

Society for Telemedicine and eHealth in Nigeria in collaboration with
Federal Ministry of Health



Process Report on the

“2ND PAN AFRICAN CONFERENCE ON TELEMEDICINE AND eHEALTH (PACTe)”

Venue: Nnamdi Azikwe Hall, Nicon Luxury, Abuja. Nigeria

Date: 18 – 19th September 2008

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Introduction

This report is a documentation of the proceedings of the **2nd Pan African Conference on Telemedicine and eHealth PACTe** held in Abuja, Thursday September 18 - 19th 2008. This conference was organized by *Society for Telemedicine and eHealth in Nigeria (SFTeHIN)*, in collaboration with the *Federal Ministry of Health (FMOH)* with support from *Hygeia (HMO)* and *Lagoon Hospitals*.

It is important to mention at this point that what is presented here is a **process documentation** of the sessions highlighting the thrust of comments, key issues generated, action plan and recommendations made. In effect, this report is a summary, rather than detailed presentations made by presenters.

Opening remarks

The event began at 10.00am with the introduction of guests at the high table. A brief opening remark was made by the Deputy Secretary General, SFTeHIN, Dr Francis Ohanyido. He welcomed and recognized dignitaries from Germany, Zimbabwe, South Africa, Uganda, Ghana and Malaysia as well as International bodies on ICT and eHealth, and certain members of the Society. The main goal of the conference was to showcase actual solutions, technologies & products that will meet the needs of health consumers and healthcare providers in their match towards achieving health related Millennium development Goals (MDGs). The conference was also aimed at catalyzing issues of telemedicine and eHealth, and proffering solutions to existing challenges towards its implementation in Nigeria, Africa and the global world.

The dignitaries and guests on the high table included:

- Chief host of the occasion, Honorable Minister of Health, Federal Republic of Nigeria, Dr. Hassan.M. Lawal.
- Sen. Iyabo Obasanjo-Bello, Chair of Senate Committee on Health, Federal Republic of Nigeria
- President of SFTeHIN, Dr Olajide Joseph Adebola,
- Prof. Dr. Christoph Meinel, President and CEO, Hasso-Plattner-Institute University of Potsdam, Germany
- Dr. Mokuolu O. A., University of Ilorin, Chair ICT Project Steering Committee

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- Dr Olu Agunloye Executive Vice chairman National eGovernment Strategies Ltd
 - Prof. Felix Anjorin, Vice Chancellor & Provost, College of Medicine, Birmingham University, Nassarawa State.
 - Dr Obi, M. M, Representative of the Nigerian Computer Professional Regulatory Council.
 - Ayuba Kadafa, Director African Regional Bureau, Global Digital Solidarity Fund

Welcome address by Dr. Olajide Joseph Adebola, President Society for Telemedicine and eHealth in Nigeria

On behalf of the organizers, African states and Guests are welcome to the 2nd edition of the Pan African Conference on Telemedicine and eHealth. The idea of this joint conference is to bring experts in the field of eHealth and telemedicine to present current research findings around the globe. Also, to proffer adaptable solutions that can be effectively and efficiently entrenched into our health care system. In essence, this conference is necessary to help in proffering solutions and guide policy makers on judicious and accountable spending on eHealth. This conference will also allow us to infer technological solutions that can be used in our environment. Recommendations made at the end of the conference will be made to guide the African states. It is also necessary for guests to see the beautiful scenery of Abuja.

Address by the Guest of Honour – Dr. Olu Agunloye Executive Vice Chairman National eGovernment Strategies LTD

All protocols duly observed. Dr. Agunloye is presently in Germany on invitation. He is one of the main champions and pioneers of Telemedicine and eHealth in Nigeria. There is power in information and technology which affects our daily lives. There is an urgent need to develop the capacity among stakeholders to know how it can help to meet the MDG in Nigeria. Videoconferencing in animated fashion has been done by previous organizers. Igbobi Orthopaedic Hospital in Lagos is the only hospital that has set up a Telemedicine center. India has also integrated the use of telemedicine and connected to specialist hospitals on Nephrology, Cardiology etc. Other countries have adopted the idea of delivering telemedicine to urban, peri-urban and rural areas. The 7 point agenda is a good opportunity to draw on the benefits of telemedicine to boost the economy of the country and healthcare delivery.

Currently, we are working on mobile telemedicine geared towards consulting health on an ePlatform. This can also be useful in addressing maternal and child mortality in Nigeria and Africa. There has been a remarkable improvement: the Federal Government has created a telemedicine and eHealth desk within the department of Hospital services. One issue however still remains a concern to all: the area of public awareness should be addressed. Everyone should be sensitized and educated, not just the layman but experts too. Attention should be given to human resources. Technology is no longer an issue, and man is the key to solving such issues. I hereby wish you a successful conference,

Remark by Sen. Iyabo Obasanjo-Bello, Chair, Senate Committee on Health, Federal Republic of Nigeria.

Speaking extempore, she gave insights on health issues and their challenges in Nigeria. As a major player on health, strongly dedicated to the upliftment of the wellbeing of Nigerians she did not conceal her passion for changing the indicators of Maternal Mortality Rates. Telemedicine according to her promises to bridge access to health and improve these health indicators.

Her major reason for honoring the invitation was directly drawn from an experience which she recounted: She had visited the University of Maiduguri Teaching Hospital, Maiduguri where she was amazed at the enormous benefits of the Telecenter in accessing health care. eConsultation and interactions was carried out between doctors in the teaching hospital and those in the Federal Medical Centre, Azare, Gombe state. The whole interaction according to her brought home the idea of the usefulness of technology and medicine in health care delivery in Nigeria. She intends to strongly show her support and learn more about strategies for the implementation of telemedicine and eHealth in our health care system. This she believes will reduce unnecessary referrals hence, patient load on certain hospitals. It could also be extended to Primary Health Care (PHC). The problem of PHC is also the problem of the health center. She also noted the fact that she is not a fan of technology that requires electricity as this is currently nonexistent in the rural areas. The health system is in a dire state and requires solutions to improve quality health care services. In her words “....*I earnestly want to learn, listen and support this innovation, most importantly to learn how to use this technology to better the lives of people in the rural areas. Therefore, I urge you all to encourage a learning interaction and depend on her as an ally in telemedicine and eHealth...*”

Address by the Chief Host, Hon Minister of Health, and Federal Republic of Nigeria declaring the conference open

He welcomed all guests to the second edition of the Pan African Conference on Telemedicine and eHealth.

It is indeed an honor for Nigerians to host other African countries on advocacy issues on telemedicine and eHealth. Nigeria is investing in Information, Communication Technology (ICT) for the future of Telemedicine and eHealth activities. The Federal Ministry of Health (FMOH) is making efforts on establishing a National Coordinating Mechanism for eHealth activities in Nigeria. Also, to establish a National eHealth Program for the entire country. To buttress this, a mobile health unit has been set up and will be reshuffled round 8 states for a period of 2 months. These states include teaching hospitals in University of Ibadan and Maiduguri, Federal Medical Centers in Owerri, Gombe and Birnin Kebbi. I therefore urge you all to view this conference as a serious assignment to facilitate Telemedicine and eHealth for the delivery of health to all geographic regions and locations.

The conference was declared opening after concluding his opening address.

Vote of thanks by Dr. Temitayo Daramola, 1st Vice President Society for Telemedicine and eHealth in Nigeria

Dr. Temitayo thanked guests for making out time to attend this conference and also appreciated the personal sacrifices made. He concluded by welcoming guests to the beautiful scenery of Abuja and encouraged enjoy their stay.

Session I: INTERNATIONAL COOPERATION ON DEVELOPING eHEALTH

**Chair: Dr Mokuolu O.A, chair ICT Steering Committee University of Ilorin,
Kwara state**

eHEALTH – IMPROVING HEALTH CARE BY INTERNET BASED SERVICE-ORIENTED IT SYSTEMS

By Prof Dr. Christoph Meinel.

(Prof Meinel is the Director of Hasso-Platner Institute. As a full computer science professor since 1991 and a professor of Internet Technology since 2004, he has provided linkages between IT security, eLearning and tele-teaching on Telemedicine and eHealth).

Digital computing systems can be used to store, analyse and deal with medical and patient information to improve a society's health care system. Usually patient's demographic characteristics, administrative and clinical data can be stored. Most complex IT system in a society requires personal and medical information over a long period of time. The system participant includes medical organizations, professional health care providers, insurance organizations, and patients. They need to know the kind of information to look for. This system is usually a life-long record and thus reveals that such health care systems are large and complex.

The eHealth uses web portals to share information between health care professionals and the insurance system. This has been done to professionalise the system thus shifting this system from the hospital base into the homecare system with treatment and management of chronic diseases. Telemedicine is the use of medical information transferred from one site to another through electronic communication to improve patient's health care including diagnosis and treatment.

All these services are brought into play through the use of IT technology. It allows the user to get expert knowledge on special cases and on an international basis to discuss treatments and diagnosis. It can also serve as an intelligent data warehouse which contains clinical data, patient journals as well as remote health and home care systems for the elderly. This can also be used to organize hospital business processes and archiving. An example is ePharmacy, a sort of internet pharmacy that can be used to buy drugs online.

Security concerns in eHealth and Telemedicine

Personal privacy and population safety is critical to public safety. It allows for early detection of biological events, electronic reporting of lab test results and so on. In doing so, it is thus imperative to ensure high measures to protect patient's confidential information. Internet is a public access and can serve as a real danger for committing internet crimes. There have been a lot of internet crimes and one has to be very careful in securing systems.

Public health surveillance helps in disease prevention, detection, characterization and eradication of diseases. However, this should not be a reason for revealing what persons have certain health ailments. Rather it should focus more on numbers.

The question then is: what is the minimum information public health officials need to know to effectively protect the persons behind the information?

The Public organizations recommendation:

1. The Cyber Security Industry Alliance Organisation (CSIAO)
2. Deployment of strong authentication and authorization control
3. Encrypting data
4. Proper disposition of retired information and equipments
5. Conducting frequent system audits
6. Using digital signatures and secure data time stamps
7. Using private data backbone through the use of private data network

Security goals should be geared towards ensuring stronger user authentication procedure, using digital technology and employing confidentiality in the protection of data. Strong protection of central health care database can be strengthened using PKI systems which use digital certificates for all users and also XML security. Employment of Secured infrastructure is necessary in designing an eHealth system. Human factor can serve as a challenges and potential risks in misusing data. Accordingly, it is crucial to carefully train the people using the system, educate by awareness creation, and create knowledge when acts are wrong.

Security by system design could also serve as a problem in achieving functionality. They arise from ad-hoc or non existent design failures. It is also necessary to know the threshold of who can access the system and design systems to tackle security. This is best done during the health system design phase and not at the later stage

as mostly done. Confidentiality should be a serious factor to be considered, all demographic information should be secured and only known to the health care professional. A digital envelope technology could be developed based on digital certificates and also Symmetrical algorithm for encryption of data can be used to maximize confidentiality of patients' data.

In the heart of each eHealth system, each user or any system participants must have a digital identity. This could consist of a username, dynamic passwords and PKI smart cards username passwords. This smart card has a key which gives the individual access to his data. Digital signatures can also be used which has 3 different types namely health insurance cards for patients, health care professional cards for medical practitioners and pharmacists, and secure module cards for medical practices and pharmacies to be used by their employees. In this way, security is improved to a maximal level.

Telemedicine and eHealth uses a database which can be secured using a Hippocratic data base produced by IBM and Microsoft. This approach is designed for eHealth and Telemedicine and ensures security on the data base level. It also enforces disclosure policies down to the cell level.

Some recent projects in telemedicine and eHealth projects:

There are research solutions to the requirements of a secure health care system and includes authorization, trust, and digital identity management. Trust deals with Doctor-to-Doctor; patient-to-Doctor; patient-to-organization; and organization-to-doctor. There has been improved interconnection of oncological treatment with the help of tumor conferences. A tumor conference portal in action was displayed where health issues were raised and discussed by physicians. This was conducted as a conference among physicians, created through a web portal to exchange information from a small hospital to a bigger one. The use of teleconference and video conference has been explored to discuss difficult cases such as tumor cases. It could also be used to dialogue with a beginner physician and expert on ideas on certain health cases. Participants directly connected through portal video conference system and the coordinator only coordinates basic parameters. The idea is that each hospital collects statistical data on their patients, therapies and doctors, quarterly region-wide reports are compiled after manually merging hospital records. The next step is to connect statistical records with real time.

eHEALTH: RESEARCH AND DEVELOPMENT ISSUES IN DEVELOPING COUNTRIES ECONTEXT, BUSINESS OPPORTUNITIES AND PROSPECTS

By Emuoyibofarhe .O. Justice, (Senior Lecturer LAUTECH; collaborator in the Department of Computer Science, University of Zululand, South Africa).

Nigeria as a developing country has similar major socio-economic development challenges facing most African countries. This includes poverty and unemployment, and diseases. The global population is about 78 million a year. The deaths can be improved with quality information on health.

Thirty one African countries have fewer than 10 physicians per 10,000 of the population. This calls for the uptake of the telemedicine and eHealth. Health care service delivery is presently shifting from patient-doctor contact-based to anytime-anywhere-based (eConsultation, ePrescription, ePharmacy, Telesurgery, Telemonitoring etc). However, the situation in Africa is quite different such that the use of Personal Computer (PC) technology seem to have failed. An African that lives on less than \$1 a day cannot afford a computer. By nature humans are nomadic and would not want to sit down all day using their PC. Many will prefer to carry a mobile device: laptop. The Mobile device is recommended PC so that while on motion one can enjoy this opportunity. An average African has a mobile device, thus promoting deployment of GPRS and UMTS. This idea has progressed from novelty to a must-have. Presently, about 2.5 billion wireless phones are reported to be within GSM coverage.

The cost effective provision of quality health care is a prominent social and governmental issue throughout the world. Recommending health care cost, physical movement, sharing of health care resources and improving community is highly necessary, while still maintaining universal high quality in health care. The context is different from the developed world where there is optimal access to funding, technology and infrastructure. Africa does not have this enabling environment and so it is necessary to come up with solutions that fit into the African context. In doing so, it is necessary to ensure appropriateness, affordability, sustainability, community ownership and empowerment in health care system. Also, it is crucial to carry out a proper needs assessment and research to know what works for us in Nigeria. Critical issues of great concern include appropriate connectivity in technology, use of low cost devices, intermittent power and power failure recovery. In using technology, it is important to have an appropriate user interface that

communicates in a language that can be understood, technology must be acceptable and cheap to allow for maintenance.

A multi-modal user interface is presently developed in health care to take care of the educated and the non-educated in providing access to health care. Every patient is given a smart card that shows medical history (such as allergies) and demographic information. Research challenges that must be addressed include Grid computing issues/ health-grid, mobile computing, delayed tolerant network and middleware services.

The electronic health care is the main tool for storage and linkages. This has not yet been implemented and scenarios in Germany could be adopted. The eHealth care services can only work with the use of the health insurance scheme. Research must be done in the local context to achieve the development of Telemedicine and eHealth. There is an urgent need to collaborate with other researchers and institutions due to the enormity of the project. Thus, it ensures public – academia relationship. Great investment opportunities could be achieved in the area of Telemedicine and eHealth, also serving as one of the largest industries in the world.

The challenges in implementing eHealth and telemedicine are research limitation, acute lack of funding, lack of relevant infrastructures, poor connectivity and eHealth readiness level. An eHealth readiness assessment was carried out to assess the readiness level in term of eHealth; the study indicated many health personnel are not ready.

The following recommendations were proffered:

- Research and capacity development in Africa
- Acceptance and use issue
- Acceptability issues
- Economical issues
- Coordination issues
- Resource optimization / collaborative issues

Comments from the Chair

Prof. Meniel

This presentation provided detailed information on definitions on Telemedicine and eHealth, available health care services on IT. It also identified complexities of eHealth, the heavy task on dealing with a lot of data and personnel and the challenges posed by internet crimes and security. The presentation also proffered solutions towards reducing challenges of internet security.

Dr. Emuoyibofarhe

This presentation clearly highlighted the opportunities that eHealth offers. The need to understand how we position our system in this context is necessary. The paper also raised this from the research development perspective, raised key challenges on eHealth and Telemedicine. It also identified research issues and expected deliverables, and business opportunities. Strong advocacy is important for Government officials to take advantage of the investment opportunities.

Questions

Prof. Ajorin

1. The attempts in many health Institutions is laudable in establishing a regional Telemedicine program. How then do you resolve the issue of confidentiality through lumping of five hospitals together? Who is going to be held responsible of leakage of information?
2. How do you handle compensation of physicians as a motivator?
3. I strongly commend your vision for this project. A pilot project was launched in Abuja using a live teleconferencing on real time using WIFI. We had problems with poor image quality, telecom providers shout about 2.5/3.5G but this is usually in the big cities. People in the rural areas are eMedicine ready and telemedicine ready but will the eHealth be ready? When asking if they are eHealth ready, we need to take it from where they are to where we are.

Dr Olusesi, A.D

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4. Is it possible to connect to internet technology to the rural populace using tin cans by the roadside?

Low band with can be used for implementation of Telemedicine and eHealth which can ride on 32kbps. Telemedicine in rural areas can be delivered using cans. Germans are extremely familiar with this. In Nigeria, we are running from tackling the issues of connectivity head on. Such low bandwidths will work consistently in Nigeria. Whatever Nigeria intends to use, it is necessary to ensure maximum standards in ensuring security. Using public IPs predisposes our databases to security risks. We need to look for ways to collaborate with Prof. Meniel to learn how we can effectively adapt and strengthen Telemedicine and eHealth in Nigeria. We need to also acknowledge the strong commitment from Government officials.

Dr. Olajide Joseph Adebola (President SFTeHIN)

How feasible will it be to produce flash drives instead of using smart cards, especially when talking about literacy level and costs in the rural areas being a deterrent to solutions that it may provide?

Dr Mokolu, O.A

Being at the vanguard of developing a blue print in Telemedicine and eHealth, what partnership provisions can Nigeria buy into?

Answers

Designing Telemedicine and eHealth system depends on how it is going to be used. It involves using two parallel ways, designing the system and ensuring security. Avoid technological restrictions. GSM can be used as an entrance into the telemedicine since it's the preferred choice in Nigeria. Later, the use of the smart cards can be introduced say 10 years from now.

Smart cards technology has its problems which can be solved using ID cards with digital signatures, a modern way of developing smart cards. Flash drives don't have this facility.

In Germany, there are set of rules each company has to follow regarding data confidentiality. Violating these rules of data confidentiality could lead to jail/imprisonment. Developing Telemedicine and eHealth requires creating a central

database, so whoever is responsible could be traced easily. There are a lot of rules guiding such violations of data confidentiality and could lead to jail/imprisonment.

Physicians in Germany are paid through Insurance companies. This is usually on a contract basis and every year they meet to discuss percentages per consultations.

On the issue of partnership with the Hasso-Platner-Institut, this cannot be considered because it's a small institute. The institute can however offer PhD sponsorship to IT professionals. Presently, the institute has no one from Nigeria. The institute is having discussions with South Africa because they observed the university gives grants to only South Africans. Currently, there are a lot of positive activities with the German and Nigerian government. In research, the Institute will be willingly to cooperate.

To combat poor image quality using mobile wireless devices, the health grid computing can be used. The health grid should be located in a hospital that has the facility to manage the grid. What could have been done is to transmit information on a low bandwidth or through email.

The rural communities in Nigeria are not eHealth ready. eHealth readiness has to be classified in terms of infrastructures and personnel. Previous assessments have shown that rural communities are not yet ready. Telecenters can be created so rural populace can have access to quality health care.

The cans are very cheap and can be used in the village setting for internet connectivity. This is usually placed on the roof top with an antenna.

Advocating the use of smart cards and can be built into the national identity cards which must placed securely.

Session II: Telemedicine and eHealth: Applications, infrastructures

Chair: Gbenga Adegbusoye

MOBILIZING STAKEHOLDERS FOR ONE THOUSAND TELEMEDICINE UNITS

By Ayuba Kadafa, Regional Director, Global Digital Solidarity Fund.

A film documented in French and subtitled in English was shown. The film is centered on the introduction of eHealth and Telemedicine to a peri urban center in

Bobo Dioulasso, Burkina Faso. A young boy Modibo and his sister Sinata are orphans and both live with their aunt who strives to survive to make ends meet. Sinata constantly falls ill and was introduced into telemedicine by her determined and willing brother who was convinced the internet can heal his sister. This documentary was created by the Global Digital Solidarity fund which was established during the Geneva phase in 2003. The use of ICT as a tool for health care delivery services is however, fast becoming one of the most rapidly growing fields in the health sector. The term eHealth encompasses a range of services that involve the use of information and communication technology (ICT) to diagnose and improve on the health management of patients and quick delivery of information to people in the fields of health care. The DSF identifies with the vision of ISfTeH because ICT is a vital and critical tool for healthcare delivery.

To this effect, the Fund has established 10 projects in the area of tele-medicine and tele-education, in Burkina Faso and Burundi. Each beneficiary site has been fully equipped with broadband satellite connection, around 40 computers and all auxiliary IT equipment, including video-conference and other facilities necessary for the proper functioning of the sites. WI-FI networks have also been deployed, to provide a connection to nearby clinics, hospitals and other public institutions. Hundreds of such projects are feasible, not only in telemedicine and tele-education, but in all fields of activity; including public administration and services to citizens, training and employment, income-generating activities and business creation, land and natural resources management, and in the field of arts and culture. Within the framework of global solidarity, the DSF offers the possibility to finance 1000 telemedicine units in Africa. DSF plans this project with WHO and other partners to provide 1000 tele-medicine projects to district hospitals in Africa.

HEALTH TOURISM AND EHEALTH

*By Dr Tshepo Maaka MD Serokolo Health Tourism LTD, Johannesburg
South Africa*

(Dr Maaka is currently involved in the development of the medical tourism industry in South Africa; she is a former CEO of HIV/Care, a wholly owned subsidiary of Netcare).

Serokolo Health Tourism formed in April 2004, is a health services provision company with a key focus on health and medical tourism (medical and health travel), services and medical outsourcing based in South Africa. It allows for provision and access to medical facilities and medical/surgical specialists to international partners. Serokolo presents an affordable and safe alternative to medical, dental and surgical procedures done in a home country. They provide services across all medical and surgical specialists “from a basic medical screening to heart transplant”, through hospitals and clinics in Gauteng, Kwazulu-Natal and Western Cape.

Medical tourism is a rapidly growing industry with various factors contributing to its increasing popularity:

- High health care costs in industrialized countries
- Decreasing levels of medical insurance coverage
- Ease and affordability of international travel
- Advancement in telecommunications
- International trade agreements
- Proven safety of healthcare in select foreign countries
- Rapidly improving technology and standards of care in many countries of the world
- Increasing mechanization of medical practice
- High standards and quality of care in developing countries that now offer world-class medical services
- Globalization of health care
- Multinational pharmaceutical companies
- Multinational medical equipment manufacturers
- Favourable currency exchange rates in the global economy

Comments from the Chair

DSF intends to create and mobilize 1000 Telemedicine units across the African continent. It's a daunting task ahead and they should keep in mind that where there is no will, there is no way. This is very possible especially with a population of 140 million with 70% in the rural areas. Telemedicine will be the key especially to achieve the MDGs. This presentation has shown a fantastic graphical way to show the complexity of achieving health. Ten years ago, it seemed impossible but now people are beginning to access this idea. Funds allocation from development

partners seems to be waning. We therefore need to look for innovative ways to seek for funds towards advocating this new digital technology.

Questions

Taking the Nigerian scenario into consideration, others have the homogenous health care system; the Central government controls the state, state to the local. They all don't like taking instructions from each other, it a huge task bringing all levels into implementation of programs at the national level. The local Teleunits are connected to urban centers. Who are the urban units connected to? How then do we tackle language barrier across regions?

The first set of program has been rolled out and it is envisaged that more people will be engaged whereby there will be a multiplier effect leading to standard access to health care services in rural communities. If 50% of persons in the rural communities are not having access to health care, how then can we achieve the MDGs by 2015? People are using DSF to get what is done and not DSF getting what should be done. The difficulty on the Federal system is that the National Councils on health that decides on priority issues facing the health care. The benefits of this health care system should be made available to health care stakeholders to overcome the challenges that have been identified.

Questions

Medical tourism and eHealth go hand in hand; this shows the next level in which the world is handling things. It also shows a product of globalization which is being facilitated by IT, the biggest thing is the innovativeness in the delivery of medical services. During the period of 1997-2001, Yugoslavia, later Asia and Ukraine were top countries that were most traveled to in terms of accessing high standard quality health services. They were also more cheaply compared to US and other developed countries. Doctors in the Soviet Union were much trained but poorly paid. In the early 90s, Nigerian doctors were better paid than some other European Countries. South Africa had to work her way into the league of choice destinations for medical procedures which has been commendable. I expect places like Kenya to launch this effort. Nigeria is pushing tourism very hard in this direction and we can take ownership and strive for medical tourism. The President of STeFHIN should use this good example and explore the advantages of Telemedicine as a development tool leveraging on improved tourism and health care for all.

The EU framework allows any person to receive health care in the EU. Is your Organization trying to work on a similar strategy that deals with acquiring health care services and attention on any part of Africa?

Answer

Serokolo came in late compared to the progress of medical tourism in developed countries. They are trying to help systems in Africa, though a lot of work still needs to be done. Currently, a big project is going on but has faced challenges on the issue of smart cards. This project is meant for only South Africans. It also involves the use of a medical visa which alleviates some of the barriers for traveling. On a small scale, medical information can be sent to any part of the world. Also, they have medical data for all medical tourists that have come to South Africa through them. Serokolo is a step ahead in Medical Tourism in Africa but behind other continents in terms of framework of the global players in the developed countries.

Session III: 3G + Technology, Satellites and eHealth

Chair: Prof. Felix Anjorin, Prof. E.A Onyejekwe

UNIVERSAL HEALTH SERVICE DELIVERY IN AFRICA: LEVERAGING THE EMERGING TELECOMMUNICATION INFRASTRUCTURE FOR AN INTEGRATED EHEALTH

By **Dr. Adesina Iluyemi**, Centre for Healthcare Modeling and informatics, University of Portsmouth, UK.

(Dr. Iluyemi is a former student of the Obafemi Awolowo University, Ile Ife. He had an idea on this research during his National Youth Service Corps/residency training when he pioneered the use of PDA for learning using free downloadable software to improve dental practices take decisions in health care practice).

The health problems in Africa are enormous. Africa has a population of about one billion without infrastructures and issues of brain drain, poverty and financial constraints are still paramount problems. 40% of the African population survives on less than \$1 per day. Malaria related mortality is at 1million deaths annually and affects mostly children. eHealth is the use of ICT for health processes either locally or at a distance (WHO 2005). It involves Telemedicine, Telehealth, Telecare, Health Management Information Systems; Health Knowledge Systems etc. eHealth services

require enabling ICT infrastructure and is beyond telemedicine. However, Telemedicine is a subset of eHealth.

Why do we need eHealth in Africa?

People tend to gravitate towards the urban area leaving the rural area with inaccessible health care services and substandard health care facilities. Telemedicine can be used to share expert knowledge with personnel in the rural communities. The cost of infrastructure is getting cheaper and connectivity is getting easier by the day. Integrated eHealth model should be organized in a coordinated way to allow for geography, applications, access, health system, technology, telecom infrastructure etc. Health is needed at the district level, thus, it is necessary to build a wide district level care to enable the community use and implementation. The bottom-up approach should be used rather than the top-down approach. In Nigeria, 50% of health care services are provided by the private hospitals. The private sector is important in setting up an eHealth system. The Civil Society should be also be integrated because they provide and deliver care to the people that need such services. Mobile devices i.e laptops should be used which are more sustainable, accessible, and consume less power. It can also effectively run real time video conferencing. Wireless infrastructure is also important which can be delivered into homes, facilities, communities etc. Web based applications is also needed. Policy and change management should also be integrated to enable people make use of it. Simple SMS can be used to deliver health services, wireless, fibre optics, satellite, ISDN can also be used.

Lagos state has a state wide telemedicine network compared to other states. The missing link is a dedicated National eHealth policy which should be developed and strengthened. eHealth should be able to meet the local health needs of the people. It is necessary for the government to strengthen eHealth which is in the national ICT policy, and provide a framework for an eHealth department. Most importantly, government should provide the lead in terms of investment and support for research. Telecom operators, Bank, International donors can take advantage of this investment initiative to provide money and support and also create eHealth partnerships. eHealth services and products have potentials for Nigeria and Africa in general to meet her health needs and MDGs targets.

INTEROPERABILITY IN EHEALTH: THE MISSING LINK

By *Prof. Onyejekwe Eugondu*, Visiting Professor of Health Informatics (US), Department of Public Health Technology, School of Health Technology, FUTO, Owerri.

(Prof. Onyejekwe has lived in the US for 30 years and has contributed immensely in the area of health informatics. She came home through the diaspora to step down her expertise and help in budget appropriation of resources. She read Software Engineering and her 2nd degree is in Public health technology).

There are so many worrisome questions to ask ourselves in Nigeria and Africa.

How could Nigeria have a N300 million surplus on health and yet people are dying?

Nigeria's data is readily unavailable rather we use the United Nations data as health indices. Where are they getting this number that we can't get them?

Nigeria has the 3rd highest number of PLWHA (People living with HIV AIDS) in the world after India and South Africa. Where are these people? Are they in the hospitals?

Are there data on bioinformatics? Is it included in our health plan?

The application of information technologies to optimize the information management within an organization can thus be used. It is necessary for allocation of resources. The four quadrants of learning, research and work is called the classical model and could be referred to as the same-time same-place. The classical model "classroom model is limited by space and the need to allocate resources to tackle challenges. The second quadrant is called the traditional lab, which allows one easy access. The 3rd quadrant deals with distance learning for video conferencing. There is the need to galvanize the knowledge of brain drain to brain gain. Finally, the fourth quadrant deals with the World Wide Web. We need to figure out the problem before developing a model. In developed countries, evidence based medicine or evidence based public health is integrated into research and projects rather than seeking every where for funds.

A thorough needs assessment should be developed to understand the initial statement of the problem. Thus, it is imperative to have evidence before conducting a research. Expatriates don't incorporate technology transfer to Nigerian colleagues and that's why many Nigerians lack maintenance culture.

Session IV: National Telemedicine and eHealth Initiative and Developments

Chair: Prof. Felix Anjorin

STATIC PATHOLOGY IN RURAL AFRICAN SETTING: A PILOT EXPERIENCE AT MAKERERRE UNIVERSITY UGANDA, FACULTY OF MEDICINE

By Dr. Ian Guyton Kwadu Munabi.

The challenges of managing cancer in Uganda and Africa extensively include Low human resource available in most systems, brain drain and increasing demand for the services. Also, old infrastructure and Incidence of preventable deaths were challenges of managing of cancer in Uganda.

Opportunities included:

- Increased connectivity via the internet
- Reduction in the cost of most of the equipment
- More collaborative global community
- Well tried easy to use and teach methods of tissue preparation
- Well tried and cheap methods of treatment

Tools used as an imaging system were laptop, microscope, mobile phone, camera and modem. Our first case was 14 year old male with swelling in the neck with fevers and generalized body weakness.

The lessons learned on the project includes:

- Procurement and taxes process
- Challenges with imaging (the red hue) are technology dependant
- A regional referral Internet hub would save lives and lower the cost of treatment
- Internet can save time (2hours compared to 2 weeks)
- This is easy to do and staff in peripheral health units can be trained to do the imaging

OVERVIEW OF TELEMEDICINE PROJECT IN NIGERIA: A CHALLENGE TO IMPROVE THE HEALTH CARE QUALITY IN HOSPITALS AND HEALTH CARE CENTRES IN RURAL AREAS

By Wolfgang Trappe

Telemedicine has vast advantages to Nigerians which includes bridging the gap in the access to health services. Many Nigerians live far from specialist health care facilities. Telemedicine also facilitates a better grasp of the key issues in the nation's health thereby improving actual statistics for planning purposes. It also allows for government to attract more external funding for health and access to specialist knowledge around the world without physical presence.

The features of telemedicine includes Electronic Examination, Examination Data Store/forward processing, Tele consultation, Tele diagnosis/online via Video conferencing, Tele treatment and Tele monitoring.

The elements of Telemedicine include:

- ✘ Patient registration is electronic
- ✘ Appointments can be electronic, reminder by SMS
- ✘ Patient examination is largely electronic generating storable and transmittable data
- ✘ The stored data can be reviewed later and by many in disparate locations
- ✘ Diagnosis results from the review process or in some cases in “real time”.
- ✘ Patient follow-up can be from a remote location

CIT in collaboration with the Federal Ministry of Health and Space Research and Development Agency, in a pilot project will deliver healthcare services to remote communities in Nigeria. The mission of the pilot telemedicine project is to facilitate the provision of high quality and cost-effective healthcare to all citizens of Nigeria. The pilot will also facilitate the recruitment and retention of healthcare providers in rural communities in Nigeria. University College Hospital (UCH), Ibadan and University Teaching Hospital, Maiduguri will provide specialist consultation while 6 Federal Medical Centres - Owo, Owerri, Markudi, Maiduguri, Yenagoa, Kebbi, Gombe and a Mobile Unit will act as remote healthcare facilities.

Comments from the Chair

Dr. Iluyemi

Dr. Iluyemi's presentation highlighted the necessity of making our eHealth systems patient-centric. A bottom-up approach is necessary to adopt and sustain the system, and also to obtain necessary data and information. Government support and universal approach is necessary to access health care services. The African Union & NEPAD should invest in the business opportunities of eHealth and Telemedicine.

Prof. Onyejukwe

I am glad to hear that the young students were able to obtain information on the deplorable state of data information at the local government level. I also appreciate the use of the quadrangle in explaining the time space ideology, and also on the need to utilize the World Wide Web. The rural communities are more intelligent than you can imagine; they only require simple teaching. The portal of entry is usually the hospital.

Dr Munabi

Dr. Mokuolu was highly impressed that within 2 hours a differential diagnosis could be made. In the US that usually can take 2 months. It could also involve telling the patients to go home. A simple lesson can be learnt from this presentation: we talk of man-power in Nigeria and other African states, we need to utilize simple technology to access expertise to solve problems rather than attaining a brain drain. Also, we need to think of innovative solutions and strategies to help people in judicious ways.

Questions

Is there a need to inculcate software vendors in Nigeria to sit down and agree on standards to be integrated into a hospital management system?

Before implementation of eHealth four things should be put into place: communication, policy, technology and the people to use the system. The 3 other components are in place but we don't have a guiding framework in place. On what principles are the current telemedicine projects operating on?

There is different software that is presently being used and produced here in Nigeria. What modifications can be made here?

Answer

There are certain standards that must be maintained in the hospital management system. The HL7 software allows you to bring inputs from the different aspects of clinical delivery. It is presently operational around the world.

The National eHealth policy is required to meet our health needs. The states and LGs should all have their health needs, and thus there is a need to create the post of a Chief Information Officer (CIO). The ideal person should be a hybrid that understands the organization and the outside world. They should be guided by a coherent policy.

The software can be improved on and there is no need to redevelop newer software. The AMD tools can be used and is still a preferred choice.

Day two

Session I: Open source in Health Information Technology

Chair: Prof. E. A Onyejekwe

USE OF OPEN SOURCE TECHNOLOGY IN HEALTH CARE: FOCUS ON LOW RESOURCE ENVIRONMENT

By Dr. Molly Cheah.

(Dr Cheah is currently the President of the Primary Care Doctors Organization Malaysia (PCDOM) and also the current President of the Open Source for Health care Alliance (OSHCA)

Health care is very important and it is essential for all interconnections on the parts to work together and not separately. There are various ICT issues in health care which encompasses issue of complexity and high cost. The current focus is in hospitals which have high failure rate, and lack open standards. Lack of open standards results in interoperability barriers in data exchange among health applications. There is a great need to develop new initiatives to facilitate research networks and innovative ideas that focus on building evidence, collaboration, and capacity building.

Why focus on developing countries?

Eighty four percent of the population exists in low income countries with 93% burden of disease. Low income countries spend about 11% of its total budget on health, and share just about 6% of the global internet hosts.

F/OSS (Free Open Source Software)

FOSS is copyright software made available under an open source license. Open source (as a concept) is a collaborative set of methods and practices meant to provide open access and share to design and knowledge. Check www.fsf.org for detailed information.

The advantages include:

- Most importantly and in relation to freedom, it prevents vendor lock in
- Initial attraction to the use of frees software and many of its tools
- Transparency of source codes
- Easy implementation of standards
- Ability to adapt the application to different environment
- Affordability
- Sustainability

The development of Free Open Source Strategy is similar to evidence based medicine.

The free software philosophy grants the following set of freedoms:

- Freedom to run the program (Freedom 0)
- Freedom to study how the program works and adapt it to your needs (Freedom 1)
- Freedom to redistribute copies so you can help your neighbor (Freedom 2)
- Freedom to improve the program and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition to this.

DICOM IN HOSPITAL INFORMATION SYSTEM

By Michael Enwere,

Mr Enwere is an Executive board member of the Society for Telemedicine and eHealth in Nigeria.

DICOM is defined as Digital Imaging and Communication in Medicine. This started with the coming together of the American College of Radiology (ACR) and the National Electrical Manufacturer Association (NEMA) to address the problem created by the numerous medical equipments in the market and the attendant interoperability difficulty that arose out of the situation. A joint committee was thus set up in 1983.

Some of DICOM's objectives include:

- To promote communication of digital image information regardless of device manufacturer
- To facilitate the development of expansion of picture archiving
- To allow creation of diagnostic information databases that is interoperable by a wide verity of devices distributed geographically.

With DICOM standard, pathology, endoscopy, cardiology, ophthalmology, therapy plans, structures etc can be transmitted to a remote location.

Therefore, for Hospital Information System to be deployed DICOM standard must be used integrated for interoperability.

Comments from the Chair

The presentation highlighted issues regarding freedom, basic information in ICT and health care, Accountability and responsibility covers the quality of the information. It also allows us to think deeply behind certain facts or figures presented to the country. For example, data says there are 1 in 100,000 people in the hospital and yet how much money is spent in the hospitals. Where are these clients or people we are talking about? Regardless of whatever strategies you choose, it must be sustainable and useful to others. In setting up standards of interoperability, the software must be openly developed. The presentation also listed health application for public health and primary health care. Dr. Ransome

Kuti made a white paper on instituting the PHC as the community's primary contact in terms of access of health care services. This is not presently implemented. PHC can drive this patient-centered care.

Questions

What are relationship between OSHCA and FOSS?

The issues of interoperability in respect to Nigeria, if you were to give an open license, would you prefer to give it to regulatory bodies or individual hospitals?

Answers

Organizations are members of OSHCA. Membership can also be on an individual basis or as associate membership which are of 2 types: the NGOs and business men. FOSSFA can become a member of OSHCA and it has 7 regions which are representative in each.

I will prefer to give the license to the regulatory bodies to coordinate the PHC users. It is also crucial to strengthen the system of PHC. It has been proven that if you have a good PHC, then the health system will be improved. Ingenuity can be used to integrate innovation into health systems. A system is needed to be effective, efficient and affordable.

Medical equipments globally were developed with the mind of developed countries. They come new with lock-in software and system and the fuses burn regularly. The regulatory body is ISO, and only 10 countries are signed on. I strongly think it would be necessary for African countries to sign and adopt GE standards like in India. When such equipments are donated, the systems could be outdated as far back as 10 years and it would be very difficult to find experts who can work on it. Such equipments will have to be refurbished and this leads to spending more money.

Prof Onyejekwe

Most of what we have in Africa is dictated by the developed countries. They set up the standards since it is their product. Thus, they have full control over us. This is deterrent to securing propriety tools. There should be a strong organization that can challenge Microsoft to adopt open source software.

Session II: *National Telemedicine and eHealth initiatives and Developments*

Chair: Dr. Emuoyibofarhe O. Justice

GHANA TELEMEDICINE PILOT PROJECT, GHANA: AN OVERVIEW OF THE MILLENNIUM VILLAGE PROJECT

By Eric Akosah.

This project consists of about 30,000 persons in 30 communities in Ghana. It acknowledges the fact that Telehealth is vital to achieving MDG 4 and 5. It involves the stakeholders from the community up to the national level, to get inputs to be used at the various levels. Feasibility studies have been carried out and it was observed that the project's strength lies on the level of enthusiasm for the success of the project right from the community to national. People want to see a National Health Sector ICT policy in place and also the standard treatment guide which can be digitalized. They presently have a telemedicine center in one of the teaching hospitals. The MVP project involves the use of the primary care health delivery and community health extension worker concept. The project trains youth in health and agriculture for health care delivery. It aims to provide handy digital communication devices to transmit images, collaborate with medical schools locally in research and ICT for development of software. There exists some challenges which includes operational area, lack of energy systems, reliance more on solar energy system backed by generating set, and poor communication. Also, there exists high computer illiteracy among health professional, poor data organization and management and poor road network.

Comments from the Chair

Eric Akosah

His presentation gave an overview of the Millennium Village project in Ghana. It also allows us to understand the role of collaborations with ERICSON and other service providers. The presentation also highlights the need to bring in service providers involved in this technology. Also, the project shows an involvement on the uptake of PHC and the community health care concept in Ghana. One of the challenges include power problem in the village settings which needs to be addressed to allow for improvement. The project shows that solar energy can be used instead of sole dependence on generated power supply.

Dr Molly Cheah

I strongly appreciate the development that has been put into the presentation. The cross platform shows the use of open source and Microsoft though with implications. If given the opportunity, we can also come up with competing software even though

there are constraints. The presentation showed that there should be integrated efforts of the IT world and the medical field to make Telemedicine and eHealth work. The software is created by IT experts but the contents are created by the medical professionals. On a visit to several hospitals, it was observed that many lack computers. This could be that hospitals have not provided computer or doctors are not interested in IT.

Questions

How possible is it to download software on Child and Maternal Mortality on simple mobile phones?

Does your project work with local universities and other Telemedicine projects?

What organization holds the authorizing license software?

Answers

Presently, we are linking the PDA of the mobile phone to the prima care. The modules are in the application and they don't have to be downloaded from the server. It only means an individual should connect to the server.

Yes, the project works with the local universities in Ghana and the Telemedicine Center in India

PCDOM holds the authorizing license software.

Session III: National Telemedicine and eHealth Initiatives and Developments

Chair: Dr. Ian Guyton Kwadu Munabi

TELEMEDICINE ACTIVITIES IN FEDERAL MEDICAL CENTER OWO, ONDO STATE NIGERIA

By Bolaji Ajibabi.

National Space Research and Development Agency (NASRDA) deployed the mobile telemedicine unit to the centre on 30 June 2008 and it was redeployed to rural areas within Ondo State after the management commissioned the center's telemedicine unit and the bus on 1st July, 2008. The center sensitized the health care delivery team and organized a seminar for the nurses before National Space Research and Development Agency (NASRDA) brought the mobile clinic to the centre. In addition, letters were sent through the Local Government Commission to the Local

Government Chairmen concerned. Furthermore, the Centre announced the programme on radio and television in order to create awareness. The Coverage areas include Owo, Ose, Akure South/North and Akoko South West. The Pilot Project took place between 1st and 18th July, 2008. The mobile clinic crew had the following professionals on board: Doctors, Nurses, Pharmacists, Medical Record Officer, System Engineer, driver and cleaner. The management of Federal Medical Centre Owo dispensed drugs worth Eighty -Seven Thousand, Seven Hundred and Thirty - five Naira (=N= 87,735.00) free to all patients seen during the project. Ophthalmology, Dermatology, and ENT cases were prevalent. Many long-term disease conditions were attended to free of charge. Consultations were made to the Federal Medical Centre Owo Telemedicine Unit and Federal Medical Centre Gombe for dermatologist and ENT consultations. Specialist attention was received promptly in the Two centers. Cases that required further evaluation and operative intervention were referred to Federal Medical Centre, Owo. The challenges observed include:

- Poor participation in some LG
- Images beamed by the diagnostic instrument on board became unclear from the second week
- Time taken to connect to the satellite was prolonged
- Lack of interest by some institutions
- Bus could not get to some LG due to terrains

FROM CLIENT-CENTRIC TO CHAOS (FRACTALS) THE PHIP PROGRAM

By Prof. E. A Onyejekwe

This presentation will focus on the 3rd and 4th quadrant. It will lay emphasis on the public health information portal and is envisioned as the CDC of Nigeria. It entails effective collection of all health data and assembling them using techniques through mobile technology to be distributed. Web based applications will also be used. This quadrant is for a program on time and space independence. All levels (PHC, State and National) will have to be same and will look like replicating structures. The system envisaged to be used is the grid technology. It advocates for evidence based medicine and evidenced based public health. It follows the person from the health institutions to wherever it ends rather than looking at diseases. SSA and Africa currently do not have an efficient system to galvanize or collate health data. Our goal is to actualize and operationalize the conceptual model and also to illustrate how access to public health data can influence healthy behaviors in the prevention of illness and health maintenance. In summary, the overall goal is to increase public health literacy and awareness and also improve access to health. The model used will be chaos and will focus on the client.

Action Plan

The Action Plan for the 2008 Pan African Conference on Telemedicine and eHealth includes:

- National Governments should engage the African Union and NEPAD to promote regional collaboration to build capacity for eHealth in the continent
- National Governments should engage the African Union and NEPAD to endorse the development of a Pan-African Community on Telemedicine and eHealth (PACTe) to serve as a professional group to help with eHealth policy, regulations, standards and capacity development in Africa
- African Union and NEPAD should ensure that each member state sets up a National eHealth Coordinating mechanism to coordinate activities at country levels
- The African states should carry out a national eHealth needs assessment / survey to assist with policy development and wider implementation
- The National Governments should advocate the need to develop collaboration among the telecom operators, Software developers and health professionals for eHealth development in their country since it's a multidisciplinary field; ensure the capacity building/training of personnel especially for project implementation; integrate compulsory Medical Informatics/Training Management courses in the Medical curriculum, to advocate at the national level and the Ministry of Education; introduce ICT courses at undergraduate and post graduate level for ongoing training of health professionals
- The African Union and NEPAD should advocate for a national telemedicine and eHealth working groups to bring in more partners and encourage public-private partnership in line with the following:
 1. To adopt corporate social responsibilities which would create and strengthen alliances
 2. Bring organizers of PACTe to collaborate with bodies like NEPAD. In turn, NEPAD could write and invite State and National governments and CSOs making implementation and generation of funds a lot easier. In summary, a holistic approach should be adopted that involves the engagement of CSOs to champion the course of Telemedicine and eHealth in Africa;
 3. To explore the investment opportunities through partnership with the Telecommunication sector in Africa;
 4. Create a call group to follow-up on this meeting and reconnect for the purpose of Telemedicine and eHealth in Africa;
 5. To develop models upon which one can demonstrate for evidence based medicine and evidence-based public health that will help in advocacy

6. To advocate and increase the level of coordination and awareness across States, National and International groups.
7. To strive to involve more of the African continents on Telemedicine and eHealth and also encourage collaboration across Africa;
8. Finally, to host and network a true beginning of a Pan African Conference on Telemedicine and eHealth in Africa.

Recommendations

The recommendations arrived at the PACTe conference was as follows:

- National Governments should include eHealth as part of their overall health budget yearly
- Support the adoption by the international community of the 1% digital solidarity contribution as a complementary and innovative means of mobilizing resources devoted to reducing the digital divide and provision of health services using ICT as a tool;
- Urge and call on Governments and other stakeholders to join the DSF and implement the 1% digital solidarity principle;
- Help in mobilization of stakeholders to partner with the DSF to implement community based projects like the 1000 telemedicine projects in district hospitals and health centers in the rural area;
- Welcome the initiative of France to host the World Conference on Digital Solidarity in 24 November 2008.
- The multifaceted challenges in Africa defy a single prescription. What is needed is a nuanced approach, tailored to the particular needs of each country” (ADB 2008)

Concluding statement

We, the organizers of this Conference thank the participants for a successful conference on Telemedicine and eHealth. We also wish to extend our invitation to other African countries to host the next Pan African Conference on Telemedicine and eHealth and our tertiary institution to host the 2009 edition of the Nigerian Conference on Telemedicine and eHealth. The next country/institution to host the conferences will be communicated to all participants before the end of the year. Thank you all.

The 2nd edition of the Pan African Conference on Telemedicine and eHealth (PACTe) came to an end at 5:35pm on 19th September, 2008.

Appendix

a. Local Organizing Committee & Partners PACTe 2008

Names	Organization represented
1. Dr O.J Adebola	Society for Telemedicine & eHealth in Nigeria
2. Dr Diran Kolajo	Federal Ministry of Health
3. Michael Enwere	Society for Telemedicine & eHealth in Nigeria
4. Dr Justin Ekpa	Society for Telemedicine & eHealth in Nigeria
5. Dr Olatunde Oni	Ladoke Akintola University of Technology
6. Dr Francis Ohanyido	Society for Telemedicine & eHealth in Nigeria
7. Chukwudi Igboelli	Digital Solidarity Funds
8. Dr Adeshina Jenrola	Federal Medical Centre Makurdi
9. Dr Khaliru Alhassan	Director Health Services, Sokoto MOH
10. Lucy Mbanefo	Society for Telemedicine & eHealth in Nigeria
11. Tanya Akpabio	Society for Telemedicine & eHealth in Nigeria
12. Phyllis Nwadike	National Information technology Development Agency
13. Dr Kabir Mustapha	National Health Insurance Scheme
14. Ogunyemi Ganiyat	Media Consultant
15. Dr Tunde Adegboyega	World Health Organization
16. Dr Temitayo.O. Daramola	Society for Telemedicine & eHealth in Nigeria
17. Dr. S. S. Sule	Medical and Dental Council of Nigeria
18. Dr. Jojo Onwukwe	Neuro-psychiatry Hospital Enugu
19. Abimbola Onigbanjo	Lead Rapporteur
20. Chinedu Ohanyido,	Rapporteur
21. Omale Michael John	Rapporteur

Appendix

b. List of Delegates at the Conference

S/N	Name	Organization Represented	E-mail
1.	Dr Hassan.M.Lawal Hon.	Minister of Health, Federal Republic of Nigeria	NA
2.	Senator Iyabo Obasanjo-Bello	Chair Senate Committee on Health	NA
3.	Prof. R. A Borroffice	Director General, National Space Research Development Agency	NA
4.	Dr Olajide Joseph Adebola	President, Society for Telemedicine & eHealth in Nigeria	dradebola@sftehin.org
5.	Dr Olu Agunloye	Executive Vice Chairman, National eGovernment Strategies Ltd	NA
6.	Prof. Dr Christoph Meinel	President and CEO, Hasso-Plattner-Institute University of Potsdam, Germany	meinel@hpi.uni-potsdam.de office-meinel@hpi.uni-potsdam.de
7.	Dr O.A Mokuolu	Chairman, ICT Steering committee University of Ilorin Kwara State	oamokuolu@yahoo.com
8.	Dr Tshepo Maaka	Serokolo Health Tourism South Africa	drt@serokolo.co.za
9.	Dr Adeshina Iluyemi	NEPAD Council	ailuyemi@nepadcouncil.org

10.	Dr Munabi Ian	University of Makerere, Uganda	imunabi@med.mak.ac.ug
11.	Ayuba Kadafa	Regional Director Digital Solidarity Fund	ayubakadafa@yahoo.com ayuba.kadafa@dsf-fsn.org
12.	Eric Akosah	MDG Project, Ghana	eakosah@yahoo.com
13.	Dr G.M.M Obi	Computer Professional council of Nigeria	gmm.obi@consultants.com
14.	Dr Emioyibofarhe.O.Justice	University of Zululand South Africa/ Ladoke Akintola University Nigeria	eojustice@justice.com
15.	Prof. E.R.Onyejekwe	EARTHMAP, USA / Federal University of Technology Owerri	egondu@comcast.net
16.	Prof. Manny Aniehun	Afrihub	profmanny@afrihub.com
17.	Igboeli Chukwudi. N	Digital Solidarity Fund	
18.	Mlambo Jairos	Government of Zimbabwe Health Ministry	mlamboj@yahoo.com
19.	Gbenga Adebusuyi	National eGovernment Strategies Ltd	gbenga.adebusuyi@negst.com
20.	Dr Victor.A.Ordu	NEPAD Nigeria	vordu@nepadaprmnigeria.org
21.	Dr U.S. Galadima	Nigerian Medical Association, FCT	usmangaladima@yahoo.com
22.	Dr G.O.G Awosanya	Lagos University Teaching Hospital	gog.awosanya@yahoo.com
23.	Ukeje, Ndukwe	National Information Technology Developemnt Agency	nukeje@nitda.gov.ng

24.	Engr. U.U. Ekpo	NEPAD Nigeria	uuekpo@gmail.com
25.	Dr U.M. Offiong	Abuja University Teaching Hospital	uroffiong@yahoo.com
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28.	Y.E Dominic	Federal Ministry of Health	emmayori@yahoo.com
29.	Dr N. Onwudiwie	Federal Ministry of Health	mn_onwudiwie@yahoo.com
30.	Mrs J.N Akalezi	Federal Ministry of Health	tynaakalezi@yahoo.com
31.	Marshall Gundu	Federal Ministry of Health	Marshall-gundu@yahoo.com
32.	Dr.M.A. Akindipe	Federal Ministry of Health	radiationshealth@yahoo.com
33.	Tosin Ogunsola	Federal Ministry of Health	tosinogunsola24@yahoo.com
34.	Mercy Enechete	Federal Ministry of Health	mecon_ime@yahoo.com
35.	Dr A.O.J Kolajo	Federal Ministry of Health	kolijious@yahoo.com
36.	O.A. Ajayi	Federal Ministry of Health	aabimbola98@yahoo.com
37.	Dr Y. Imam	Federal Ministry of Health	yagana@yahoo.com
38.	Mrs A.N. Ogini	Federal Medical Center Owerri	augustogini@yahoo.com
39.	Dr A.A Jenrola	Federal Medical Center Makurdi	jenrolashina@yahoo.com
40.	Prince A.A Oyerinde	Federal Medical Center Ebutte-Metta	waleoyerinde@yahoo.com
41.	Dr A.C Onuh	University Of Enugu Teaching Hospital	voxpathvoxdei@yahoo.com
42.	M.I Sanni	Federal Staff Hospital	NA

43.	Muhammed Bello Yakubu	Federal Staff Hospital Garki	drkanu2000@yahoo.com
44.	Dickson Bada	Garki Hospital	badadix@yahoo.com
45.	Chime Anna	Wuse General Hospital	
46.	C.K.C Okoye	University Of Enugu Teaching Hospital	oyeplaza@yahoo.com
47.	Dr E.N Etebu	Federal Medical Center Yenagoa	enafetebu@yahoo.com
48.	Adeolu Tella	Federal Medical Center Yenagoa	deolutella@yahoo.com
49.	Dr Tayo Oguntuase	Federal Medical Center Owo	doctortuase@yahoo.com
50.	Miss B.A Ajibabi	Federal Medical Center Owo	itsbjma2@yahoo.com
52.	Dr.A.M Kodiya	National Ear Care Center Kaduna	dockodiya@yahoo.com
53.	Abiagam Noble	National Ear Care Center Kaduna	abiagamnoble@yahoo.com
54.	Dr A.D. Olusesi	National Hospital Abuja	biodun@nanotology.org
55.	Dr A.O Adekanye	Federal Medical Center Bida	tokiade@yahoo.com
56.	Dr Muhammed L. Abubakar	Federal Medical Center Gombe	lashilma@yahoo.co.uk
57.	Dr Wayas Samuel	Federal Medical Center Gombe	samwayas@yahoo.com
58.	Dr. U.S Etawo	University of Port Harcourt Teaching Hospital	dr_etawo@yahoo.com
59.	ADNS Abira Abatan	Federal Medical Center Ebutte-Metta	ainaabatan@yahoo.com
60.	Dr B. Adeghe	Federal Medical Center Owerri	wema4real@yahoo.com
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Appendix

c. Lead papers presented at the conference



MOBILIZING STAKEHOLDERS AND RESOURCES FOR ONE THOUSAND (1000) TELEMEDICINE UNITS FOR AFRICA

BY AYUBA KADAFI REGIONAL DIRECTOR FOR AFRICA OF

THE GLOBAL DIGITAL SOLIDARITY FUND (DSF)

ON 18TH SEPTEMBER 2008 AT NICON LUXURY ABUJA

1. Introduction

The Fifty-eighth World Health Assembly in May 2005, adopted Resolution¹ WHA58.28 establishing an eHealth strategy for the World Health Organization (WHO). The WHO defines eHealth as “the cost-effective and secure use of information and communications technologies (ICT) in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research”². Although, eHealth is a relatively new term, based on the WHO resolution above, it has been in practice for a long time due to both rigorous training and inter-personal relationships among medical professionals.

The use of ICT as a tool for health care delivery services is however, fast becoming one of the most rapidly growing fields in the health sector. The term eHealth encompasses a range of services that involve the use of information and

¹ WHO resolution WHA58.28: www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_28-en.pdf

² As contained in the WHA58.28: www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_28-en.pdf

communication technology (ICT) to diagnose and improve on the health management of patients and quick delivery of information to people in the fields of health care.

The WHO resolution (WHA58.28) urged Member States to plan for appropriate eHealth services in their countries. For us at the DSF, telemedicine is an aspect of eHealth services which involves the use of medical information transferred from one site to another through electronic communications to improve patient's healthcare which including diagnosis and treatment. Telemedicine may be as simple as two medical professionals discussing a medical case over the telephone, mobile phone or as advanced as using video teleconferencing systems as you have seen from the short film played a few minutes ago.

The DSF identifies with the vision of ISfTeH because ICT is a vital and critical tool for healthcare delivery. I therefore wish to commend the organizers of this year's event for a well thought out theme which challenges our collective and individual commitments to the achievement of the Millennium Development Goals (MDGs).

To encourage and ensure fast implementation of the resolution, the WHO launched the Global Observatory for eHealth³ (GOe) dedicated to the study of eHealth—its evolution and impact on health in countries across the globe. With eHealth rapidly transforming the delivery of health services and systems around the world, WHO is playing a central role in shaping and monitoring its future especially in low- and middle-income countries. The mission of the GOe is to improve health by providing Member States with strategic information and guidance on effective practices and standards in the field of eHealth. It is expected therefore that all countries will take advantage of the mission of GOe to improve on the health of their citizenry.

Gunther Eysenbach, an editor of the Journal of Medical Internet Research and a renowned eHealth expert, defines eHealth as “an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology”⁴.(Eysenbach,2001).

Today the world is faced with enormous threats (like HIV/AIDS pandemic, malaria, influenza, diabetes, cancer with other endemic diseases, the health consequences of conflict, bioterrorism, and natural disasters) with global players which includes policy and decision makers, the academics, students, health professionals, research

³ Global Observatory for eHealth website: www.who.int/kms/initiatives/ehealth/en/

⁴ Journal of Medical Internet Research Vol.3 No. 2 (2001) Editorial Introduction: www.jmir.org/2001/2/e20/

institutions, health/drug companies working vigorously towards addressing most of these related and devastating challenges. Due to our increasing vulnerability to these unlimited challenges to world health safety, a more proactive global collaborative approach in tackling them is very essential.

As a result of these unlimited health challenges, the Director-General World Health Organization Dr Margaret Chan in her message during the presentation of the 2007 WHO report solicited for global solidarity for a safer future for a global public health security in the 21st century. She further stated that “International public health security is both a collective aspiration and a mutual responsibility. As the determinants and consequences of health emergencies have become broader, so has the range of players with a stake in the [health] security agenda. The new watchwords are diplomacy, cooperation, transparency and preparedness. Successful implementation of International Health Regulation ((IHR) [2005]) serves the interests of politicians and business leaders as well as the health, trade and tourism sectors”.

It is within this context of global solidarity, mutual responsibility and cooperation that world Leaders had gathered at the World Summit on the Information Society (WSIS) in Geneva in 2003 and in Tunis in 2005 to fashion out how to meet the challenges of harnessing the potentials of ICT as a tool for development including addressing health-related matters to promote the achievement of the MDGs. The common vision of the WSIS was the desire and commitment to create an inclusive and development-oriented information society.

This includes using ICT in addressing the health related challenges of the vulnerable group and underserved communities across the world. However, one of the major challenges is finding sustainable financial resources to fund access and the use of ICT as a tool in addressing health related projects especially eHealth/Telemedicine services in the developing nations because of the inadequacy and shortcomings of traditional and conventional forms of financing development through ODA and market forces.

We are currently mid-way to the target year of 2015 for the achievement of the MDGs but many developing countries especially in Africa, stand the risk of not achieving the goals. There is no socio-economic activity that is today not driven by the ICTs including using it as a tool for addressing health challenges; yet the majority of rural populations do not have access to this vital tool of development. It should however, be acknowledged that a lot has been achieved especially in the

urban centers but more needs to be done in rural areas where majority of the populations live. It is in the interest of all stakeholders to increase their levels of commitment in mobilizing resources to address challenges to development.

I therefore wish to commend the Society for Telemedicine and eHealth in Nigeria (SFTeHIN) for their commitment and promoting the use of ICT as a tool for addressing health challenges especially in the rural communities of Africa particularly Nigeria. Africa with its numerous challenges especially in the area of health and the digital divide requires innovative medical and technical initiative to salvage her. Most importantly, adequate resources in both human capital and innovative financial mechanism whose sustainability is guaranteed are very vital in addressing the numerous challenges.

According to United Nations MDGs report of 2007, adequate resources need to be made available to Africa especially in ICT for effective rural connectivity to be achieved. The report shows that since 2004, there has been no significant increase in Official Development Assistance (ODA) target of 0.7 per cent of Gross National Income (GNI)⁵. This is unfortunate considering the Paris Declaration which also aims at making Aid Effective because anything that is inadequate can not be effective. The report however, shows that “access to ICTs grew fastest in the mobile than fixed telephone subscribers with over 55 million new mobile subscribers added in 2005.

By the end of 2005, there were a total of 130 million subscribers of mobile telephones which translates to 15% of African population compared to 3% fixed telephone and 4% usage of internet”. With this development, there is the need to make optimal use of the evolving new technologies in the ICT sector as an effective tool in addressing the challenges of the eHealth and other relevant services in the health sector. For example, with the successful launch of the 3G technology in the African market, we can all embrace this technology due to its numerous features that includes the convergence of data, audio and video, and again its security features of identification of both user and location of usage.

The challenges of providing adequate healthcare delivery especially in Africa particularly in the underserved rural communities are still very enormous. We are today faced with the infrastructural problem of adequate supply of energy (fuel) and the ICT connectivity problems especially in internet exchange point (only two

⁵ Millennium Development Goals Report 2007-Overview Progress:
<http://www.un.org/millenniumgoals/pdf/mdg2007.pdf> Page 5

currently available in Africa that in the second most populous continent in the world). Although a great success has been achieved in the field of the mobile telephony, we still need to contend with the call drops and inconsistent call charges of the mobile operators.

For us to assess our level of success in the field of eHealth there must be concerted efforts in addressing most of the challenges identified above. This is because the success of the eHealth services like the telemedicine especially in Nigeria are directly dependent on both infrastructure (especially energy) and ICT connectivity (especially internet connection point). We must work very hard to contain and address the problems of health and ICT penetration in the rural communities by establishing functional hospitals and health centers and the provision of necessary infrastructures. The majority of the people dwell in the rural communities and research shows higher record of endemic diseases and other health challenges and poverty being prevalent there. Furthermore research shows that the African rural communities are unfortunately not attractive to investors for several reasons:

- The rural communities are poor and therefore have low consumption capacity for services;
- Businesses will not get a quick return on their investment;
- Industrial activities are generally concentrated in urban areas;
- Infrastructure especially transport network, power and energy are inadequate or non-existent

These challenges call for global solidarity based approach to mobilize enough resources to fund the provision of access to ICTs for rural communities in order to reduce the digital divide and address the health challenges through eHealth services. This will encourage investment in the health sector especially the telemedicine as a veritable tool for healthcare delivery. The African continent risk falling behind permanently in the race for development, if the rural communities remain outside the evolving information society.

2. Objectives of the Paper

The objectives of this paper are to:

- Highlight the current digital situation which has consequences on telemedicine.
- Highlight the activities of the DSF aimed at providing access and use of ICTs for development in the health sector.
- Present the one thousand (1000) telemedicine unit project of the DSF for Africa.

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- Present the **1% Digital Solidarity Contribution** as an innovative and complementary financing mechanism for development devoted to reducing the digital divide and improving healthcare delivery.
 - Make recommendations to the Pan African Conference on Telemedicine & eHealth.

3. Summary of Current Digital Divide Situation

Apart from the tremendous success recorded in the mobile telephony in Africa, the continent is seriously lagging behind in most other areas of ICTs. According to the world internet statistics⁶ latest report of June 2008, Internet penetration in Africa is about 5.3% compared with 48.1% in Europe, 73.6% in North America, 59.5% in Oceania/Australia, 24.1% in Latin America/Caribbean, 21.3% in the Middle East and 15.3% in Asia. In terms of percentage of internet world usage; Africa is 3.5%, Asia 39.5%, Europe 26.3%, Middle East 2.9%, North America 17.0%, Latin America/Caribbean 9.5% and Oceanic/Australia 1.4%.

The ITU World Telecommunication/ICT indicators database⁷ 2007 also shows that apart from the significant growth in mobile access mainly in the urban areas, Africa continues to lag other regions in overall access to ICTs particularly in rural and remote areas. This lack of access to energy and ICT surely affects the continent's aspiration for leverage in social, economic and business development in the globe. The ITUs' ICT Statistical Newslog "[Improving Rural Telecoms Connectivity in Africa](http://www.itu.int/ITU-D/ict/newslog/Improving+Rural+Telecoms+Connectivity+In+Africa.aspx)" by the Commonwealth Telecommunications Organization (CTO)⁸ also shows very pitiful situation in Africa in the ICT sector.

The CTO report declares that "although the recent years have seen dramatic growth in penetration rates in some African countries, especially through mobile networks, the continents' aggregate penetration rate is still less than 20 %"⁹. For internet access and use, the figures are not different from others earlier mentioned which is still below 5% for most African countries. The report went further to demonstrate that more than 60% of Africa population live in unconnected rural areas which represent an untapped market.

Therefore for us to make any genuine meaningful impact in the use of ICT in achieving development especially in connecting the rural populace of Africa and for health delivery, there must be total attitudinal change in leadership and politics,

⁶ Visit World Internet Statistic latest report of June 2008 : <http://www.internetworldstats.com/stats.htm>

⁷ www.itu.int

⁸ <http://www.itu.int/ITU-D/ict/newslog/Improving+Rural+Telecoms+Connectivity+In+Africa.aspx>

⁹ <http://www.itu.int/ITU-D/ict/newslog/Improving+Rural+Telecoms+Connectivity+In+Africa.aspx>

solidarity, improvements in ICT regulatory policies to conform with best practices so as to attract developmental partners, service providers, equipment manufacturers and entire telecommunication industries to the continent.

4. The Global Digital Solidarity Fund

The Global Digital Solidarity Fund was established during the Geneva Phase of the World Summit on the Information Society (WSIS) in 2003. The idea for creating the DSF was presented during the Summit by H. E. President Abdoulaye Wade of Senegal on behalf of African Union and New Partnership for Africa's Development (NEPAD). The Fund is a complimentary financial mechanism of voluntary nature that will mobilize resources and implement projects including ICT health related projects aimed at reducing challenges in the rural communities of developing countries. Addressing health challenges using ICT as an enabler/tool requires a lot of resources that are not readily available.

To achieve an all inclusive healthy-information society requires an innovative form of financing for development based on global solidarity due to the inadequacy of traditional forms of financing projects as well as the unattractive nature of rural communities to private sector investment.

Since the inauguration of the DSF, it has continued to receive international support and recognition. In September 2005, in New York, the Fund was unanimously welcomed by the Heads of State and Government gathered at the United Nations Millennium +5 Summit and again during the WSIS summits of 2003 in Geneva and of 2005 in Tunis. In addition, it has equally enjoyed political backing from various international summits/fora.

The DSF is open to all stakeholders: Nation States, Regional and Local Authorities, International and Regional Organizations, Business Sector Entities and the Civil Society. The Fund is administered by a Governing Board drawn from the various regions of the world to represent Nation States, Local Authorities, Business Sector and the Civil Society. Presently there are 29 founding members of the DSF¹⁰.The

¹⁰ **The 29 founding members of the DSF:**

18 Nation States: Algeria, Saudi Arabia, Burkina Faso, Cameroon, China, Cuba, Dominican Republic, France, Gabon, Ghana, Equatorial Guinea, Kenya, Mali, Mauritania, Morocco, Nigeria, Senegal and Tanzania.

9 Cities and Regions: City of Dakar (Senegal), City of Geneva (Switzerland), City of Lyon (France), City of Paris (France), City of Saint Domingo (Dominican Republic), [Rhône-Alpes Region \(France\)](#), Piedmont Region (Italy), Malaga City (Spain) and Basque County;

Fund mobilises all partners who are committed to the use of ICTs for development, and that is why it is open to all stakeholders.

4.1 Criteria for Project Financing

The Fund is a financing Foundation that subsidises community-based projects addressing insolvent demands, in order to create new activities, new jobs and new markets. Such community-based projects must:

- Respond to the real needs of communities;
- Be adapted to field realities;
- Be respectful of local knowledge;
- Be easily replicated in other communities;
- Provide partnerships between public sector, private sector and civil Society;
- Ensure traceability, transparency and accountability of the financial support.

Priority would however, be granted to projects involving women's organisations – as they are the main providers of food, education, and healthcare. As a financing institution, the Fund allocates:

- 60% of its resources for projects benefiting least developed countries;
- 30% of its resources for projects benefiting developing countries; and
- 10% of its resources for projects benefiting developed countries or countries in transition.

4.2 Projects

Health is wealth and for a nation to contribute and compete favourably in the current global economy, greater percentage of its citizenry must be healthy in order to generate constructive and innovative ideas to boost the economy. DSF is totally committed to building a healthy society through the provision of ICT driven health services in the underserved rural communities of the world. It is therefore based on this that the DSF as soon as it became operational responded favourably to the first request for financing. The Fund's first project was the complete reconstruction of the information system of the Banda Aceh Municipality in Indonesia which was totally destroyed during the 2004 tsunami disaster. Next, it decided to support vulnerable populations, mainly women and children affected by HIV/AIDS in Africa.

1 International Organization: the International Organization of the Francophonie (OIF); and

1 Private Company : StratXX SA

To this effect, the Fund has established 10 projects¹¹ in the area of tele-medicine and tele-education, in Burkina Faso and Burundi. Each beneficiary site has been fully equipped with broadband satellite connection, around 40 computers and all auxiliary IT equipment, including [video-conference and other facilities necessary to the good functioning of the sites](#). WI-FI networks have also been deployed, to provide a connection to nearby clinics, hospitals and other public institutions. Hundreds of such projects are feasible, not only in tele-medicine and tele-education, but in all fields of activity; including public administration and services to citizens, training and employment, income-generating activities and business creation, land and natural resources management, and in the field of arts and culture.

5. One Thousand (1000) Telemedicine Units for Africa

Within the framework of global solidarity, the DSF offers the possibility to finance 1000 telemedicine units in Africa. DSF plans this project with WHO and other partners to provide 1000 tele-medicine projects to district hospitals in Africa¹². These are “à la carte” partnerships in the context of a far-reaching project across the African continent, in collaboration with The Network of French-speaking Africa for Telemedicine (RAFT), University Hospitals of Geneva (HUG) and the Africa Health Infoway (AHI), World Health Organization (WHO). The DSF is using this forum to call on all stakeholders who wish to commit to concrete actions for Africa towards the 1000 telemedicine unit for Africa to join the partnerships.

5.1 Objective of the 1000 telemedicine units for Africa

The project aims to reinforce the skills of doctors at district hospital level by making Internet access available, together with equipment for diagnostic aid and enables knowledge to be shared through the practice of telemedicine.

5.2 Project Description

The project consists of equipping district hospitals with modern and adapted diagnostic tools (ultrasound scan, electrocardiography), as well as Internet connections permitting live or deferred exchanges with experts at a distance and the continued training of health professionals by e-learning. For the district hospitals the simultaneous availability of the connection and adapted medical tools presents three major advantages:

¹¹ DSF 10 projects in the area of tele-medicine and tele-education, in Burkina Faso and Burundi: (<http://www.dsf-fsn.org/cms/content/view/43/77/lang.en/>)

¹² 1000 tele-medicine projects by DSF, WHO and other partners to district hospitals in Africa: (<http://www.dsf-fsn.org/cms/content/view/288/1/lang.en/>)

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- Speed of roll-out, through installation of light-weight infrastructures, (VSAT satellite connection, plus one computer per doctor), easily managed at local level.
 - Fast and easy appropriation of IT and medical tools through "hands-on" training.
 - Connection with existing active networks in the area of telemedicine.

5.3 Why focus on District Hospitals

Many district hospitals are located in areas where electricity, mobile telephony and Internet are available but where current equipment does not allow transfer of medical data to the upper end of the scale in the country, or to hospitals of high international standing. There are also several districts without access to ICTs.

Due to a lack of diagnostic means and specialists, care given to patients in district hospitals is often far from adequate. Delays in the implementation of treatments or unjustified evacuation can be responsible for poor use of already scarce resources and unnecessary suffering for patients. One way of improving this situation is to implement modern diagnostic means, adapted to the field, together with tools to enable long-distance mobilization of the specialists' expertise along with logistical support. The advantages of such an approach have been demonstrated, but there is not yet any wide scale deployment of these tools.

The district hospitals in sub-Saharan Africa are usually used as an initial reference point for 50,000 to 200,000 inhabitants. There may several doctors, as well as a minimal medical and technological platform (laboratory, operating theatre, conventional radiology) which enable some difficult and urgent cases to be taken care of. Training for first call health professionals is also dispensed at district hospital level along with their supervision and co-ordination, as well as the collection and consolidation of field information and indicators which, going up to ministerial level, enable the health system to be managed.

5.4 The Telemedicine

Telemedicine tools permits exchange of information in electronic form and facilitates access to medical expertise from a distance. A doctor who finds himself far from medical expertise can thus consult colleagues at a distance in order to resolve a difficult case, follow a continued education course broadcast on the Internet, or access knowledge banks or digital libraries. The potential of these tools is obvious in countries where specialists are rare and where distances and quality of infrastructure make it difficult for doctors or patients to travel. This is the case for most of the countries of sub-Saharan Africa.

5.5 Equipment required for the Telemedicine Units:

- Satellite aerial and terminal(VSAT)
- Laptop computer with webcam
- Data projector to equip training room (as required)
- Portable digital ultrasound scan station
- Digital electrocardiograph machine
- SOS Kit(blood pressure and glycemia monitoring)
- Electric supply by solar panels (as required)

5.6 Mobilization of Support for the Programme

The towns and local partner communities are invited to mobilize a local resource of tediagnosticians (volunteer doctors, hospitals, aid centers). Operational support structures are necessary, at least at the level of each country concerned, to guarantee an effective mobilization of experts and a response to questions from teleconsultations within a worthwhile timeframe.

The Network French-speaking Africa for Telemedecine (RAFT – University Hospitals of Geneva, Switzerland), has a pool of medical and technical coordinators available in twelve African countries, ready to extend their activities to support these new telemedicine and e-learning services. The collaborative platform of RAFT allows the teleconsultation activities to be structured by defining closed groups who can thus work in a network of confidence and make up “virtual communities”.

The co-operation of other active telemedicine networks in Africa has already been assured:

- World French-speaking Digital University, Paris, France
- World French-speaking Virtual Medical University, Paris, France
- E-Health Stakeholders’ Club (CATEL), Vannes, France
- World Health Organization, eHealth Unit, Geneva, Switzerland
- EMISPHER telemedicine network, Charité Hospital, Berlin

Training workshops for learning the manipulation of diagnostic tools are required. The training will cover the use of remote diagnosis tools, principles of ultrasound for prioritizing emergencies and obstetrics, ultrasound scanning, techniques in directing the care of the patient and possible evacuation to a regional hospital, foetal ultrasound scanning for pregnancy monitoring and early detection of cases which could pose problems at the time of the birth etc. These training programmes, together with the initiation in use of telemedicine tools, will be supplemented by distance learning courses.

5.7 Programming phase

5.7.1 At the level of recipient countries:

- identification of recipient countries and sites (based on an evaluation of needs)
- agreement of the authorities concerned
- identification of local officials (national and local)

5.7.2 At cost estimation level:

- publication of calls for tender (for connection equipment, devices and training)
- evaluation of tenders
- drawing up of an operating budget

5.7.3 At the level of fund raising:

- identification and negotiation of potential financial partners

5.7.4 At the level of partnerships (contents):

- identification of institutional partners for development of content, support and networks

5.7.5 At communication level:

- development of a communications strategy for the whole project

5.8 Operational phase

- agreements with all recipient countries
- contracts with all suppliers
- roll-out of equipment
- field training (seminars)
- setting up of monitoring and evaluation mechanisms

5.9 Evaluation

Evaluation of the impact of these tools is necessary to demonstrate the advantages and justify the expansion of their use. The following indicators can easily be measured:

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- number of scans used for diagnoses and procedures carried out under ultrasound
 - number of scans which modified patient care
 - number of teleconsultations which modified patient care
 - number of medical evacuations avoided
 - number of continued training courses followed

An evaluation of changes in practice resulting from these tools will be the subject of field studies. A measure of the improvement of the state of health of the populations will have to be carried out in the longer term.

6. Innovative Financial Mechanism for Development

In January 2008, United Nations Secretary-General Ban Ki-Moon commented at a press conference in Geneva that, “we don’t need new promises. We need fresh ideas and fresh approaches and the political will to follow through on the promises that Governments made eight years ago. We need to find new ways to honour our commitments, the commitments already made in the Millennium Declaration, the 2002 Monterrey Conference on Financing for Development, and the 2005 World Summit”¹³.

Based on the observation and recalling the International Conference on Development Financing held in Monterrey in 2002, which made it clear that to achieve the Millennium Development Goals, existing sources of financing for development would have to be increased substantially. Within the debate of finding new resources for development, innovative financing mechanism was identified as an initiative that will help us in closing the financing gap in achieving the MDGs. Since that Conference, there have been concerns that the traditional development assistance has not matched the expectations.

According to the Organization for Economic Co-operation and Development (OECD)¹⁴ annual report 2008, “the total Official Development Assistance (ODA) provided in 2006 by the members of Development Assistance Committee (DAC) fell to US\$104.4 billion which is 4.5% lower than 2005, while the unsolved problems continue to grow”. “The official development assistance (ODA) from members of the DAC fell further by 8.4% in 2007 to US\$103.7 billion” according to provisional data

¹³ UN Secretary-General Ban Ki-Moon, Opening remarks at news conference, Geneva, 23 January 2008, http://www.un.org/apps/news/infocus/speeches/search_full.asp?statID=176 As specified in the document, this was UN General Assembly Resolution 60/1, 2005

¹⁴ OECD Report 2008 Development and global relations: www.oecd.org/dataoecd/39/19/40556222.pdf. Page 69

report by the members¹⁵ In addition to the traditional problems, new challenges to development are emerging and deepening, including the digital divide especially in addressing rural connectivity. Regrettably, from OECD report¹⁶, progress towards achieving the MDGs as illustrated above is far from satisfaction. This further strengthens the arguments for the need for alternative means of mobilizing resources for development.

During the Millennium+5 Summit in 2005, at the initiative of Brazil, Chile, France, Algeria, Spain and 79 other countries, a declaration was adopted inviting the international community to reflect on the implementation of solidarity contributions aimed at mobilizing additional resources to provide stable means for financing development. A Conference was held in 2006 in Paris to examine and review the following financing mechanisms for development:

- Environmental taxes, primarily through levy on air and sea transport;
- Taxation on financial transactions;
- Taxation on arms trade;
- The use of special drawing rights;
- International financing facilities;
- Voluntary contributions.

As a result of the Conference the “Leading Group on Solidarity Levies to Fund Development” was established for innovative financial mechanism. One of the Leading Group’s goals is to provide substantial and sustainable additional long term resources to foster economic and social development. Today, the “Leading Group” is composed of 54 countries¹⁷ (from the North and the South) and 2 observers and has held four plenary meetings (Brasilia/July 2006, Oslo/February2007, Seoul/September 2007 and Dakar/April 2008). For the next 6 months (May to November 2008, The Leading Group is presided by Guinea (Conakry). May I therefore add that solidarity levies are considered a necessary

¹⁵ Development Co-operation Directorate(DCD-DAC) of OECD:

http://www.oecd.org/document/8/0,3343,en_2649_33721_40381960_1_1_1_1,00.html

¹⁶ OECD Report 2008 Foreword: www.oecd.org/dataoecd/39/19/40556222.pdf Page 8

¹⁷ South Africa, Algeria, Germany, Saudi Arabia, Austria, Bangladesh, Belgium, Benin, Burundi, Brazil, Cambodia, Cameroon, Cape Verde, Chile, Cyprus, Congo, Ivory Coast, South Korea, Djibouti, Spain, Ethiopia, Finland, France, Gabon, Guatemala, Guinea, Guinea Bissau, Haiti, India, Italy, Jordan, Lebanon, Liberia, Luxembourg, Madagascar, Mali, Morocco, Maurice, Mauritania, Mexico, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Norway, Poland, Central African Republic, The United Kingdom, Senegal, Sao and princible, Togo, Uruguay, (two observant countries: China and Japan).

supplement, not a substitute for conventional Official development Assistance (ODA).

7. The One Percent (1%) Digital Solidarity Contribution

Within this debate on innovative financing mechanism for development, the Global Digital Solidarity Fund (DSF) proposed the 1% Digital Solidarity contribution on Information and Communication Technologies (ICTs) related public procurements; the proceeds of which will be allocated specially to fight the digital divide. Considering that the 1% digital solidarity principle is to complement traditional development funding by offering stable sources of revenue that would be used specifically to reduce the digital divide, the Leading Group decided to include this principle as one of the innovative financing mechanisms for development. To implement an equitable information society, this principle should have universal application. Senegal has therefore proposed the adoption of an International Convention endorsing this principle. The text of the Convention was discussed for the first time in January 2008 during an Expert Meeting of the Leading Group in Dakar. The Convention is being examined and its adoption is among the objectives of the Guinean presidency of the leading group

The digital solidarity principle would be clearly stated in the public bids and the winning vendor would commit to contribute 1% of the transaction to the Fund. The 1% digital solidarity contribution requires voluntary commitment of public and private companies and other stakeholders that have won bids for public ICT procurement contracts, to make a contribution of 1% of the transaction to the DSF for use in addressing ICT related challenges especially in the rural communities of Africa. For instance, any organization or institution can decide to introduce this clause in all its bids related to the ICT sector. The terms of this clause states that the vendor who wins any ICT related contracts at such organization or institution would pay 1% of such transactions to the DSF. For the winning vendor, this is neither a tax nor a donation, but an investment as the contribution will be invested to open new markets in the same sector in rural communities in the developing world. In recognition of this contribution, the winning vendor receives a **digital solidarity label**.

From the perspective of the public institution, this financing system also has the advantage of being quite simple to implement: it can be easily applied following three steps¹⁸: First, the public entity has to adopt the Geneva principle pursuant to

¹⁸ DSF, Applying the “1% Digital Solidarity” Principle, <<http://www.dsf-fsn.org/cms/content/view/40/74/lang,en/>>

its administrative regulation and competences; once the decision is formally taken, the institution has to inform the DSF by sending its decision to introduce the 1% digital solidarity clause in its calls for bids by mail or by post. Second, the digital solidarity clause can then be included in the calls for bids for the supply of ICT related goods or services. Finally, when the contract has been awarded, the institution solely has to inform the DSF of the name of the successful bidder and the value of the contract using a DSF “information about the contract” form, which is available online¹⁹; this information is always treated with complete confidentiality.

The DSF received the support of the ACP for the 1% digital solidarity principle during the 5th ACP Summit²⁰ held in Khartoum in December 2006 called the “Khartoum Declaration”. The ACP accepted the digital solidarity principle as veritable means of mobilizing resources and has called on its development partners to implement it. The DSF also wishes to report that the principle has been tested and it works. Already, 17 companies, 3 public institutions, 2 Local authorities and one Nation State have agreed to implement the 1% digital solidarity principle²¹.

Civil Society Groups from both the North and South have made firm commitment to support the 1% digital solidarity contribution proposed by the DSF. In a report titled “Breaking the Taboo”²² published by the Commonwealth Foundation²³, the Civil Society Organizations (CSO) from the North and South (across Africa, Canada and Europe) met in Dakar Senegal from 19 – 20 April 2008 to analyze and share views on the innovative financing mechanisms for development. The CSO presented a statement at the end of their meeting, to the Fourth Plenary Meeting of the Leading Group on Solidarity Levies to Fund development reaffirming the importance of the March 2002 Monterrey consensus and the 2008 Doha review process. The CSO which comprises of many members²⁴ informed that to meet the

¹⁹ Information on DSF contract form: http://www.dsf-fsn.org/cms/documents/en/pdf/information_contract_en.pdf

²⁰ 5th ACP Summit “Khartoum Declaration” : <http://www.5thacpsummit.gov.sd/>

²¹ The following have adopted or are applying the 1% Principle: Republic of Senegal, City of Geneva, City of Lausanne, BCom SA, Bedag Informatique SA, Comsoft Direct SA, Coris SA, Dimension Data SA, Documents Ad Hoc Sàrl, E-Secure Sàrl, Hewlett-Packard International Sàrl, Hôtel Intercontinental, Ilem SA, Sopra Informatique SA, SQLI Suisse SA, Telecom Systems, Tonality Distribution inc, WISeKey SA, Xerox SA, Caisse de Prévoyance (CIA), Geneva Hospital (HUG), Hospital Centre of Vaud Canton (CHUV)

²² Commonwealth Foundation: Breaking the Taboo: Perspectives of African Civil Society on Innovative Sources of Financing Development: http://www.dsf-fsn.org/cms/documents/en/pdf/breaking_the_taboo.pdf

²³ Commonwealth Foundation website: www.commonwealthfoundation.com

²⁴ The Association of NGO’s (TANGO), Gambia; Conseil des ONG d’Appui au Développement (CONGAD); Nigeria Network of NGOs; Association pour la Démocratie, Les Droits de l’homme et la Bonne Gouvernance, Fédération des ONG de la Société Civile Camerounaise (FOSCAM); Africa Development Interchange Network (ADIN), Cameroon; Children Education Society

challenges the world faces today requires significant and sizeable new sources of finance for development which are additional, predictable and sustainable. They further recognized “the urgency of carrying forward more fully research and information on the development impacts of the information society including the facilitation of the transfer of technology”. The CSO finally endorsed the 1% Digital Solidarity Principle and supported the idea of widening the scope and “the calculation basis of the 1% collection within the digital solidarity fund mechanism”.

The advantage of this mechanism to mobilize resources is that, while it does not require additional funding from public authorities, it can generate millions of dollars, provided it is universally implemented. It requires nothing from public authorities more than political will. This digital solidarity clause has no financial impact on the organization that applies it, as the financial contribution is paid by the vendor or company that wins the procurement contracts. The winning vendor gains tremendously, as the 1% collected will be used by the DSF will buy back equipment or services from the market. Furthermore, by investing the money in ICT equipment and services in populations with insolvent demands, the ICT markets will be expanded, creating new opportunities for the vendors.

At the end of the day, the “Information Society Marshall Plan” being proposed by the DSF will benefit the ICT market operators. Through this principle, the international community can mobilize billions of dollars for the implementation of projects and programmes for a more equitable information society.

8. Way Forward in Addressing eHealth challenges

At its 4th Plenary Session in Dakar/April 2008, the Leading Group on Solidarity Levies has endorsed this principle and has agreed to further negotiate the Convention to enable for it to be considered for adoption by all member countries of the Group at its 5th session (Conakry/October 2008). Once it is adopted by the Leading Group, the Convention will be tabled at the Lyon World Conference of Digital Solidarity, which will be held, at the invitation of President Nicolas Sarkozy, on 24 November 2008. This Conference presents an opportunity to mobilize resources for rural community projects especially eHealth services and the adoption of an International Convention on Global Digital Solidarity Fund. At this Conference, the DSF will also submit request for community-based projects,

(CHESO), Tanzania; Liga mocambicana dos Direitos Humanos, Mozambique; South African National NGO Coalition; North South Institute, Canada; Social Watch, Uruguay; Commonwealth Foundation ,UK; Ubuntu: World Forum of Civil Society Networks; Network Movement for Justice and Development (NMJD), Sierra Leone.

including eHealth projects from the developing world and the 1000 telemedicine units for Africa to development partners for funding. These processes are expected to lead to a win-win solution with regards to the problem of digital divide.

This Pan African Conference on Telemedicine & eHealth presents an opportunity to consider and support the adoption and application of the digital solidarity contribution. Africa (government, business and civil society groups) should send a clear signal to the rest of the world that the continent is demanding for a more equitable healthy information society governed by the principle of global solidarity.

This can be achieved if Africa is able to support the 1% digital solidarity principle, harmonize its position and project proposals and present them at various meetings especially at the World Conference in November 2008. Endorsement of the 1% digital solidarity principle would provide the means of breaking the exclusion of various developmental projects to which rural communities in Africa and other developing regions are currently facing. Africa should not forget the international community is preparing for the Doha Summit in November/December 2008 to review the commitments of the Monterrey Conference of Development Financing of 2002. It is the desire of the international community that the MDGs will be achieved by 2015.

If the draft Convention on the DSF receives the support of Africa, it will become the expression of the continent for the international community to support actions, including the 1% principle, as means of mobilizing the resources to reduce the digital divide which will provide resources for telemedicine. I therefore wish to appeal to this conference to:

- Support the adoption by the international community of the 1% digital solidarity contribution as a complementary and innovative means of mobilizing resources devoted to reducing the digital divide and provision of health services using ICT as a tool.
- Urge and call on Governments and other stakeholders to join the DSF and implement the 1% digital solidarity principle.
- Help in mobilization of stakeholders to partner with the DSF to implement community-based projects like the 1000 telemedicine projects in district hospitals and health centres in the rural areas.
- Welcome the initiative of France to host a World Conference on Digital Solidarity on 24 November 2008.

9. Conclusion

Ladies and gentlemen, provision of ehealth services to the rural/underserved communities of Africa using ICTs as a tool especially for telemedicine is not an end itself but a very important gateway in realising the MDGs. We are halfway into the target year of 2015 to achieve the MDGs but Africa still faces numerous challenges especially that of mobilizing enough resources to meet the targets. The Pan African Conference presents an opportunity to deliberate on the challenges of using ICT and other infrastructures for eHealth services and to support the adoption the 1% digital solidarity principle as an innovative financing mechanism devoted to reducing the digital divide for development especially in the health sector. Africa should demand and call on development partners to support the need for a more equitable information society governed by the principle of global solidarity.

Endorsement of the 1% digital solidarity principle would provide the means of breaking the exclusion to which rural communities in Africa and other developing regions are currently facing and guarantee access to eHealth services. It is the desire of the international community that the MDGs be achieved by 2015. African stakeholders should take the lead in supporting the adoption of the 1% digital solidarity contribution because the support that the Fund would get from other regions of the world for financing development projects would largely depend on the support that it gets from Africa, which is the major beneficiary of the Fund's activities.

Thank you for your attention.

African Regional Bureau

Global Digital Solidarity Fund

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**UNIVERSAL HEALTH SERVICE DELIVERY IN AFRICA:
LEVERAGING THE EMERGING TELECOM INFRASTRUCTURE
FOR AN INTEGRATED
EHEALTH NETWORK**

@

PACTe/NICTe 2008

Abuja, Nigeria. 18-19 September 2008

Adesina Iluyemi

eHealth Change Management & Policy in Africa

Char, Global Health, NEPAD Council

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Health Problems in Africa/ Nigeria

- Africa has a population of about ONE billion people
 - Up to 70% lives in isolated rural areas
 - Half lives on half a dollar per day
 - Poor telecom & transportation infrastructure
- Lack of Infrastructure and Capacity...Healthcare delivery
- Brain Drain: International and Local (Rural vs. Urban)
 - Africa has 10% of world population with 25% of global health burden but with only 3% of global health workforce
- Poverty & Financial constraints
 - HIV/AIDS accounted for 2.4 million deaths alone in 2002
 - 40% survive on less than \$1 per day
 - Malaria related mortality is at 1 million deaths (mostly children) yearly
- Health Problems in Africa/Nigeria
- Enormous economic cost on health systems

-
-
- 10% of individual income
 - Human resources impact

Health Priorities driven by Millennium Development Goals (MDGs) are

- 8 Goals set by United Nations in 1999/2000 to achieve for specific 18 targets by 2015
- 3 MDGs are health related
- Common Risk Factor is Poverty
 - Hence, need for sustainable financial solution
- Target #18 of MDGs calls for using Information & Communication Technologies (ICTs) towards MDGs attainment

eHealth as an Enterprise service

- eHealth is the use of information (data) and communication technologies for health processes (Health System) either locally and at a distance (WHO 2005).
- eHealth involves telemedicine, telehealth, telecare, health management information systems, health knowledge systems etc.
- Health System is information, data and communication intensive and requires more than SMS
 - Health Workers as “Knowledge Workers”
 - Patients as citizens (Citizen-centric eHealth)
 - Health System as Data processing & communication enterprise
- eHealth services require enabling ICT infrastructure
 - Telecommunication Infrastructure (TI)
 - Internet Access Devices (IADs)

Why eHealth for Nigeria/Africa?

- To provide access to distributed health knowledge and information to mostly rural health workers.
- Urgency is required to meet the MDGs targets and to reverse the poor health and developmental ratings
- Geographical barriers to access health service provision especially in Africa (rural areas).
- Connectivity (wireless telecommunications) is becoming widely accessible and available even in rural communities
- But there are issues: Cost, telecom infrastructure, existing health problems etc
- Policy for eHealth in Africa
- Africa Union/ New Partnership for Africa's Development (NEPAD)
- NEPAD's Action Plan Strategy on sector development
 - Alignment between telecom and health sectors
 - Calls for a continental-wide eHealth infrastructure based on wireless telecom infrastructure
- NEPAD's eHealth for:
 - Communication system
 - Integration of & access to vertical HISs
 - Extending healthcare to isolated and rural communities and populations
- Global Policy for eHealth
- Global initiatives in favour of eHealth is being championed by The World Health Organisation (WHO) under the Global Observatory for eHealth (GOe) (WHA 58.18)
- The European Union has plans for eHealth in Africa

-
-
- Using wireless/mobile technologies
 - International Telecommunication Union (ITU) since 1998 has commissioned eHealth projects in developing countries using mostly wireless technologies
 - The ITU-D Q14 Working Group is focussed on eHealth strategy and policy development with interest in mobile/wireless technologies especially in developing countries

Integrated eHealth Model

- Geography
- Applications
- Access
- Services
- Levels of Government
- Health System (Facilities)
- Technology (Hardware & Software)
- Telecom Infrastructure
- Integrated eHealth Model
- Telecom in Nigeria
- Telecommunication boom is on in Nigeria and other African states
 - Mobile- SMS, Voice, Broadband
 - Wireless- WiFi, WiMAX
 - Fibre-optics- SABI, Rural Internet programme
 - Satellite
 - ISDN
- Computer devices (hardware) and peripherals are becoming cheaper and locally manufactured

-
-
- Local Software initiatives are on
 - Patchy initiatives are on ground in Africa
 - NigComSat 1 Telemedicine programme
 - Fantasua in Kaduna
 - Private Hospitals
 - Lagos State initiative

What is missing?

- eHealth Policy in Nigeria
- eHealth is in the National ICT policy
- But a dedicated National eHealth Policy is urgently needed
- To provide a framework for eHealth Development in Nigeria
- Should address local health needs and locally driven solutions
- Should integrate local & state level roles and responsibility
- eHealth Investments in Nigeria
- Government funding & support for:
 - National, State, Local
 - Telecom Infrastructure
 - Innovation & Enterprises
 - Research & Development
 - Pilot projects for local solutions
- Telecom Operators
- Banks
- International Donors/NGOs
- International Investors

-
- eHealth Partnerships
 - Public
 - Private
 - Industry
 - Academia/ Universities
 - Health Organizations
 - Investors/Funders
 - NGOs
 - International Collaborators

Conclusion/ Recommendation

- **eHealth services & products have potentials for Nigeria and Africa in general to meet her health needs & MDGs targets**
- **“The multifaceted challenges in Africa defy a single prescription. What is needed is a nuanced approach, tailored to the particular needs of each country” (ADB 2008)**

INTEROPERABILITY IN EHEALTH: THE MISSING LINK

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Prologue:

“Imagination is more important than knowledge” – Albert Einstein

So The Nigerian Head of State has defined the 7 Point Agenda and Vision 20/20

Introduction – Client Centered-Evidence-Based

- Health Informatics
- The Four Quadrants (Telemed/eHealth)
- Interoperability

Reliable Data: The Missing link

- Decision Support
- The Way Forward
- WHO 2005

Fact or Fiction?

The WHO’s new estimate shows that about half a million women died of maternal causes in 2005. Nearly 99% of these maternal deaths occurred in developing countries, mainly in Sub-Sahara Africa. The WHO data (2005) lists Nigeria as one of the nations with 1000 maternal deaths per 100,000

Even with the global commitment to reduce the maternal mortality ratio by 5.5%, the current rate of decline is about less than 0.4% per annum.

Fact or Fiction?

According to the UNAIDS (2007), the [HIV/AIDS](#) rate (4.4%) in Nigeria is much lower compared to the other African nations such as [Kenya](#) or [South Africa](#) whose prevalence rates are in the double digits

However, Nigeria has the third highest number of people living with HIV/AIDS in the world – after India and South Africa!!!!!!

Fact or Fiction?

A breakdown of HIV national prevalence of 4.4% shows prevalence ranges from 1.6% in Ekiti in South West Zone, to one as high as 10% in Benue in North Central Zone

The UNAIDS (2007) stated: “A recent development in sub-Saharan Africa (SSA) is the emergence of injecting drug use as a potential factor in the HIV epidemics of several countries, notably those of Kenya and Tanzania (as well as Nigeria and South Africa).”

Six most Lethal Infectious Diseases among Children

Every hour 1,500 people – mostly children in developing countries die from tuberculosis, malaria, measles, chronic diarrhea, AIDS and acute respiratory diseases

MDGs

Furthermore, Nigeria, like many sub-Sahara African (SSA) countries is neither on track to achieve the Millennium Development Goals (MDGs), nor Africa 2015 and is not even adequately implementing Abuja Declaration of 15% allocation of the national budget to Health. Besides poverty and other mitigating socio-economic issues, there is mass public illiteracy including public health illiteracy

Core Health Indicators

The impact of this problem is vividly illustrated by a snapshot of Nigeria’s public health status and poor results on many of the WHO core health indicators. For example, the life expectancy for males and females in Nigeria is 47 years and 48 years, respectively, compared to 75years and 80 years for American males and females respectively

There are other sobering core health indicators that will be discussed later

Fact or Fiction?

Nigeria, like many developing countries, also faces a current [polio](#) crisis as well as periodic outbreaks of [cholera](#), [malaria](#), and [sleeping sickness](#)

Nigeria does not perform well in other core indices of health including Chronic Diseases The life expectancy for males and females in Nigeria is 47 years and 48

years, respectively, compared to 75 years and 80 years for American males and females respectively

Fact or Fiction?

United Nations (UN) data (2006): Nigeria has been undergoing an explosive population growth and has one of the highest growth and fertility rates in the world.

Projects Nigeria will be one of the countries in the world that will account for most of the world's total population increase by 2050

This population is young –

Fact or Fiction?

UN (2006) estimates indicated that almost half of Nigeria's population (42.3%) is between 0 -14 years of age, while 54.6% is between 15-65 years old

Although the death rate is high (at 16.9 per 1000 people), the [birth rate](#) is significantly higher (at 40.4 per 1000 people)

Informatics

The application of information technologies to optimize the information management function within an organization

Information management

Assuring that the right information is available to the right people, within and without an organization, at the right time and place, and for the right price

This is health informatics!

Bioinformatics

1. Biological structure informatics
2. Computational biology
3. Expression profiling and microarrays
4. Genomic ontologies
5. Genomics
6. Linking the genotype and phenotype
7. Neuroinformatics

8. Pharmacogenomics

9. Proteomics

Clinical Informatics

10. Barriers to clinical system implementation

11. Clinical systems in ambulatory care

12. Clinical systems in high intensity care

13. Careflow and process improvement systems

14. Disease management

15. E-health and clinical communication

16. Evaluation of health information systems

17. Health data warehousing

18. Health information systems

19. Integrated health and financial systems

Education and Training

20. Computer-assisted medical education

21. Consumer health information

22. E-learning or distance learning

23. Education and training

24. Library information systems

25. Medical informatics teaching

26. Patient education and self-care

27. Professional education

Human Information Processing and Organizational Behavior

28. Cognitive models and problem solving

29. Data visualization

30. Natural language understanding and text generation

31. Human factors and usability

32. Human factors and user interfaces

33. Human-computer interaction

34. Models of social and organizational behavior

35. Natural language processing

Bioinformatics

- Biological structure informatics
- Computational biology
- Expression profiling and microarrays
- Genomic ontologies
- Genomics
- Linking the genotype and phenotype
- Neuroinformatics
- Pharmacogenomics
- Proteomics

Clinical Informatics

- Barriers to clinical system implementation
- Clinical systems in ambulatory care
- Clinical systems in high intensity care
- Careflow and process improvement systems
- Disease management
- E-health and clinical communication
- Evaluation of health information systems
- Health data warehousing
- Health information systems
- Integrated health and financial systems
- Evidence-Based Medicine and Public Health

Rise of Evidence-Based Medicine (EBM)

First described in 1992

A new approach to teaching medicine

A “revolution” in medical practice

Other “evidence-based” approaches: ethics, psychotherapy, occupational therapy, dentistry, nursing, and librarianship

Definition of EBM

“The integration of best research evidence with clinical expertise and patient values.”

Evidence-based medicine (EBM) aims to apply [evidence](#) gained from the [scientific method](#) to certain parts of medical practice. It seeks to assess the quality of evidence relevant to the risks and benefits of [treatments](#) (including lack of treatment)

WHO Malaria Control and DDT

WHO is currently facing a double challenge – a commitment to the goal of drastically and sustainably reducing the burden of vector-borne diseases, in particular malaria, and

At the same time a commitment to the goal of reducing reliance on DDT in disease vector control, in line with the Stockholm Convention which entered into force in May 2004.

Evidence Based Medicine continued

EBM recognizes that many aspects of medical care depend on individual factors such as [quality](#) and [value-of-life](#) judgments, which are only partially subject to scientific methods.

EBM, however, seeks to clarify those parts of medical practice that are in principle subject to scientific methods and to apply these methods to ensure the best [prediction](#) of outcomes in medical treatment, even as debate about which outcomes are desirable continues.

EBM continued

Practicing evidence-based medicine requires clinical [expertise](#), but also expertise in retrieving, interpreting, and applying the results of scientific studies and in communicating the risks and benefits of different courses of action to patients

According to the [Centre for Evidence-Based Medicine](#), "Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients."

EBM

Using techniques from [science](#), [engineering](#), and [statistics](#), such as [meta-analysis](#) of [medical literature](#), [risk-benefit analysis](#), and [randomized controlled trials](#), EBM aims for the ideal that [healthcare](#) professionals should make "conscientious, explicit, and judicious use of current best evidence" in their everyday practice.

Three Distinct areas of EBM

Generally, there are three distinct, but interdependent, areas of EBM. The first is to treat individual patients with acute or chronic pathologies by treatments supported in the most scientifically valid medical literature. Thus, medical practitioners would select treatment options for specific cases based on the best research for each patient they treat.

Three Distinct areas of EBM continued

The second area is the [systematic review](#) of medical literature to evaluate the best studies on specific topics. This process can be very human-centered, as in a [journal club](#), or highly technical, using computer programs and information techniques such as [data mining](#). Increased use of [information technology](#) turns large volumes of information into practical guides.

Three Distinct areas of EBM continued

Finally, evidence-based medicine can be understood as a medical "movement" in which advocates work to popularize the method and usefulness of the practice in the public, patient communities, educational institutions, and continuing education of practicing professionals.

Factors Driving EBM

- Overwhelming size of the literature
- Inadequacy of textbooks
- Difficulty synthesizing evidence and translating into practice
- Increased number of (Randomized Control Tests) RCTs
- Available computerized databases
- Reproducible evidence strategies
- Critique of EBM
- De-emphasizes patient values
- Doesn't account for individual variation
- Devalues clinical judgment
- Leads to therapeutic nihilism

Development of Evidence-Based Public Health (EBPH)

Jenicek (1997) published a review discussing epidemiology, EBM, EBPH

Epidemiology described as the foundation of both EBM and EBPH

EBPH unique in using complex interventions with multiple community and societal issues

Malaria Research in Kenya

The CDC works with the Kenyan Medical Research Institute to study and prevent Malaria

Nearly three hundred researchers work on various projects near Lake Victoria and Kisumu

The Researchers use Differential Global Positioning Systems to collect positions and data in the field and then then edit and analyze this data in ArcView GIS

Old Method, New Twist

- Every six months, today's bednets are treated with colorless insecticides which offer better protection
- They are left to dry before use
- Treated bednets prevent mosquitoes from getting close and also repels them
- A bednet costs only about \$5 – but must be well maintained and used properly

Definition of EBPH - 1

“EBPH is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of communities and populations in the domain of health protection, disease prevention, health maintenance and improvement.”

Jenicek (1997)

Definition of EBPH - 2

“EBPH is the development, implementation, and evaluation of effective programs and policies in public health through application of principles of scientific reasoning, including systematic uses of data and information systems and appropriate use of program planning models.” Brownson (1999) Steps of EBPH by

Brownson et al

Develop an initial statement of the issue

Search the scientific literature and organize information

Quantify the issue using sources of existing data

Develop and prioritize program options; implement interventions

Evaluate the program or policy

Steps of EBM

Convert the need for info. into an answerable question

Track down the best evidence

Critically appraise that evidence

Integrate the appraisal with one's clinical expertise and the individual patient

Evaluate

Comparison of the Steps

As presented previously, here are the steps of EBM, for comparison:

Convert the need for info. about prevention, diagnosis, prognosis, therapy, and causation into an answerable question

Track down the best evidence to answer that question

Critically appraise that evidence for its validity (closeness to the truth), impact (size of effect), and applicability (usefulness in one's clinical practice)

Integrate the appraisal with one's clinical expertise and with the patient's unique biology, values, and circumstances

Evaluate one's effectiveness in executing the first four steps and seek ways of improving one's EBM approach.

EBM and EBPH Parallel

State the scientific question of interest

Identify the relevant evidence

Determine what information is needed to answer the scientific question

Determine the best course of action considering the patient or population

Evaluate process and outcome

This extensive survey report answers to pressing questions about the implementation of new technologies, The Internet and those associated with it like the Web, the blog, YouTube etc

The next survey in progress is regarding the transition to electronic medical records, and the role of Health informaticists within organizations such as University Teaching Hospitals.

Extensive Survey on Basic IT/ICT use in Nigeria

This extensive survey report answers to pressing questions about the implementation of new technologies, The Internet and those associated with it like the Web, the blog, YouTube etc

The next survey in progress is regarding the transition to electronic medical records, and the role of Health informaticists within organizations such as University Teaching Hospitals.

- Renewed industry focus on patient safety
- Escalating healthcare costs
- Chronic labor shortage
- Explosion in biomedical and healthcare research

Interoperability – Bellagio (Italy 7-14-08 to 7-18-08)

"Interoperability' means the ability to communicate and exchange data accurately, effectively, securely, and consistently with different information technology systems, software applications, and networks in various settings, and exchange data such that clinical or operational purpose and meaning of the data are preserved and unaltered." [1]

[1] Executive Order of the President of the United States, August 22, 2006

For our purposes, we will focus on interoperability standards as the agreed upon common elements within and between systems that allows the effective and reliable re-use of health information

Interoperability: Assumptions

We are making two key assumptions that are operative for interoperability standards work:

As much as possible, health information systems should record a piece of data only once which can then be reused accurately for different or similar purposes elsewhere in the system or in other systems.

In general, data interoperability is preferable to monolithic integrated systems. Integrated systems appeal due to an appearance of simplicity; there is no need to develop a semantic infrastructure, for example. However, integrating systems into a single monolithic technological platform is not desirable due to high risk of failure, reduced opportunities for innovation, and unlikelihood of buy in from groups that have already invested substantially in their own systems already customized to their needs.

Current Situation

Data from facility based, district, LGAs, State, national and international health information systems have been a historically unreliable basis for decision-making. Aside from a few 'positive deviants', health information systems in country tend to be fragmented, inaccurate, cumbersome, untimely and often isolated. Even within the same ward of a hospital, several systems for recording the admission of a patient may exist depending on which entrance is used.

The result is poor use of health data at the facility or at higher levels of the health system. Program monitoring may rely more on surveillance, surveys, or statistical estimation methods for information rather than routine patient data. Continuity of care is disrupted through poor record keeping between visits, when clinicians change, or when records do not easily follow mobile patients between facilities.

Even the most sophisticated drug procurement systems, when not linked to reliable patient data, cannot reliably predict demand, leading to stock outs . In the case of HIV or TB treatment the consequences, including the increased risk of drug resistance, are clear

Paper systems or inappropriate electronic systems often cannot cope with the volume of patients and often fail. Duplicate and contradictory data elements exist, whether in the form of double entry of an individual's data or contradictory disease

indicators from separate departments which drew data from parallel and uncoordinated databases on the same patient population

The number of standards related issues in a national health information system is large and the problems complicated. We propose to break down the issue of interoperability standards into five distinct priority areas, based on the authors' experience of working with systems developers, implementers, Ministries of Health, donors, and others, primarily in sub-Saharan Africa but also in other geographies such as Southeast Asia and Eastern Europe as well

Patient Record

- Cryptography, database security, and anonymization
- Database access and delivery
- Database design and construction
- Data standards and enterprise data sharing
- Patient record management
- Privacy, confidentiality, and information protection
- Standard medical vocabularies
- Standards for coding
- Standards for data transfer
- Screen shot of an EMR

Ten Functional Requirements of the EMR/EHR

Education and Training

- Computer-assisted medical education
- Consumer health information
- E-learning or distance learning
- Education and training
- Library information systems
- Medical informatics teaching
- Patient education and self-care
- Professional education

Innovative Technologies in Health Care

- Computer-communication infrastructures
- Internet applications
- Mobile computing and communication

-
-
- Portable patient records
 - Security and data protection
 - Software agents and distributed systems
 - Telemedicine
 - Virtual reality
 - Wireless applications and handheld devices

Innovative Technologies in Health Care continued

- Knowledge Management
- Automated learning and discovery
- Clinical guidelines and protocols
- Controlled terminology, vocabularies, and ontologies
- Intelligent data analysis and data mining
- Decision support systems
- Knowledge management
- Knowledge representation
- Neural network techniques
- Pattern recognition/classification

Organizational Issues

- Careflow management systems
- Care delivery systems
- Cooperative design and development
- Economics of care
- Ethical and legal issues
- Health services evaluation: performance and quality
- Organizational impact of information systems
- Quality assessment and improvement
- System implementation and management issues
- Technology assessment
- Decision Support
- The Interactive Flash Map
- Decision Making
- Error Reduction
- Better Decision
- Electronic Medical Records
- GIS

-
- GPS
 - Other tools
 - GIS examples
 - GIS stands for Geographic Information System
 - GISA stands for Geographic Information System and Analysis

GIS is a computer-based tool for mapping and analyzing features and events on earth

Body Viewer by GeoHealth Inc. is an ArcView GIS extension

Used by CorVel and other companies to deliver workman's compensation billing statistics with clear injury focus

Facilitates the analysis of over 14,000 ICD-9 codes used by the healthcare industry to index ailments, treatments and procedures

Body Viewer uses the Musculoskeletal System to describe injuries to the head, neck, arms, back, and legs

Used also to find the most frequent musculoskeletal injuries by their ICD-9 codes

Injuries to the vertebral column (dark blue) are the most common

More specific second map drills it down to lower back and spine

The Way Forward

Mobile Computing

A **mobile device** (also known as **converged device**, **handheld device**, **handheld computer** or simply **handheld**) is a pocket-sized computing device, typically comprising a small visual display screen for user output and a miniature keyboard or touch screen for user input. Use of hand-held or portable devices to assist providers with data entry/retrieval

Mobile computing is poised to revolutionize the way patient care can be delivered and practiced at the point-of-care to help increase patient safety, reduce the risk of medical errors and improve clinician productivity. Clinicians can use mobile devices over wireless network to quickly, efficiently and securely:

Typical Mobile Services

Smartphone

Personal digital assistant

Mobile phone

Information appliance

Personal Communicator

Handheld game console

Ultra-Mobile PC

Handheld television



Hasso
Plattner
Institut

IT Systems Engineering | Universität Potsdam

– Improving Health Care
by Secure Internet-based IT-Systems

Prof. Dr. Christoph Meinel
Hasso-Plattner-Institute
University of Potsdam, Germany
President and CEO



Christoph Meinel - Short Introduction

...my Person www.hpi.uni-potsdam.de/meinel

- Full Professor for Computer Science since 1991
- Since 2004 director of the Hasso-Plattner-Institute and professor for "Internet Technology and Systems"

■ Recent **research** focuses on:

- IT-Security e.g. SOA-Security or Lock-Keeper (licensed by Siemens)
- E-Learning and Teleteaching e.g. www.tele-task.de
- Telemedicine and E-Health

...my Institute www.hpi.uni-potsdam.de

■ **Hasso-Plattner-Institut** (HPI) is an university Institute at University of Potsdam, Germany specialized in **IT-systems engineering**

■ 10 Profs, 50 lecturer, 250 Bachelor and 100 Master student, 80 PhD-students

■ HPI belongs to the **top 5** of German-speaking IT-institutes

■ Completely financed by the foundation of the SAP founder Hasso Plattner



**Hasso
Plattner
Institut**

IT Systems Engineering | Universität Potsdam

Telemedicine and E-Health –
Medical Services through IT-Technology

E-Health Some Quick Facts!

E-Health – using digital computing systems to *store, process, analyze and deal* with *medical* and *patient* info to improve a societies health care system

■ What kind of Information?

General: Personal ID

Demographic: name, national security no., date of birth, etc.

Administrative: current location, date of admission, dates of hospital visits, etc.

Clinical: procedure codes, diagnoses, drug dosages, test results, etc

■ System Participants:

Medical Organizations (hospitals, clinics and pharmaceutical companies)

Professionals (doctors, physicians, nurses, pharmacists): provide the healthcare

Insurance Organizations: do the financing

Patients: look for adequate treatment

■ E-Health record is a private lifetime record



E-Health and Tele-Medicine: Complementing Services to Patients

E-Health

- The use of web portals offers astounding opportunities to share information between healthcare professionals and to reduce the costly paper trail

- The healthcare system has shifted from a “hospital based” one into a distributed one that advanced into homecare system with treatment and management of chronic diseases for the elderly via Internet

Tele-Medicine

- Involves the use of medical information transferred from one site to another through electronic communications to improve patient’s health care including diagnosis and treatment

- New Study finds telemedicine leads e.g. to better stroke treatment

Services Through IT-Technology

Intelligent Data Warehouses contain

- clinical data, advanced medical imaging, molecular medicine, tissue microarray analysis, pharmaceutical information ...

- patient journals: physiological parameters, outer indications, patient history

- Chronic and infectious disease analyses

Access to expert knowledge

- web and specialist databases,

- Online Diagnosis

- Online Counseling: general, psychiatric, chronic, tele-rehabilitation, - physiotherapy

Remote Healthcare

- Home care systems for elderly

- Body sensors wirelessly linked to a mobile phone that interacts with

remote healthcare services and staff ...

Hospital business processes (organization, administration, accounting, ...)

- Routine office duties: meetings, internal e-mail

- Patient follow-up: appointments, notes taking

Tele-Medicine in the News

„One out of five new **heart defibrillators** is **monitored remotely**“

■ „**Tele-radiology** in northern Germany“

Medical images are sent to **central server** by physicians from **all over the region**

One physician processes images and reports **diagnosis** over

the phone: 28.500 images per month

■ „**Virtual ward round** over 3G“

Continuous **monitoring**

Automated emergency **calls** with **GPS** tracking

Allows for **earlier discharge** from hospital

Cost saving, **improved experience** to patient

>30% savings when treating **chronic diseases**

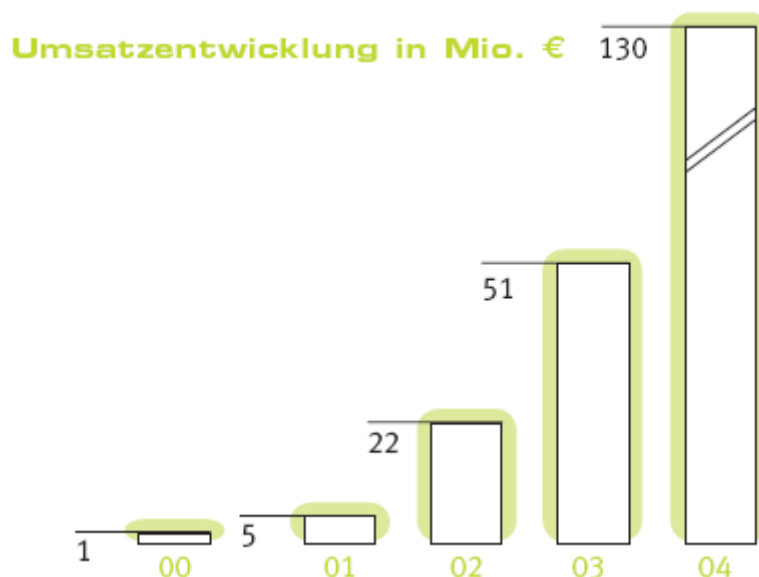
Medical Trends in the WWW (1/2)



E-Commerce Business2Customer

■ Example: **DocMorris, Internet Pharmacy**

- 1 million+ customers in Germany by end of 2007
- Annual sales: 130 million €+



Medical Trends in the WWW (2/2)

McZahn AG (translates to „Mc Tooth“)

- 400 dental practices planned
- Centralized mass production of dental prostheses
- Patient communication via Web site
- Appointments, notifications, ...

Cost efficiency in health care

- Supporting business processes with a modern IT strategy
- Realize business processes with (Web) services




McZahn - Zahnersatz zum Nulltarif - Microsoft Internet Explorer

Datei Bearbeiten Ansicht Favoriten Extras 2

Zurück Suchen Favoriten

Adresse <http://www.mczahn.ag/seite.php?p=06m+26sw1> Wechselt zu Links

Die McZahn Zentren:


Berlin	Berlin
Weitere Informationen in Kürze.	
32257 Bünde	Nordrhein-Westfalen
Eschstraße 31 Eröffnung: 1. Dezember 2006	
 Diese Praxis wird von einem Oralchirurgen und Implantologen aus dem östlichen Ruhrgebiet übernommen. Er freut sich schon heute auf seine neue Aufgabe.	
Düsseldorf	Nordrhein-Westfalen
Grabenstr. Ecke Kasernenstr. Eröffnung: 1. Februar 2007	
Weitere Daten werden in Kürze bekannt gegeben.	

McZahn
Perpet Dental
Meisterlabor

Reaktion ohne Worte

In architektonisch reizvollem Ambiente wird das erste McZahn-Zentrum Krefeld seine Pforten öffnen...

...T-Online... berichtet über McZahn



Fielmann für die Zähne
Die Willicher McZahn AG verspricht Zahnersatz zum Nulltarif. Mit 450 eigenen Zahnarztpraxen will das Unternehmen den deutschen Markt aufrollen...

Vorstands...

Ferbig Internet



Security Concerns in E-Health and Telemedicine

Security Concerns in E-Health and Tele-Medicine

Personal Privacy and Population Safety

- Critical to public safety
- Early detection of biological events,
- electronic reporting of laboratory test results,
- efficient exchange of case reports across jurisdictions, and
- timely alerting of health threats
- Public health surveillance helps in:
 - disease prevention, detection, characterization, and eradication
- The critical question is:
 - What is the minimum information public health officials need to know to effectively protect the health of their constituency?
How can we provide the data required and at the same time protect the personal privacy of patients?



Some Security Breaches

Why do we care?

r1

Indianapolis	The medical records of patients of a psychiatrist -> Posted
Harvard	r2 Major Health Maintenance Organization (HMO), had maintained medical records containing detailed notes from psychotherapy sessions
Michigan University	r3 patient records accessible by anyone through a publicly available search engine
Record contamination	r4 Quickly kill the patient in an ER
Organized crime	Social security number + Dental record = A person

Folie 12

r1 who treated sexual problems, were posted on a web site accessible to the public.
rehab.alnemr; 16.04.2008

r2 that were accessible to all clinical employees
rehab.alnemr; 16.04.2008

r3 Until it was discovered
rehab.alnemr; 16.04.2008

r4 contaminated electronic medical records could quickly kill the patient
rehab.alnemr; 16.04.2008

Internet Crime – a Real Danger

- **Pentagon** hacked: 14,000 records **stolen**
- One out of five **companies** infected by **key loggers**
- **Trojan horse** manipulates **online banking** sites in the Web browser
- Bot net operator arrested in Netherlands
- **Phishing attack** on Swiss **bank customers**
- Service provider **hacks** US **power supply** system
- **Federal police** arrests **phishing** criminals
- US survey: **Phishing, viruses, spy ware** cost **billions**
- **Spy ware disguises** as Firefox **update**
- **Trojan horse disguises** as Windows **update**
- FBI: **Computer crime** costs companies **67 billion \$ per year**

What are Public Organizations Recommending ? (1/2)

The **Cyber Security Industry Alliance** (CSIA)
recommended steps:

- Deployment of strong authentication and authorization control methods using secure ID tokens
- Encrypting data that resides on storage devices using strong and standardized technologies (to ensure confidentiality and privacy)
- Proper disposition of retired information and equipments
- Conducting frequent system audits (to ensure data integrity and authenticity)
- Using digital signature and secure date-time stamps
- Using private data backbone through the use of private data Network



What are Public Organizations Recommending ? (2/2)

The Health Insurance Portability and Accountability Act (**HIPAA**) and the European Union Commission's Directive on Data Protection:

- regulatory standards designed to limit the risks of loss due to breaches of privacy and security

More organizations and projects like **e-DiaMoND**, **Himss**, **NCQA**, and **JCAHO** are contributing to the development of a common framework to guide the protection of personal health information



Necessary Security Goals

1. Ensuring strong user authentication procedure
2. Using digital signature technology
3. Employing confidentiality protection of data in the system on the application, transport and network layers
4. Privacy protection of the patient personal data
5. Strong protection of the central healthcare database based on multiple firewall architecture
6. Using PKI systems, which issue X.509 digital certificates for all users of the system (healthcare professionals and patients) - digital identities (IDs) for the users.
7. XML security -XML standard formats are often used in these portals and accordingly the
 - a. improving XML document itself by using encryption and digital signatures within the document
 - b. providing this functionality outside the XML document

Necessary Security Infrastructure

Employment of:

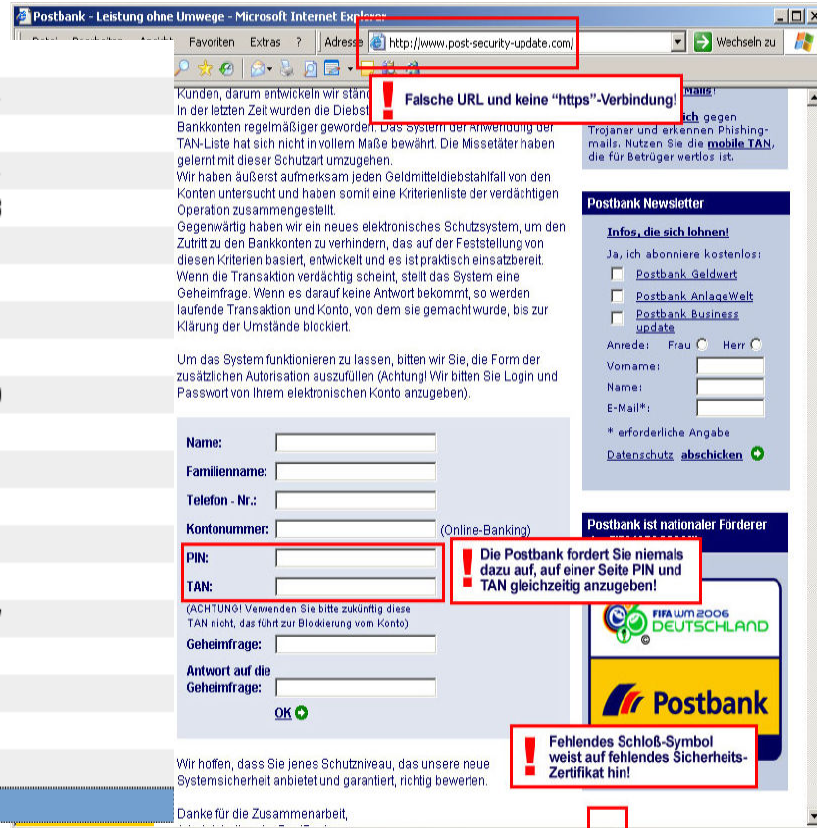
- Strong user authentication procedure
- Digital signature technology
- Confidentiality protection of data in the system on the application, transport and network layers
- Privacy protection of the patient personal data
- Strong protection of the central healthcare database based on multiple firewall architecture and PKI systems
- XML security

By using: **Digital Identities**



Security: The Human Factor

legendary <mcqvbyudfa@pasteu...	towers thereWere going	Di 01:24
karlis michaeline <dorellepepe...	Enhanced libido	06. Nov, 20:54
Boys Welcome <qjshgrfo@outlo...	use Accrued paid used	06. Nov, 14:28
Feedback <eugmbesg@parsifal.m...	Menu Enter login	06. Nov, 08:14
happy fun <yjageahytoe@parago...	Cheers America gonna burn	06. Nov, 06:18
secret <mrdjwzwhdo@surfer.at>	episode	05. Nov, 23:01
above.var <ojzlgnnhmo@uni2.es>	John: Lord Lovest thou	05. Nov, 20:03
tore vania <lissettarubetta@194va...	Cover her in it if you want	05. Nov, 19:47
Now Featured <wihojwb@openski...	Recent	05. Nov, 15:09
bertine bethany <rondademetri...	the price is frowng, 27% up	05. Nov, 09:40
Bread <jgvqojzhnkl@liwest.at>	Belgium	04. Nov, 18:49
karlen ardella <joelleaviva@strob...	Sweet	04. Nov, 13:35
becouse features <wllfwlasw@rim...	Weeks Month	04. Nov, 00:22
Marquita Hagen <escorts@00-44...	Fw:	03. Nov, 21:11
alaine chelsey <mercedesines@...	Studies show it improves the flavor	03. Nov, 13:06
bethel schmidt <joleneimpi@hol...	found it	03. Nov, 06:07
file <txqkngya@parker75.com>	just purchased fantastic	03. Nov, 03:26
start <zpuftabqods@rr.com>	often say only	02. Nov, 13:37
carolan trudy <tuckiemichael@co...	Howdy	02. Nov, 10:10
judson howell <scholeyjij@acce...	let's go check itout	02. Nov, 07:53
click <rnbqasxlayn@oracle.com>	impulses recording Mini large	02. Nov, 03:47



■ Education by **Awareness Creation**

- Point out **potential risks**
- Create knowledge what **acts are wrong**

Summary: Requirements of a Secure Healthcare System

1. Complies with the legalization laws
2. *Safety-versus-privacy* dilemma (override the security policies if needed)
3. Defines extensible trust hierarchies and levels
4. Enforcing privacy and authorization policies in both database level and application level
5. Enables information retrieval independent of patient location –decentralized information system
6. Offers flexible yet secure information retrieval in case of emergencies
7. Presents anonymous consultation possibility
8. Enables user-policy control through user friendly interface
9. Identifies policies conflicts and enables fast conflict resolution
10. Allows *Policy-transition* capability
11. Enables equal security levels for mobile healthcare systems that include handheld computing platforms and wireless communication technologies.



But How to Design
Secure E-Health Systems ?

Security by System Design

happy run <yjageanyto@parago...>	episode	05. Nov. 23.01
secret <mr0jatwido@surfer.at>	John Lord Lovest thou	05. Nov. 20.03
above var <costinmho@unio.es>	Cover her in it if you want	05. Nov. 19.47
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bertine bethany <rondametri...	the price is frowng. 27% up	05. Nov. 09.40
Bread <igvgopmk@lwest.at>	Belgium	04. Nov. 18.49
karlen ardella <joelleaviva@strob...	Sweet	04. Nov. 13.35
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Marquita Hagen <escorts@00-44...	Fw	03. Nov. 21.11
alaine chelsey <mercedene@...	Studies show it improves the flavor	03. Nov. 13.06
bethel schmidt <joleneimp@hol...	found it	03. Nov. 06.07
file <tkokngya@parker75.com>	just purchased fantastic	03. Nov. 03.26
start <zpufabqods@rr.com>	often say only	02. Nov. 13.37
carolan trudy <tuckiemschael@co...	Howdy	02. Nov. 10.10
judson howell <scholeyj@acce...	let's go check it out	02. Nov. 07.53
rick <wibaeakayn@pdrle.com>	impulsars recording Mini laptop	02. Nov. 03.47

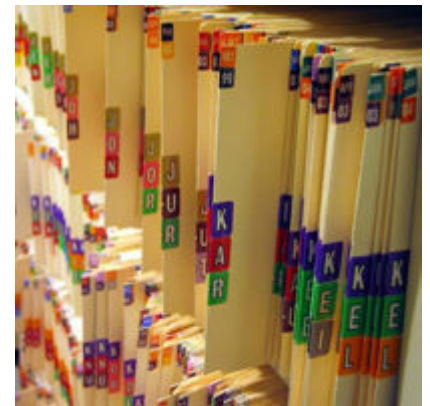


- **Security problems** arise from **ad-hoc** or **non-existent** design
- „Let's include **security later**“: **later=never** **Security by Design**:
- Security is **part of system design** >>> **Threat Modeling**

Confidentiality - Nobody Should Know!

Problematic Information Gathering:

- age, gender, race,
- occupation,
- HIV positive,
- mental illness,
- alcohol,
- treatment, ...



Digital Envelope Technology

- based on digital certificate
- symmetrical algorithms for encryption of data and asymmetrical algorithms for protection of symmetric key which is sent together with encrypted data



Confidentiality

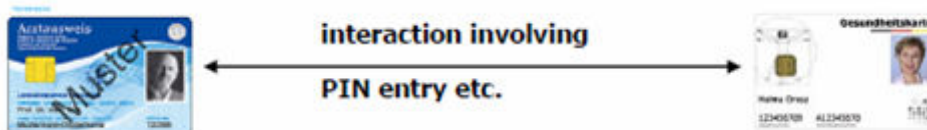
At the Heart of each E-Health System: Digital Identity Management

- Each User – any system participants – has a digital identity
- Digital Identity consists of:
 - Username and dynamic password obtained by appropriate hardware token, or by
 - Username/password and PKI smart card and a challenge response procedure based on PKI X.509 and asymmetrical cryptographic techniques.
- *Digital identity management:*
 - login and permission management
 - group/role based access control
 - little or no versatility of data

Digital Signature - Sign with Your Card !

Digital Signature through electronic health cards
Three different types introduced:

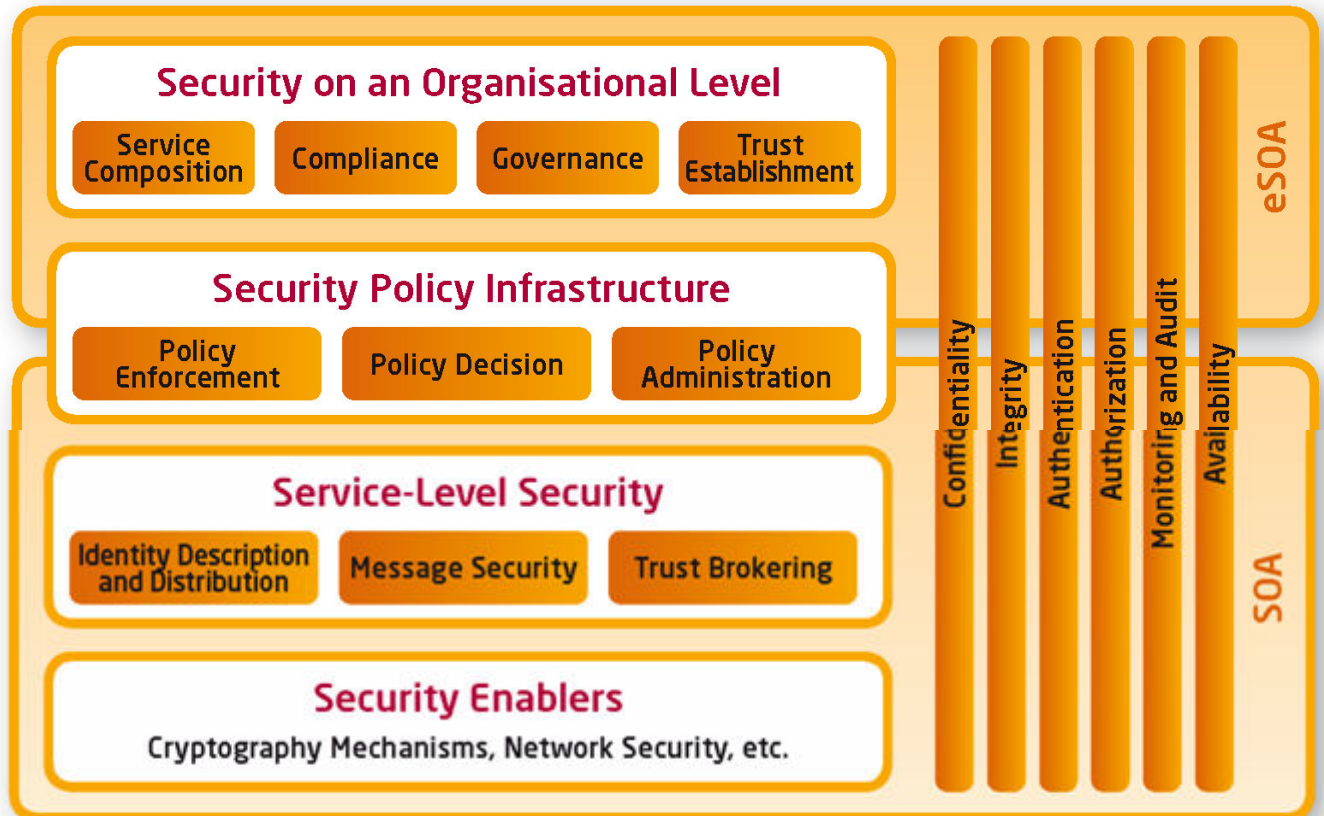
- *Health Insurance Cards* for patients



- *Health Professional Cards* for medical practitioners and pharmacists
- *Secure Module Cards* for medical practices and pharmacies to be used by their employees



Security Aspects in SOA are Implemented Across Different Layers



ERM – Enterprise Rights Management

ERM: facilitates a data-centric protection model

- Medical data is protected at the end points of the communication rather than relying on different networks to provide confidentiality, integrity and authenticity
- The data owner protects the data by encrypting it within a protected data container
- The ERM framework enforces policies governing access to sensitive information, but also ensures protection if information is distributed beyond organization boundaries

What about the Database?

- *Hippocratic Database approach*: by IBM and Microsoft
- Security on the database level
- *Active enforcement*: rewriting user queries to conform to the organization's data disclosure policies and individual patient choices.
- Enforces disclosure policies down to the cell level in the database, allowing health organizations to comply with detailed requirements of data protection laws without recording their applications.
- *Compliance Auditing applications*: enables organizations to investigate past disclosure, tracking user identities, date of access, and the purpose of access



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Some of our Recent Projects in
Telemedicine and E-Health

Hasso-Plattner-Institut: Our Research and Solutions

How to fulfill **Requirements** of a secure healthcare system

- Authorization ?
- Trust ?
- Doctor-to-Doctor, Patient-to-Doctor, Patient-to-Organization, Organization-to-Doctor, ...
- Digital Identity Management ?
- Federated identity between
- organizations and hospitals

Our prototypes, test beds, solutions

- Systems for medical image viewing and processing
- Infrastructure for medical statistics
- close collaboration with several German hospitals
- **Tumor Conference Portal**

Recent Project: E-Health Portal for Tumor Conferences

- Improved **interconnection** of oncological treatment with the help of tumor conferences
- **Web Portal** to **coordinate** existing tumor conferences
 - planning and holding meetings
 - taking meeting minutes
 - integrated **video conferencing software**
 - interface to widely used **Gießen Tumor Documentation System (GTDS)**
 - includes online **DICOM Viewer**
- In cooperation with hospitals from greater Berlin area



Tumorkonferenz Portal

[Home](#) | [Kontaktieren](#) | [Videokonferenz](#) | [Stimmzettel](#) | [persönliche Einstellungen](#) | [Dokumente](#) | [Archiv](#)

Persönliche Angaben	
Titel: <input type="text"/>	
Vorname: <input type="text"/>	
Nachname: <input type="text"/>	
Foto: <input type="text"/> <input type="button" value="Datei wählen..."/>	

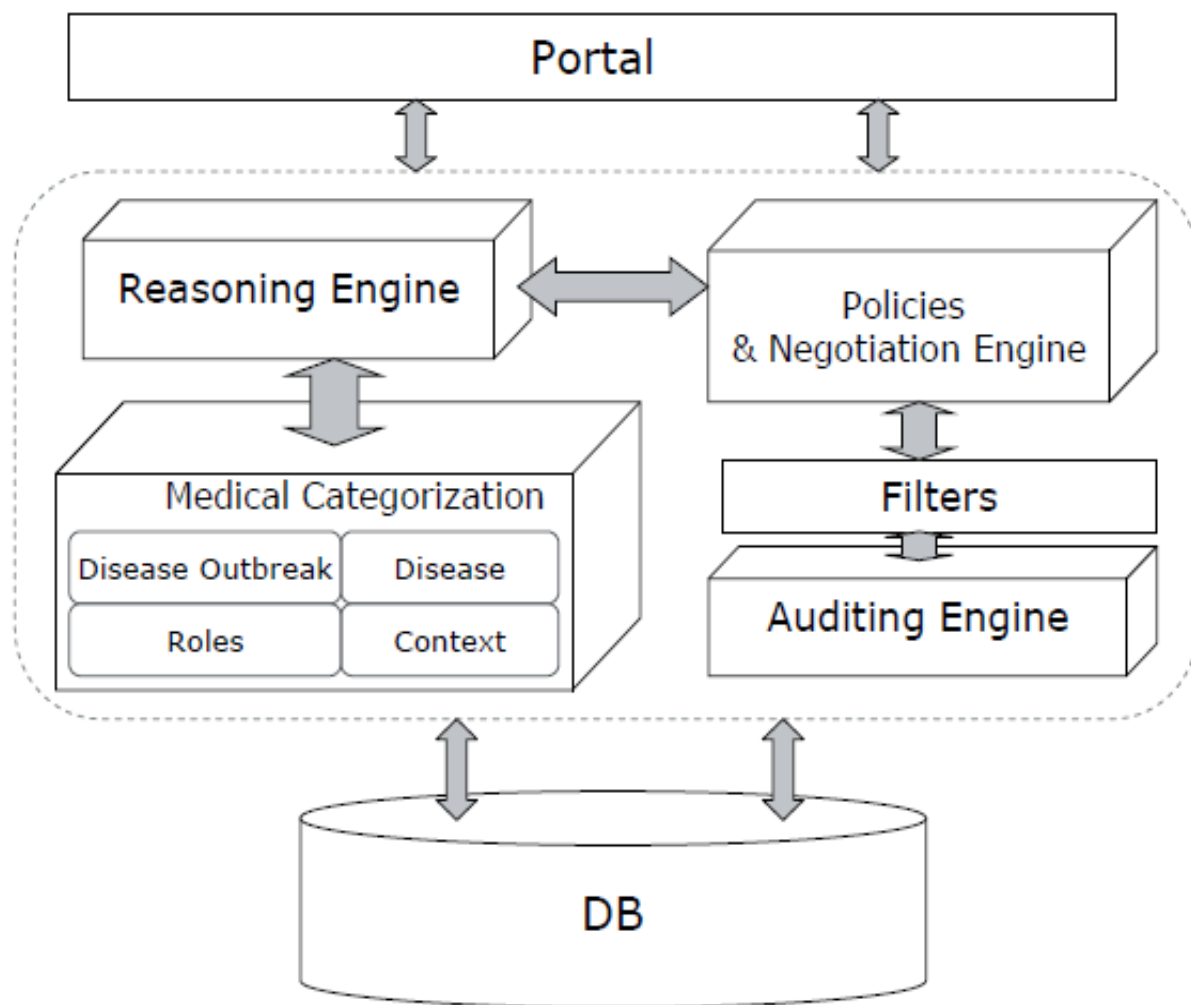
KEIN
BILD

Passwort	
Passwort: <input type="text"/>	
Neues Passwort: <input type="text"/>	Wiederhole Passwort: <input type="text"/>

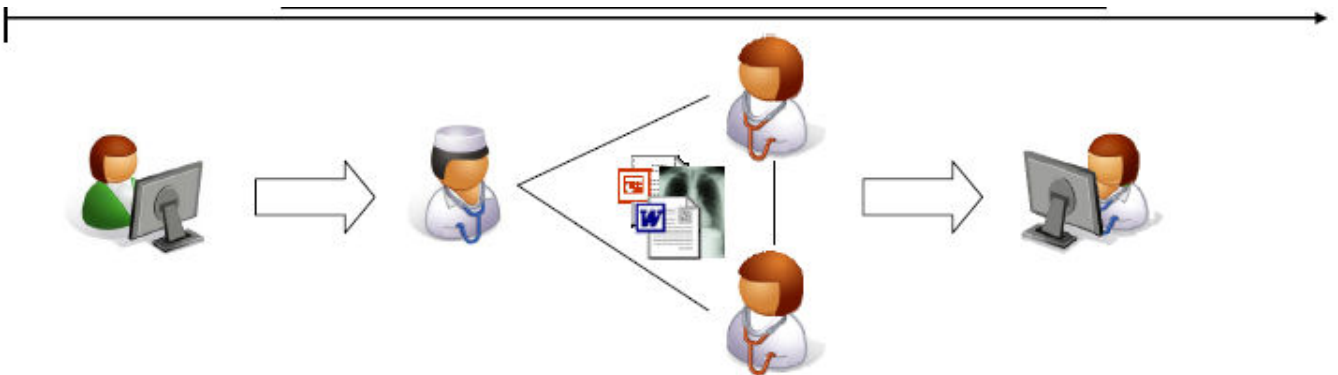
Kontakt	
Adresse: <input type="text"/>	Hausnummer: <input type="text"/>
Ort: <input type="text"/>	PLZ: <input type="text"/>
Land: <input type="text"/>	E-Mail: <input type="text"/>

[Startseite](#)

System Architecture – Building Blocks



Tumor Conference Portal in Action



The Tumor Conference Portal: From Extra Efforts to Added Value

Before: Conferences exist, but manual efforts

- Large hospitals offer counseling to physicians in the region about cancer treatment

- Meetings are held **personally**, as **video conference**, or **telco**

- Conference chair („**coordinator**“) collects patient **cases**, participating **doctors**, and medical **documents** beforehand

- Via **email**, **phone** calls, **non-standard** document **formats**

After: Everyone focus on their competences

- **Participants register** their cases and **upload** medical documents

- **Participants** directly **connect** through portal's video conf system

- **Coordinator only** to coordinate **basic parameters**, no content

Tumor Conference Portal: The Future

Status quo

- **Each hospital** collect **statistical data** on their patients, therapies, and doctors
- **Quarterly** region-wide reports are compiled after **manually merging** hospital records
- No inter-organizational **real-time** statistics,
- Up to three months **time delay** between data acquisition and evaluation
- **Manual efforts** expensive, error-prone, repetitive

Next steps: connect statistical records for real-time queries

- Supervise **adherence to guide lines**, transparent **quality**, achieve **optimal medical treatment** in **rural areas**



Some Previous Research Projects: TI-jPACS and Telemed-VS

TI-jPACS

- **Freely available** medical image processing platform
- Supports medical standards such as **DICOM**



Telemed-VS

- **Visualization** and **Segmentation** of medical **3D** images
- Computer-aided **Diagnosis**
- **Combination** of different approaches to **visualization** and **segmentation**





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E-Health can Benefit from
Free Open Source Software

E-Health Can Benefit From Free Software



■ Server infrastructure

- Apache HTTPD, Tomcat Web servers
- JBoss application server
- MySQL database system
- Linux, BSD operating systems



Network Security Services (NSS), a free TLS implementation

■ Document editing, management, processing



- OpenOffice.org, fresh release to appear **end of this month!**

■ Software development

- GNU Java compiler. Eclipse



Free software from legal point of view

- **Free software** matter of **liberty**, not **price**
 „think of **free speech**, not **free beer**“
 – Richard Stallman, Free Software Foundation



Shades of freedom in different licenses:

- **BSD license:** You can do whatever you want
- **LGPL:** Do what you want, but give something back to community
- **GPL:** Use only with free software, give back to community
- **Dual license:** Two licenses—free and commercial—to choose from
- **Non-commercial/academic:** *Free of charge* for some purposes
- **Commercial:** payment required; different versions
 („home“, „professional“, „enterprise“) may exist

Vendor liability
 ↑
 User freedom

Free Server Infrastructure: Apache HTTP Server (httpd)



- Overview
- Extensible HTTP/1.1 Web server
- Authentication mechanisms: Password file, Kerberos, LDAP, ...
- Licensed under Apache License (Free software, source code copyright notice must be retained)
- Programming interface for PHP, Python, ...
- History
- First release 1995
- Recent release: June 2008
- Serves 49% of all Web sites

Free Server Infrastructure: Apache Tomcat and JBoss



- Overview
- Tomcat:
 - Servlet container with JSP support
 - Apache License
- JBoss: Java EE 1.4 Application Server
 - Clustering, Failover, Load-balancing, Enterprise Java Beans, ...
 - LGPL
- History
- First Tomcat release: 1999
- Latest Tomcat release: July 2008
- Latest JBoss release: June 2008

Free Server Infrastructure: MySQL Relational Database



- Overview
 - Relational Database Management System (RDBMS)
 - Multiple users, multiple databases
 - Licensed under GPL
 - Programming interfaces for Java, C, PHP, ...

- History
 - First release May 1993
 - Recent release August 2008
 - Currently more than 11 million installations world-wide

Free Server Infrastructure: BSD and Linux operating systems

■ Overview

- BSD = Unix originally developed in Berkeley
 - superseded by Free-/Net-/OpenBSD
 - BSD License
- Linux = Unix-like operating system
 - Red Hat/SUSE/Ubuntu/... Linux = Linux kernel + GNU system utilities + Support
 - GPL

■ History

- BSD: since 1977
- Latest *BSD releases: early 2008
- Linux: kernel since 1991, GNU operating system tools since 1983
- Latest Linux kernel release: September 2008

Free Server Infrastructure: Transport Layer Security (TLS)

- Competing free implementations
 - GnuTLS
 - Developed in Europe (Greece, Sweden)
 - LGPL
 - OpenSSL
 - Developed in Australia
 - BSD with „Advertising clause“ incompatible with GPL
 - Network Security Services (NSS)
 - Developed in USA
 - Mozilla Public License (MPL), also incompatible with GPL
- GPL incompatibility can lead to legal problems; rewriting a whole software project can be necessary

Free Developer Infrastructure: GNU Compilers and Eclipse

- Overview
- GNU compilers for many programming languages
 - Originally C („gcc“), C++, Haskell („ghc“)
 - appearance 1985, latest release: August 2008
- Eclipse
 - Since 2001; latest release: August 2008

