makers are often reluctant to such projects, people in southern countries welcome them. Finally, on a marketing point of view, investing in projects in poor regions can be used to promote the image of the company in Occidental countries.

In such non-profitable scenario, companies could be asking for financial support from public bodies in order to share the burden of the investment. However, this solution has to be carefully analysed. We think it would make sense for companies investing abroad to get support from some research fund at a national or European level. Indeed, in the long term perspective, the outcome for the industry would be positive. Moreover, as diseases do not respect borders, it is in every country's interest to care about preventing and combating contagious sickness, even outside its territory. For companies, the presence of public support does not only mean the sharing of the investing costs, but also the diminution of the political risks that exists in many developing countries. It would provide a greater degree of certainty with regard to fair competition, rules of law, etc. Although we would plead for public support from research resources, we consider that international entities specifically funded for development cooperation should be very careful before accepting to finance eHealth projects, even along public-private partnership. This opinion is explained in the next paragraph.

b) Development agencies

There is no doubt that eHealth services would be beneficial for people living in developing countries. National, European and international public bodies could intervene and finance such projects because from a global point of view, the human and economic impacts of such health programme would definitely be positive. Moreover, eHealth infrastructures could be from great use in order to reach international commitments for development such as the Millennium Development Goals (MDGs).²³ It is worthy noting that out of the eight MDGs, three are directly related to health: reduce child mortality, improve maternal health and combat HIV/AIDS and other diseases (Goals 4, 5 and 6). Arguably, other goals such as the end of poverty and hunger are also intimately linked with the problem of health. eHealth could definitely play a role in the fulfilment of these development goals and international development organisations in the European Union and other rich countries should consider this option for reaching these objectives.

Nevertheless, most of the specialists agree that, as many other big development plans in the past, the commitment made in 2000 will be far from full achievement. The reality of the international cooperation is such that the budget allocated to it is extremely limited with regards to the needs. The trends should not be reversed in the current context of economic crisis. Hence, public money should be spent very carefully in the most beneficial activities. As we have discussed earlier, it seems that the most urgent needs in terms of health in remote areas are related to very primary healthcare, basic infrastructure and education. Except if it eases achievements in these fields, ICT for health programmes should not be a priority for cooperation bodies. Every project should be carefully analysed and focus, not on technology but on needs and processes.

c) The European Commission

²³ The Millennium Development Goals constitute a strategic international commitment agreed by all the world countries in September 2000. See www.un.org/millenniumgoals.

With regard to sections a) and b), the case of the European Commission is interesting. Indeed, the organisation includes R&D as well as cooperation-focused Directions General. We believe that a good collaboration between the different entities and the intermingling of competencies and resources could lead to largely positive outcomes.

On the one hand, DGs INFSO and RTD²⁴ have at their disposal financial mechanisms dedicated to research, some of them aiming explicitly at collaborations with developing countries. It is the case of SICA – Specific International Cooperation Action – which has been set up in the 7th Framework programme in order to encourage such projects. INFSO and RTD are also in permanent contact with private companies – in our case health and ICT companies – and are used to manage public-private partnerships with them.

On the other hand, these two DGs might be lacking expertise and vocation regarding the follow-up of projects in developing countries. DGs AIDCO, DEV and RELEX, without investing their scarce financial resources in eHealth projects, could participate in the good implementation of programmes by providing their knowledge of developing countries and their contacts there. Involving cooperation DGs would allow a better approach of developing countries and create opportunities to deal directly with local representatives.

In conclusion, we believe that association can be strongly value-enhancing. However, for partnership to be efficient, someone should be in charge of the coordination between the various entities. We believe we could play this role, given our good knowledge of eHealth research at the Commission and our background and interest in development studies.

3.3. How to proceed in the implementation of projects?

a) Analysing the needs and involve the actors

The first and most important recommendation related to the designing of projects is the investigation of region's needs and specific constraints. To do this, fieldworkers should imperatively be consulted.

In particular, it is important to involve all the actors in the project to assure its sustainability. Appropriate use of ICT in developing countries will eventually depend on local participation, especially in cases where the project coordinators are established in European countries.

In the context of eHealth, some fieldworkers argue for the involvement of young physicians in the programme rather than older ones. Indeed, the motivations and openness to new technologies are often greater for freshly graded doctors. Moreover, doctors in such countries are often overwhelmed by the load of work and do not have much time to involve in eHealth projects. As far as possible, the implementation of the programme should not last too long before the actual working of the system in order to avoid a loss of motivation.

European agents should also carefully deal with the public authorities of the region (or the country) in order to create a leadership from the authorities. From discussions with concerned people, it came out that policy constraints and inappropriate legal framework are one of the main reasons for the failure of new technology projects. Getting support from national or regional authorities is hence clearly a pledge of sustainability. In a developmental perspective, dealing with authorities allows health policy coherence for the region or the country. The project should be imperatively embedded in the existing health structure. In many cases, donors have their own priorities and programmes, resulting finally in overlaps and distortions of the national health systems (Sender et al. 2005).

²⁴ RTD is the main DG in charge of Research and Development programmes at the European Commission.

b) Paying attention to basic details

Given contextual differences – regarding infrastructure, culture, economy, etc. -, European solutions and know-how need to be sensitively reworked and appropriately translated to the specific environment of the region concerned. All the details should be taken into account, from the most complex - as the accuracy *vis-à-vis* the legislation – to the most basic. For instance, nothing can be assumed regarding IT knowledge. Many people do not have any idea of how to switch on a computer. Even simple project should be combined with IT training.

Also, projects should also take into consideration the potential lack of basic infrastructure such as electricity power.

In short, numerous features that could be assumed in Europe should be questioned in the designing of eHealth programmes.

4. Conclusion

In this paper, we have attempted to give the reader a fair idea of the eHealth activities that are currently run in Asia, Africa and Latin America and to provide a few personal recommendations about the opportunities and the threats related to such businesses.

Except for private companies having specific trial objectives, eHealth programmes should focus on needs and process rather than on technology. Although there exist huge gaps of healthcare capacities among developing countries and regions, we have highlighted that the large majority of health requirements in developing countries, and particularly in rural areas, are basic and do not require complex instruments. In some cases, ICT can bring about more efficiency in the provision of the basic needs for better health. It seems to be the case for instance of eLearning programmes and of some well-designed telemedicine projects targeting primary healthcare and using cheap communication networks.

In a scenario where needs would have been analysed and ICT would be likely to be value added *vis-à-vis* traditional instrument, eHealth programmes could be envisaged under a few *sine qua non* conditions for sustainability.

- In opposition to what is often carried out nowadays, the programme should have a wider perspective than the sole pilot project. Conceiving a self-supporting business plan seems to be a criterion for sustainability. This condition seems easier to meet when cheap and multifunction technologies are privileged.
- Prior to the implementation of the project, all preliminary requirements should be met: not only a reliable communication network but also basic infrastructures such as electricity power. Maintenance costs should be taken into account for the infrastructure to keep working.
- The project should be as much as possible integrated within the current health system and not replace it or work independently. All stakeholders should be involved in the design, implementation and assessment of the programme. An adapted training should be set up for all implicated persons. Importantly too, getting support from local and/or national authorities seems to be of primary importance for legal and institutional matters.

ICT offer huge opportunities that should be shared with the neediest persons. However, the temptation is huge to transfer our technology without any considerations for local needs and obstacles specific to the place concerned. This would be a great mistake, leading to a waste of money, whatever it comes from private fund or, maybe worse, from cooperation budget.

5. Bibliography

- CEREXHE, E. (2009), "J'avais soif et vous m'avez donné à boire", *La Libre Belgique*, 5 February 2009.
- DIXON, S., McDONALD, S., ROBERTS, J. (2002), "The Impact of HIV and AIDS on Africa's Economic Development", *BMJ*, 324(7331), 232:234.
- EUROPEAN COMMISSION (2008), *@lis programme – final evaluation*, report Commissioned by Europaid, 2007/145015.
- GEISSBUHLER, A., BAGAYOKO, O., LY, O. (2007), "The RAFT network: 5 years of distance continuing medical education and tele-consultations over the Internet in French-speaking Africa", *Journal of Medical Informatics*, 76, 351:356.
- ILUYEMI, H., BRIGGS, J. (2008), "eHealth and Global Health: Investments Opportunities and Challenges for Industry in Developing Countries", paper presented at the eHealth Conference 2008, London.
- LATIFI, R., MUJA, S., BEKTESHI, F., MERRELL, R. (2006), "The Role of Telemedicine and Information Technology in the Redevelopment of Medical Systems: The Case of Kosova", *Telemedicine and eHealth*, 12(3), 332:340.
- MITCHELL, J. (1999), *From Telehealth to eHealth, The Unstoppable Rise of eHealth*, Canberra: Department of Communications, Information Technology and the Arts.
- PRICEWATERHOUSECOOPERS (2008), *Cost Benefit Analysis of Satellite-Enhanced Telemedicine and eHealth Services in Sub-Saharan Africa*, study commissioned by the European Space Agency, November 2008.
- ROSENBERG, T. (2008), "Femmes vitales", *National Geographic*, December, p. 86-105.
- SAHN, D., STIFEL, D. (2003), "Urban-Rural Inequality in Living Standards in Africa", *Journal of African Economies*, 12(4), 564:597.
- SENDER, J., CRAMER, C., OYA, C. (2005), *Unequal Prospects: Disparities in the Quantity and Quality of Labour Supply in sub-Saharan Africa*, World Bank Social Protection Discussion Paper, 0525, Washington: The World Bank.
- SORENSEN, T. (2008), *WHO collaborating centre for Telemedicine and eHealth; annual report 2007*, Tromsø: Norwegian Centre for Telemedicine.
- UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT (2007), *Information Economy Report 2007-2008; Science and technology for development: the new paradigm of ICT*, SDTE/ECB/2007/1.
- WORLD HEALTH ORGANISATION (2005), *Connecting for Health; Global Vision, Local Insight: Report for the World Summit on the Information Society*, Geneva: WHO.
- WORLD HEALTH ORGANISATION (2006a), *eHealth tools and Services*, Global Observatory for eHealth report: WHO/EHL/06.1.
- WORLD HEALTH ORGANISATION (2006b), *World health report: Working together for health*, Geneva: WHO.
- WORLD BANK (2008), *Africa Infrastructure country diagnostic: costing the need for investment in ICT infrastructure in Africa*, Washington: World Bank.

6. Appendices

I. Differences between rural and urban indicators

Indicator	Asset Poverty	Enrollments	Ratio of girls-to-boys enrolled	Infant Mortality Rate	Neonatal care with skilled personnel	Contraceptive use	Child Stunting	Adult Malnutrition
<i>Positive (negative) values indicate higher levels of well-being in urban (rural) areas^a</i>								
Countries								
1 Benin (1996)				-14.7	24.4 **			
2 Burkina Faso (1999)	68.6 **	50.5 **	37.3 **	10.7 **	69.4 **	26.5 **	16.3 **	4.0 **
3 Burundi (1987)				-66.2 **	65.7 **			
4 Cameroon (1998)		17.7 **	7.8 *	30.3 *	37.5 **	11.7 **	9.9 **	
5 Central African Republic (1994)				41.4 **	52.3 **			
6 Chad (1997)				-20.5 *	35.2 **			
7 Comoros (1996)				6.6 +	30.1 **			
8 Cote d'Ivoire (1994)				19.7 **	48.1 **			
9 Ghana (1998)	48.0 **	13.9 **	4.8	22.8 *	46.4 **	4.7 **	15.3 **	7.3 **
10 Kenya (1998)	30.3 **	0.7	-1.0	11.8	35.9 **	12.9 **	9.6 **	4.9 **
11 Madagascar (1997)	45.3 **	24.3 **	-11.5 *	26.4 *	28.1 **	10.8 **	4.4 *	
12 Malawi (1992)				2.0	38.9 **			
13 Mali (1995)	62.0 **			44.7 **	54.1 **	15.8 **	11.4 **	
14 Mozambique (1997)				7.7 **	57.6 **			
15 Namibia (1992)				11.2 +	26.4 **			
16 Niger (1997)	59.1 **	40.9 **	38.9 **	67.8 **	61.7 **	23.1 **	11.7 **	7.5 **
17 Nigeria (1999)	45.9 **	18.4 **	4.8	4.8 +	21.5 **	12.0 **	5.5 +	
18 Rwanda (1992)				-30.8 **	39.4 **			
19 Senegal (1997)	42.3 **			56.6 **	50.1 **	22.1 **	15.5 **	
20 Tanzania (1999)	51.0 **	21.4 **	8.4	23.5 **	49.1 **	23.9 **	21.9 **	1.6 +
21 Togo (1998)				8.8 **	49.1 **	9.7 **	9.2 **	
22 Uganda (1995)	34.7 **			11.9 +	46.8 **	21.5 **	18.3 **	
23 Zambia (1996)	77.3 **	20.5 **	7.3 *	-6.3	50.9 **	16.3 **	16.1 **	2.1 **
24 Zimbabwe (1999)	56.2 **	5.3 **	7.6 +	14.0 +	28.5 **	16.7 **	8.3 **	0.8
<i>Pooled</i>	47.4 **	18.4 **	7.4 **	23.6 **	35.4 **	14.9 **	10.5 **	3.9 **

a. These are simply the arithmetic differences of the indicators. For enrolments, ratio of boys-to-girls, neonatal care and contraceptive use, this is $D_i = U_i - R_i$, where U_i is the level of the indicator in Urban areas and R_i is the level of the indicators in Rural areas. For the remaining indicators, this is $D_i = R_i - U_i$. The implication is that positive values that appear in the table indicate higher levels of welfare in urban areas, while negative values indicate higher level of welfare in rural areas. Note: ** indicates significance at 99% level of confidence, * at 95% level of confidence and + at 90% level of confidence. **Source: Sahn and Stifel (2003).**

Indicator	Asset Poverty	Enrollments	Ratio of girls-to-boys enrolled	Infant Mortality Rate	Nconatal care with skilled personnel	Contraceptive use	Child Stunting	Adult Malnutrition
<i>Countries</i>								
1 Benin (1996)				-14.7	24.4 **			
2 Burkina Faso (1999)	68.6 **	50.5 **	37.3 **	10.7 **	69.4 **	26.5 **	16.3 **	4.0 **
3 Burundi (1987)				-66.2 **	65.7 **			
4 Cameroon (1998)		17.7 **	7.8 *	30.3 *	37.5 **	11.7 **	9.9 **	
5 Central African Republic (1994)				41.4 **	52.3 **			
6 Chad (1997)				-20.5 *	35.2 **			
7 Comoros (1996)				6.6 +	30.1 **			
8 Cote d'Ivoire (1994)				19.7 **	48.1 **			
9 Ghana (1998)	48.0 **	13.9 **	4.8	22.8 *	46.4 **	4.7 **	15.3 **	7.3 **
10 Kenya (1998)	30.3 **	0.7	-1.0	11.8	35.9 **	12.9 **	9.6 **	4.9 **
11 Madagascar (1997)	45.3 **	24.3 **	-11.5 *	26.4 *	28.1 **	10.8 **	4.4 *	
12 Malawi (1992)				2.0	38.9 **			
13 Mali (1995)	62.0 **			44.7 **	54.1 **	15.8 **	11.4 **	
14 Mozambique (1997)				7.7 **	57.6 **			
15 Namibia (1992)				11.2 +	26.4 **			
16 Niger (1997)	59.1 **	40.9 **	38.9 **	67.8 **	61.7 **	23.1 **	11.7 **	7.5 **
17 Nigeria (1999)	45.9 **	18.4 **	4.8	4.8 +	21.5 **	12.0 **	5.5 +	
18 Rwanda (1992)				-30.8 **	39.4 **			
19 Senegal (1997)	42.3 **			56.6 **	50.1 **	22.1 **	15.5 **	
20 Tanzania (1999)	51.0 **	21.4 **	8.4	23.5 **	49.1 **	23.9 **	21.9 **	1.6 +
21 Togo (1998)				8.8 **	49.1 **	9.7 **	9.2 **	
22 Uganda (1995)	34.7 **			11.9 +	46.8 **	21.5 **	18.3 **	
23 Zambia (1996)	77.3 **	20.5 **	7.3 *	-6.3	50.9 **	16.3 **	16.1 **	2.1 **
24 Zimbabwe (1999)	56.2 **	5.3 **	7.6 +	14.0 +	28.5 **	16.7 **	8.3 **	0.8
<i>Pooled</i>	47.4 **	18.4 **	7.4 **	23.6 **	35.4 **	14.9 **	10.5 **	3.9 **

Positive (negative) values indicate higher levels of well-being in urban (rural) areas^a

II. Mobile Phone subscribers and penetration (by level of development and region)

Table 1.1. Mobile phone subscribers by level of development and region

	2002	% change 2002-2003	2003	% change 2003-2004	2004	% change 2004-2005	2005	% change 2005-2006	2006
World	1 166 620 215	21.0	1 412 020 934	24.5	1 757 737 988	23.0	2 161 999 103	23.0	2 658 551 657
Developed economies	606 945 165	9.5	664 725 049	11.3	740 018 120	8.9	805 873 152	9.5	882 647 414
Asia	87 452 320	6.5	93 154 960	5.9	98 661 436	3.9	102 545 000	7.4	110 101 800
Europe	349 980 073	9.3	382 606 705	10.6	423 027 952	9.5	463 043 252	7.1	495 694 514
North America	154 488 772	11.3	172 017 384	15.6	198 852 732	9.8	218 334 900	16.1	253 561 100
Oceania	15 024 000	12.8	16 946 000	14.9	19 476 000	12.7	21 950 000	6.1	23 290 000
Developing economies	520 151 801	30.6	679 319 888	31.6	893 760 760	31.0	1 170 638 544	32.1	1 546 324 643
Africa	36 918 573	39.4	51 456 107	50.8	77 608 792	69.9	131 863 273	43.7	189 497 105
Asia	382 884 203	31.2	502 288 259	27.7	641 318 745	24.6	798 880 468	32.0	1 054 509 700
Latin America and the Caribbean	100 079 725	25.1	125 232 228	39.2	174 347 694	37.2	239 249 946	26.1	301 640 938
Oceania	269 300	27.5	343 294	41.4	485 529	32.8	644 857	5.0	676 900
Transition economies	39 523 249	72.0	67 975 997	82.4	123 959 088	49.6	185 487 407	23.8	229 579 600

Source: UNCTAD calculations based on the ITU World Telecommunication Indicators database, 2007.

Table 1.2. Mobile phone penetration by level of development and region

Mobile phone subscribers per 100 inhabitants

	2002	% change 2002-2003	2003	% change 2003-2004	2004	% change 2004-2005	2005	% change 2005-2006	2006
World	18.8	19.5	22.5	22.7	27.6	21.2	33.4	21.4	40.6
Developed economies	64.1	8.6	69.6	10.8	77.1	8.1	83.3	9.0	90.8
Asia	65.2	6.3	69.3	5.8	73.3	3.8	76.1	7.2	81.6
Europe	75.2	8.3	81.4	10.3	89.7	9.0	97.8	6.8	104.4
North America	47.7	10.3	52.6	14.5	60.3	8.2	65.2	15.1	75.0
Oceania	63.7	11.6	71.1	14.6	81.5	11.4	90.7	5.1	96.3
Developing economies	10.6	28.7	13.6	29.4	17.6	28.9	22.7	30.1	29.5
Africa	4.5	36.3	6.1	46.9	9.0	64.0	14.7	39.2	20.5
Asia	10.7	29.5	13.9	25.9	17.5	23.1	21.5	30.5	28.1
Latin America and the Caribbean	18.9	23.4	23.3	36.7	31.8	35.3	43.1	24.1	53.5
Oceania	3.4	24.0	4.2	37.4	5.7	31.4	7.5	2.8	7.7
Transition economies	12.0	72.5	20.6	82.4	37.6	48.6	55.9	23.9	69.3

Source: UNCTAD calculations based on the ITU World Telecommunication Indicators database, 2007.

Source: UNCTAD (2007)

III. Internet subscribers and penetration (by level of development and region)

Table 1.3 Internet users by level of development and region

	2002	% change 2002-2003	2003	% change 2003-2004	2004	% change 2004-2005	2005	% change 2005-2006	2006
World	618 514 417	16.0	717 707 944	20.7	866 364 366	16.2	1 006 429 544	12.4	1 131 078 697
Developed economies	397 605 044	7.3	426 435 696	15.6	492 755 839	7.5	529 869 769	6.8	566 077 247
Asia	60 345 200	4.2	62 904 500	28.7	80 976 600	7.4	86 975 900	2.8	89 439 100
Europe	149 899 844	13.4	169 994 796	12.0	190 421 239	7.7	205 089 289	10.7	227 077 547
North America	174 952 000	3.0	180 128 400	14.4	206 008 000	7.2	220 860 600	4.6	231 060 600
Oceania	12 408 000	8.1	13 410 000	14.5	15 350 000	10.4	16 944 000	9.2	18 500 000
Developing economies	207 465 892	28.8	267 302 205	26.1	337 136 119	28.6	433 560 239	17.9	511 035 250
Africa	10 290 156	45.3	14 953 500	48.5	22 206 421	48.8	33 032 605	31.4	43 397 500
Asia	153 538 659	29.9	199 488 152	25.8	250 869 483	24.0	311 164 987	16.1	361 391 800
Latin America and the Caribbean	43 411 477	21.2	52 597 353	21.2	63 756 215	39.6	89 022 947	18.9	105 864 150
Oceania	225 600	16.7	263 200	15.5	304 000	11.7	339 700	12.4	381 800
Transition economies	13 443 481	78.3	23 970 043	52.2	36 472 408	17.9	42 999 536	25.5	53 966 200

Source: UNCTAD calculations based on the ITU World Telecommunication ICT Indicators database, 2007.

Table 1.4 Internet penetration by level of development and region

	2002	% change 2002-2003	2003	% change 2003-2004	2004	% change 2004-2005	2005	% change 2005-2006	2006
World	10.0	14.6	11.4	19.0	13.6	14.5	15.6	10.9	17.3
Developed economies	42.0	6.3	44.7	15.0	51.3	6.7	54.8	6.3	58.2
Asia	45.0	4.0	46.8	28.6	60.2	7.3	64.6	2.6	66.3
Europe	32.2	12.3	36.2	11.7	40.4	7.2	43.3	10.4	47.8
North America	54.1	2.0	55.1	13.3	62.4	5.6	66.0	3.7	68.4
Oceania	52.6	6.9	56.3	14.1	64.2	9.1	70.0	8.1	75.7
Developing economies	4.2	27.0	5.3	24.0	6.6	26.5	8.4	16.1	9.7
Africa	1.3	42.1	1.8	44.6	2.6	43.5	3.7	27.3	4.7
Asia	4.3	28.3	5.5	24.0	6.8	22.6	8.4	14.8	9.6
Latin America and the Caribbean	8.2	19.5	9.8	19.0	11.6	37.7	16.0	17.1	18.8
Oceania	2.8	13.5	3.2	12.2	3.6	10.5	4.0	10.1	4.4
Transition economies	4.1	78.8	7.3	52.2	11.1	17.1	13.0	25.6	16.3

Source: UNCTAD calculations based on the ITU World Telecommunication ICT Indicators database, 2007.

Source: UNCTAD (2007)

IV. @lis final assessment

	RELEVANCE	DESIGN	EFFICIENCY	EFFECTIVENESS	IMPACT	SUSTAINABILITY	COORDINATION	WEB	AVERAGE
<u>E-EDUCATION</u>									3.79
ATLAS	5	5	4	4	5	4	3	5	4.38
ELAC	5	4	4	4	5	4	4	3	4.13
INTEGRA	5	5	4	4	4	4	3	3.0	4.00
E-LANE	4	4	4	3	4	4	3	2.9	3.61
@LIS TechNET	4	4	3	3	4	3	3	4	3.50
CIBERNARIUM	3	3	3	3	3.5	4	2.5	3	3.13
<u>E-INCLUSION</u>									3.57
IALE	5	4	5	5	4	4	3	4.4	4.30
ADITAL	5	3	3.5	3.5	4	3	3.5	3.8	3.66
JIQ/NIB	3	3	4	4	4	4	2	n.c.	3.43
LINK ALL	5	3	2	3	4	3	2.5	3.9	3.30
RED-SOCIAL	4	4	2	2	3	2	4	4.3	3.16
<u>E-GOVERNANCE</u>									3.42
eGOLA	5	5	4.5	4.5	4	4	4	2.8	4.23
SILAE	3.5	3.5	3	3	4	4.5	4	4	3.69
EMPLENET	4	3	3	3.5	4	4	3	2.3	3.35
MetaLoGo	3	4	2	2	2	2	2	n.a.	2.43
<u>E-HEALTH</u>									3.99
HCN	5	4.5	4	4	4.5	4	4	3	4.13
EHAS	5	3.5	4	5	4.5	4.5	3.5	2.5	4.06
T@lemed	4.5	4.5	4	4	4	4	4.5	2.9	4.05
HEALTH FOR ALL IN LA	5	4	3.5	4	4	3.5	3.5	3.3	3.85
TOTAL FOR PROJECTS	4.3	3.8	3.5	3.6	3.9	3.6	3.3	3.3	3.70

Source: European Commission (2008).

V. Mobile Phone education project

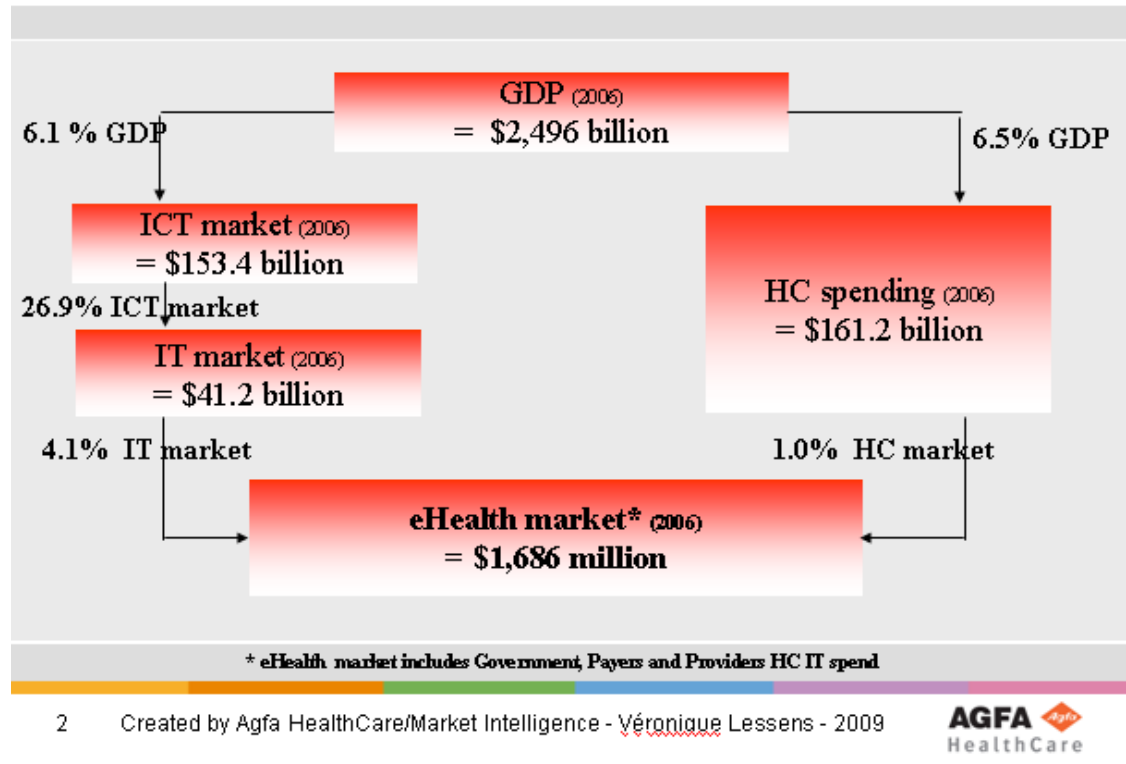
Founded in 2002, Dimagi is a group of clinicians and programmers implementing technological project for health. Among the numerous projects they executed, mobile phone education attempts to develop systems to distribute life-improving education over mobile phones. The project started in Bangladesh in 2007. It allows individuals to follow courses over the phone, by pressing numbers to answer questions. Each course will convey a few important points, such as the importance of clinician-assisted birth, or the dangers of indoor smoke pollution and why you should keep children a meter or more from a fire while cooking.

Incentives to take the courses include the recruitment of celebrities to record the audio and the short quiz at the end allowing the user to get free airtime delivered to its phone which he can use to make personal calls.

<http://www.dimagi.com/content/mobile-phone-education.html>

VI. Latin America eHealth market

LATAM eHealth market (est. Y2006) worth US\$1,686 million or 2.5% of global eHealth market



Source: Agfa Healthcare briefing, 8 February 2009.

VII. Other eHealth projects in developing countries

- T@lemed

eCare projects for remote areas in Brazil and Columbia managed by DG AIDCO in the framework of @lis.

Website: <http://www.igd.fraunhofer.de/igd-a7/projects/telemet/>

Contacts: info-brazil@alis-telemet.net and info-colombia@alis-telemet.net

- Health Care Network – HCN

This project in Latin America consists of eCare, Electronic Medical Records, Scheduling Systems for doctors' appointment and Labour Health and Security. It is also part of @lis project.

Website: <http://www.healthcarenetwork.it> (Not available anymore).

Contact: antonio.fontelles@ec.europa.eu

- EHAS

Enlace Hispano Americano de Salud is an AIDCO research and development programme dedicated to the adaptation of ICT technology towards rural areas in Peru, Columbia and

Cuba. They develop protocols to improve the health monitoring process in remote places, targeting especially the mother-child relationship.

Website: <http://www.ahas.org>

Contact: ahas@ahas.org

- [@health](#)

Project designed to foster international cooperation in the eHealth sector among European and Latin American organisations. This aim was to stimulate the sharing of knowledge in eHealth applications and technologies using on-line web platform.

Finished in 2007, this project led to the creation of a database gathering all relevant organisations in Latin America and Europe.

Website: <http://www.ithhealth.org> (not available anymore)

Contact: ragnar.bergstrom@ec.europa.eu

- [Como Estas?](#)

This project aims to develop an innovative ICT system that allows patients with overuse medication headache to receive continuous and personalised treatment. The system will be based on an advanced Alerting and Decision Support System that follows patients from the diagnosis and supports the physician in managing the therapy, controlling relevant events impacting on patient safety.

The new system will be based on a complex informative system called *Interactive Electronic Patient Record* (IEPR) and will constitute an "all-in-one" solution that will allow constant monitoring of the clinical condition of the patient by the doctor and provide a system of alerts and warnings in case selected parameters exceed given thresholds.

Website: <http://www.comoestas-project.eu>

Contact: lubomira.hromkova@ec.europa.eu

- [eCare project in Afghanistan](#)

Cisco and Roshan, the leading telecom operator in Afghanistan launched in 2007 an eCare project linking a medical institute in Kabul with a University Hospital in Karachi (Pakistan) mainly for radiology Counselling.

Contact: scostant@cisco.com

Website: http://www.roshan.af/socialprograms/?page_id=314

- [Telemedicine Centre of Kosova](#)

The eLearning centre in Kosova has been implemented in collaboration with the European agency for reconstruction (1.5 millions \$) and with the WHO. The main objective of the programme has been the implementation of learning space, electronic library and other eLearning activities.

Contact: info@telemedks.org

Website: <http://telemedks.org/>

- [SmartCare DIMAGI](#)

SmartCare is an eGovernance solution developed by Dimagi, which aims to provide "continuity of care" in preserving a longitudinal data view. Specifically designed for areas with no telecommunication, it uses patient carried smart card to record information and, on

a monthly basis, merges the data in a large and robust base. It is currently deployed in Zambia and tested in other countries. It is worthy noting that Dimagi is leading many other eHealth projects, among others, CommCare developed below.

Contact: kumar@dimagi.com

Website: <http://www.dimagi.com/content/smartcare.html>

- CommCare DIMAGI

Dimagi, in collaboration with D-Tree international, is leading CommCare, a mobile phone project aiming at a better efficiency of community health workers. Each health workers will have a phone running the CommCare software that will assist them to manage household visits and plan their day. CommCare will collect and report data that will help monitor and evaluate community health programmes themselves. The programme currently focuses Tanzania.

Contact: kumar@dimagi.com

Website: <http://www.dimagi.com/content/commcare.html>

- eCare for Tsunami relief in India

I-Linx, an international consulting firm specialised in the design of satellite systems, implemented a programme of eCare in the district of Nagapattinam, one of the most affected by the tsunami. Based on the use of R-BGAN portable satellite modem, the project involved, *inter alia*, a programme of psychological support for children via teleconference.

Contact: info@i-linx.net

Website: www.i-linx.net/files/l%20&%20Tel%20Tsunami%20Demo%20Pres.pdf

- Health information network in Uganda

UHIN (Uganda Health Information Network) is a project aiming at disseminating and collecting data in Ugandan rural areas. The use by health workers of Personal Digital Assistant (PDA), allows them to communicate with each other, exchange information and provide more accurate care to their patients.

Contact: rriccio@usa.healthnet.org or fkakaire@med.mak.ac.ug

Website: www.pda.healthnet.org or http://www.idrc.ca/fr/ev-116194-201-1-DO_TOPIC.html

- IKON in Mali

IKON is a project of teleradiology between one hospital in the capital city Bamako and three district hospitals in Tombouctou, Sikasso and Mopti through internet connection.

Contact: maduture@gmail.fr

Website: <http://teleradiologieikon.org/index.php>

- Digital health initiative

The digital health initiative is a recent public-private partnership including organisations such as Ericsson, Pfizer and the United Nations for Partnerships that aims at bringing mobile-health applications in rural Africa. The programme will be designed to address diseases such as HIV/AIDS, malaria, tuberculosis and other infectious and communicable illnesses.

Contact: Partner@un.org

Website: <http://www.ericsson.com/ericsson/press/releases/20080923-1253461.shtml>

- The Technology Partnership

Recognizing the potential of technology to drive global change, the United Nations Foundation and The Vodafone Foundation partnered in 2005 to form the Technology Partnership. Among the numerous technological projects set up, this partnership supported various eHealth initiatives, using mainly the mobile phone technology.

Contact: groupfoundation@vodafone.com

Website: <http://www.unfoundation.org/our-solutions/mobile-technology/technology-partnership.html>

- Egyptian eCare programme

Baud Telecom Company, the Saudi Arabian telecommunication company, has set up an eCare project linking seven regional hospitals with the Nasser Institute in Cairo.

Contact: info@btc-networks.com

Website: <http://www.btc-networks.com>

- African Health Infoway

The African Health Infoway is a WHO eGovernment programme, supported by Department for International Development (DfiD), aiming at providing an ICT based platform that supports the collection and the dissemination of health data in 53 African countries. One exemplary project is the open source medical record system (Open MRS) which has been implemented in several countries including South Africa, Kenya, Rwanda, Lesotho, Zimbabwe, Mozambique, Uganda, and Tanzania.

Contact: sahlug@who.int

Website: <http://www.who.int/africahealthinfoway/en/index.html>

- Nepal Wireless Telemedicine

In the context of a large initiative launched in 1997 by a Nepali teacher, aiming at creating a wireless network in Nepal, telemedicine applications have been developed in this mountainous country. For instance, telecounselling programmes have been set up between health workers in three villages - Nangi, Ramche and Tikot – and a medical doctor in Pokhara.

Contact: contact@nepalwireless.net

Website: <http://www.nepalwireless.net/index.php>

- Mobile surgery in Ecuador

Mobile Surgery is an innovative way to deliver high quality surgical services to underserved regions of Ecuador. Because of huge distances, it is very difficult to manage pre- and post-operative cares. The use of telemedicine applications has eliminated partly this barrier: teleconsultation, patient follow-up, etc.

Website: http://www.pbs.org/frontlineworld/rough/2007/06/ecuador_health.html

Contact: erodasand@hotmail.com

- Zambia electronic Perinatal Record system (ZEPRS)

Implemented by RTI international – Research Triangle Institute –, with the support of the Bill and Melinda Gates Foundation, ZEPRS is an eGovernment project led in Zambia and targeting prenatal care to women and postnatal care to neonates.

Website: <https://www.rtidemo.org/front/node/169>

- Durban Teledermatology network- South Africa

This eCare project uses ICT technology to transmit patient images to a specialist based in Cape Town for an opinion. This pilot project uses Email and current telemedicine networks, to enhance delivery of dermatological care in relatively remote areas of South Africa. Primary health care centres include localities of Umtata (Nelson Mandela Academic Hospital), George (George Hospital), Hermanus (Hermanus Provincial Clinic), Newcastle (Durban) and Polokwane (Limpopo).

Contact: mars@ukzn.ac.za

Website: <http://www.safpj.co.za/index.php/safpj/article/viewFile/877/1142>

- Cisco project in Kijabi hospital

At Kijabe Hospital in Kenya, Cisco and other collaborators install a wireless network with an online medical reference tool called the Map of Medicine in order to provide medical professionals with relevant and up-to-date information needed to diagnose and treat patients.

Contact: pdrury@cisco.com

Website: <https://www.cisco.com/web/about/ac79/health/subhosp.html>