



Implementing e-Health in Developing Countries

Guidance and Principles

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DRAFT

1. PREFACE

Health concerns all of us. Information and communication technologies (ICTs) are increasingly providing us with the tools and knowledge that we need to improve health care, enabling solutions that benefit patients as well as healthcare professionals and institutions in both the private and public sectors worldwide. E-health can serve as a vehicle for the transformation of health conditions in the developing world, particularly for those living in rural and remote areas.

Improving access to health care services in developing countries through ICTs has been receiving particular attention since the first World Telecommunication Development Conference (WTDC) in 1994. Disseminating information on successful e-health experiences helps our partner countries to gain a better perspective on why these have succeeded, and thus supports them in decision-making on how to develop and improve their own programmes in this key area.

In 2005, the World Health Assembly recognized e-health as the way to achieve cost-effective and secure use of ICTs for health and related fields, and urged its Member States to consider drawing up long-term strategic plans for developing and implementing e-health services and infrastructure in their health sectors. To successfully prepare these so-called “e-health Master Plans”, close cooperation between both healthcare and telecommunication professionals is essential. Amongst the strategic issues to consider are how to share infrastructure to reduce costs and how to integrate security and privacy aspects into planning activities.

In response to the need for clearer guidelines for developing countries on the wide range of issues relevant to developing their e-health facilities and services, ITU decided in 2007 to publish this document on “Implementing e-health in developing countries – guidance and principles”, aimed at decision-makers in the health, telecommunications and information technology sectors. To carry out this important assignment, ITU called upon the support of Professor Dr Jean-Claude Healy – a philanthropist and change agent committed to pushing forward the global e-health agenda. It was with deep regret that the ITU learnt about the unexpected passing away of Professor Healy on 21 March 2008, just as he was completing this task.

His sudden demise is indeed a great loss for the e-health community, especially for those having closely worked with him. Before his death, Professor Healy had just completed reviewing the manuscript of this document



A professor in biophysics and medical informatics at several leading French universities and hospitals for over 30 years and a member of various international research groups, Professor Healy joined the European Commission in 1995 to serve as Head of the Unit for Telematics Applications for Health (DG XIII C4), IST Applications relating to Health (DG XIII B1) and eHealth (DG Information Society and Media). In 2004, he took on a senior position at the World Health Organization, in charge of WHO’s e-health strategy, the e-health report for the World Summit on Information Society, the e-health Resolution WHA 58/28 and the associated global, regional and national implementation plans. Furthermore, he was appointed senior advisor to the United Nations Global Alliance for ICT and Development.

Professor Healy wrote more than 250 scientific publications (booklets, scientific articles, key-note speeches, etc.) and additional administrative documents. We deeply appreciate Professor Healy’s contribution, and hope that this document will serve as a reference on the topic of e-health for years to come.

2. EXECUTIVE SUMMARY

The implementation of e-health systems and services in all countries, particularly in developing countries, is a challenge shared by United Nations agencies and health authorities at the international, national and local levels. Efforts over the past few years have shown that there is a clear need for guidance on an approach and methodology which hold the most promise for success.

Drawing on experience and lessons learned, and considering progress in technology as well as the improving climate for investment and operations, it is now possible to put forward an initial outline of a general methodology for implementing ICT in health.

This outline should in the first instance make it possible to avoid costly errors. It should also serve to enhance the efficiency of health systems themselves and ultimately support the sustainable and effective use of such services.

The implementation efforts must be based:

1. on a clear appreciation of the country's current and future public health and healthcare issues and opportunities, with a definition of the corresponding national priorities;
2. subsequently, on a medium- to long-term action plan for the use of e-health technologies to meet healthcare priorities, with gradual renovation of the health systems themselves.

This plan must:

- bring together players from the public sector, not-for-profit organizations and the private sector;
- be structured in the form of a business plan, approved by the stakeholders;
- be backed by a strong commitment on the part of all players;
- include a comprehensive plan for ongoing education and communication with the partners.

If these conditions are met, the chances are more realistic for rapid return on investment, successful long-term impact, and significant benefits for all concerned.

What we need today is coordinated support from international organizations, donor agencies, other international sources and the private and public sectors. This is the prerequisite if we are to achieve success in overcoming the digital divide, reducing poverty and, ultimately, securing e-health for all by 2015. Providing access for all to the information society during this decade is a worthy goal, and a credible and neutral global champion of this effort would be a very welcome means of boosting our progress.

3. INTRODUCTION

This concise document is intended for decision-makers in the health, telecommunications and information technology sectors, particularly in developing countries. It aims to increase awareness of the opportunities that information and communication technologies (ICT) can bring to the health sector (in the form of e-health), thereby opening the way for the development and implementation of useful and sustainable products and services in their respective countries.

This document, while modest and clearly in need of ongoing review, correction and expansion, is intended to serve as a point of departure for international discussion. The goal is to accelerate the assimilation of ICT in the health and medical sectors with a view to the rapid, effective, quality-based and sustainable transformation of health systems themselves.

The many differences that exist in terms of health conditions and healthcare systems make it impossible to define a universal methodology. However, just as in the case of individual medicines, our experience over time enables us to determine "what works" and "what does not work".

The present and the future are already – and will be increasingly – characterized by rapid technological change, ever more affordable prices and increasingly user-friendly solutions. But these positive trends will be genuinely beneficial and sustainable only to the extent that a framework for action, at the political, health, technological, economic and social levels, is up and running within each country.

Our intention here has been to outline the initial main strands of this framework so that stakeholders from the sectors concerned can take the first steps, and then systematically take the plan forward in greater detail, tailoring its various aspects in accordance with their specific requirements.

This progressive approach is essential if our shared aspiration is to rise to a key challenge of the Millennium and "connect the unconnected". Where health is concerned, the connectivity targets support meeting the legitimate and achievable objective of "e-health for all by 2015" to realize the broader 2015 United Nations Millennium Development Goals in health, education, employment and poverty reduction.

4. E-HEALTH: DEFINITION AND SCOPE

4.1. Brief history and definition of e-health

The term "e-health", coined in the latter part of the twentieth century, can already be found in around 4,000,000 Web pages. In the latter part of the nineteenth and early part of the twentieth century, medical applications were quick to derive benefit from the progress being made in the field of analogue telephony. The technology enabled not only individuals to call the doctor but also hospitals to transmit electrocardiograms over telephone lines. These were the early days of "tele"-medicine, or medical care delivered remotely. However, bandwidth limitations and the consequent low rate of data transfer over the copper wires then in use, coupled with interference and various types of noise, put a brake on the expansion of these analogue techniques.

Since then, the boom in data digitization, computerization and digital networks witnessed since the mid-twentieth century has moved beyond telemedicine and has led to a multiplicity of e-health applications. These have emerged from academic research laboratories and have increasingly become part of people's everyday lives.

Digital telemedicine has experienced tremendous growth over the past 25 years and is now a major component of e-health. It enables, among other things, the exchange of healthcare and administrative data and the transfer of medical images and laboratory results. Improvement in these processes has gone hand-in-hand with the technological progress that is generating ever higher bandwidths, greater storage and processing capacities, smaller and smaller components and higher levels of security. This has occurred in the context of decreasing costs and increasingly user-friendly features. It is now reasonable to expect that by 2015 every inhabitant of our planet will, from any location and at any time, be able to access the medical information necessary to maintain his or her health or seek a cure for his or her illness.

To take up WHO's famous "Health for all in 2000" declaration, made in Alma Ata, we may now speak of "e-health for all in 2015" as being a credible and realistic objective – and one which it is our shared responsibility to achieve.

Different definitions have been used over time to designate ICT applications in the service of health. Around 1970, the term "medical informatics", considered at the time to be state-of-the-art technology, was used to refer to the processing of medical data by computers. However, the importance of "information processing" was to be rapidly superseded by that of "information communication", as seen in the extremely rapid development of the Internet.

Health applications then became known as "health telematics" or "telemedicine", and now "e health". The acceleration of transfer rates over networks of interconnected computers (currently in the order of several gigabytes per second) has removed all barriers to the exchange of medical data, physiological signals and medical imagery between computers. The standardization of exchange protocols between computers, such as the Internet Protocol for example, in addition to the improved structuring of medical data and data security rules, is increasingly making it possible for health professionals in different locations to understand one another and work together, despite differences in languages. It is now clear that the value of these applications lies not in the technology itself, or even in the exchange of data, but in the ability to develop human networks of competence and expertise in the field of health.

In short, this new way of working – networking all those involved in the health enterprise – is rapidly expanding thanks to technological progress.

The common denominator in all of these technologies is data digitization, without which data could not have been processed and exchanged in the manner to which we have become accustomed. This is why, rather than proposing a series of more or less restrictive academic definitions for the use of ICT

in healthcare, the consensus approach is to bring all of these applications together under the term "e-health".

The prefix "e-", standing for "electronic", is similarly used in numerous other applications such as "e-learning", "e-governance" and "e-transport", to convey the notion of digital data (as opposed to conventional analogue data such as paper medical records, electrocardiogram printouts and x-ray film). Without digitization there would be no automatic processing and no instantaneous exchange via the network.

The term "health" is used broadly and does not refer solely to medicine, disease, healthcare or hospitals. The scope of e-health is health in general, with its two major facets, namely public health – which is the responsibility of States and is geared towards preventing and responding to disease in populations – and healthcare, which is geared towards individual patients and the treatment of disease.

Although healthcare accounts for over 95 per cent of health expenditure in the majority of countries, it should not be forgotten that public health (including diseases relating to the environment, ageing, predictive medicine, and so on) is, and will continue to be, at the heart of sustainable health systems in both rich and developing countries alike.

The notion of e-health thus covers all aspects of health, not only healthcare. The term is gradually evolving to refer to the skeletal structure for all health systems' functions. It is not simply a matter of improving the body of epidemiological data or exchanging files between public health institutions, but increasingly with using e-health technologies to bring about necessary reforms in health systems and thereby move towards the overall improvement of health on a global scale. Examples range from individually-tailored health promotion measures in the context of the home, workplace or school to the customized delivery of healthcare to individual patients in many settings. One of the errors that are often made at the outset is to circumscribe developments in the field of e-health solely to the healthcare sector, as it is here that the developments are perceived to be more spectacular and more immediately beneficial.

4.2. Nature and added value of e-health services and methodology for evaluating them

The term e-health, referring to all digital health-related information, is therefore extremely generic, covering as it does:

- products, such as instruments to ensure the constant monitoring of blood pressure in ambulatory patients,
- systems, such as computer-assisted surgery systems, and
- services, such as:
 - operating surgical and intensive care units, with interconnected instruments and surveillance services ensuring continuous patient monitoring;
 - computer-assisted prescription services, where the software checks for incompatible drugs, contraindications and dosage levels;
 - information services for patients and consumers, including individual electronic health records.

E-health products, systems and services are location independent, in that they can be used locally (doctors' surgeries, hospitals) or remotely, as is inherent in the term "tele" (tele dermatology, telesurgery, telediagnosis and so on).

In contrast with other major health industries, such as drugs and medical imaging, e-health products have a structuring effect on health networks. That is, they influence the behaviour, processes and working habits of individuals, groups and organizations. The methodologies used for evaluating results are far more difficult to design and implement, given the need to draw a distinction between the direct benefits produced by the service for the end user, more often than not in the short-term, and the

indirect benefits, which often come later and are experienced by the community as a result of the networking effect. Examples include continuing education, quality improvement, and impact on medical errors).

There is as yet no universally-acknowledged methodology for evaluating e-health solutions, either in industrialized countries or in the developing world. However, impact metrics currently being developed will one day enable us to quantify the cost/benefit and cost/effectiveness ratios. Robust methodologies, similar to those that have been developed through time for evaluating drugs or medical imaging techniques, will then provide objective and quantitative data for decision making.

In the meantime, numerous approaches are being developed, three of which are described below:

An initial group of evaluation methodologies is based on the productivity gains that might be achieved. This approach is clearly of relevance for countries where the aim is to reduce costs and keep up with the dramatically increasing demand for healthcare services. Indeed, the data now available can be used to support decisions by health administrators regarding implementation of services such as second medical opinion, computer-assisted prescription or teleradiology.

A second group of methodologies is, by contrast, based on a global assumption of the potential impact on public health. It has been asserted that had ICTs been available in the early days of the HIV/AIDS epidemic some 30 years ago, the epidemic could have been brought under control far more rapidly and at a lower cost, particularly in developing countries.

This assumption has been borne out to a certain extent by the effectiveness of the measures taken in response to emerging epidemics such as the bird flu and acute respiratory syndromes. Here again we see the importance of taking into account the public health dimension of e-health technologies, such as identification and response to clusters of disease. A further example of effective use of ICTs for public health action was the manner in which the health consequences of the Indonesian tsunami of December 2004 were managed from WHO's "situation room" in Geneva. Within the context of economic globalization, this aspect will certainly see further development.

A third evaluation approach is concerned with assessing in a comprehensive manner the impact and costs of specific e-health technologies. This could include, for example, using telemedicine for diagnosis or access to remote medical records in the treatment of tourists or of expatriate workers outside their country of origin. Where the infrastructure exists, the operational costs of e-health services are minimal in comparison with the alternatives: transportation of the patient, attendant risks and travel time. In addition, these services are well received by patients and professionals. Finally, local healthcare facilities appreciate assistance in these contexts as well as learning about procedures or patient management techniques from which they may be able to benefit again in the future.

A vast and exciting field of research and international action covering the various types of evaluation is due to come into being in the coming years, in which context the role of international organizations such as WHO and ITU will be decisive.

4.3. The main players in the field of e-health

In contrast to the traditional health sectors, e-health solutions require coordination with new players whose cultures, objectives and traditions are different.

In the first instance, we may identify the following groups of players:

- United Nations agencies and other international bodies dealing with health, telecommunications and trade
- Government authorities, health and telecommunication decision-makers at the national and regional levels, as well as the regional bodies to which they belong
- Academic and research institutions
- Local health professionals and their associations

- Consumers, patients and their associations
- Donors
- Non-governmental organizations
- The private sector, including foundations and industries related to health and ICTs
- The media.

Each of these groups has a different educational background and tradition, as well as differing responsibilities and constraints, all of which has to be respected, mobilized and coordinated.

United Nations and other international bodies

The all-embracing mandate of the United Nations agencies is to show the way and assist countries in the ultimate interests of bringing about peace and prosperity in the world through development. Each player (e.g. the different agencies) has its own specific mandate and means. Their responsibilities in the short term have to do with implementing the action plans and programmes approved by their general assemblies and, in the long term, with contributing to the various mandates of the United Nations approved during annual plenary meetings. The e-health sector is one component in the development process since there is no health without development, no development without health. All of the United Nations agencies are therefore concerned to differing degrees, some more directly than others.

In 2000, the United Nations General Assembly adopted a vast plan of action – known as the Millennium Development Goals (MDGs) – for the new millennium with the aim of reducing poverty throughout the world and supporting development by 2015. Among the means proposed for pursuing such action, explicit mention is made of the use of information technologies and collaboration between the public and private sectors.

World Health Organization

The World Health Organization (WHO) is the United Nations agency with a mandate in global public health. Its working tools are both legal (recommendations, resolutions, expert information, health standards and regulations) and technical (action programmes, technical assistance upon request) in nature. WHO is particularly active in the effort to control or eradicate infectious diseases such as malaria, HIV/AIDS and tuberculosis, while at the same time drawing up guidelines for numerous other areas of public health including nutrition, reproduction, hygiene, use of medicines, and others.

In pursuance of its role in providing assistance to States, WHO published, in 2005, a general report on the subject of e-health, in the interests of drawing the attention of decision-makers to the need for the rapid development of strategies in this area. This initiative led to the approval by the World Health Assembly, meeting in Geneva in May 2005, of a resolution on e-health (WHA58/28), which invites each State to define its national strategy, develop regional cooperation and public/private partnerships, make the greatest possible use of technical and semantic (classification of diseases, for example) standards to facilitate cost reductions and system interoperability, and incorporate these solutions within their existing health systems.

The Resolution was later supplemented by a list of the specific contributions that WHO was proposing to make to States in such areas of common interest as deontological and ethical rules, and the publication of an annual report on the e-health situation worldwide. This WHO resolution – the first such reference document inviting States to take action – demonstrates the awareness on the part of this key United Nations agency, whose credibility is acknowledged by all, of the importance of the matter.

Whereas the number of States with the beginnings of an e-health strategy in 2005 amounted to some 20, it is now (in 2008) estimated that over 120 States have adopted a strategic outlook in that regard. Each of WHO's six regions are invited to tailor the agency's resolution to their own environment

health situation and priorities, requests from States and so on), and several regions have already produced strategic documents and outlined country plans.

Since the approval of the Resolution, an annual report based on the responses to questionnaires distributed to all Member States has been compiled by the WHO Global Observatory for eHealth for the annual assembly. In addition, factual data concerning e-health are regularly posted and updated on the WHO website.

Finally, WHO is able to provide ad hoc assistance on a case-by-case basis, to which end numerous meetings are regularly organized at the national or regional levels (e.g. the WHO Eastern Mediterranean Region).

Several ad hoc initiatives are worthy of mention:

- Handling the aftermath of the tsunami in Indonesia in December 2004 was coordinated by the United Nations, with WHO being responsible for the health issues. Using the ICT facilities available in WHO's "situation room", geographic and health data were immediately brought together in order to optimize coordination of the rescue and relief effort. The necessary international cooperation including access to communication satellites, images and networks worked very well, making it possible to avoid health catastrophes (epidemics) over and above the initial catastrophe.
- WHO's pioneering HINARI programme makes available the world's electronic health and medical literature to health institutions in developing countries, for free or at low cost. This partnership between WHO and over 50 biomedical publishers was begun under the then UN Secretary-General Kofi Annan to help bridge the digital divide in health. With institutions and universities in over 100 countries participating, the programme is a major component in the effort to combat digital exclusion in the health domain. WHO has also developed the "ePortugese" web portal to deliver health information, facilitate capacity building and improve collaboration in the eight Portuguese-speaking WHO Member States.
- The fundamental work being carried out in the area of medical and healthcare terminology is essential to the discussion and communication process. WHO's research work within the framework of international consortia should result in semantic standards that are acceptable to all, and we may now look forward to the automatic translation of medical texts as a universally-available and affordable service.
- In the technical domains, WHO is collaborating with the telemedicine reference centre in Tromsø, Norway and is developing partnerships with numerous NGOs, such as RAFT (University of Geneva), in support of health education and disease control programmes in rural areas.
- WHO's epidemiological data collection units are second to none when it comes to the gathering and analysis of health data. In cooperation with the relevant international bodies (including the United States Centers for Disease Control and Prevention in Atlanta, and the European Agency Centre for Disease Prevention and Control in Stockholm), this work enables emerging global health threats to be met with early detection, an appropriate alerting mechanism and rapid response.

These examples provide a good illustration of the diversity and henceforth essential nature of e-health solutions, as well as the need for ever greater cooperation between a diverse set of stakeholders: doctors, telecommunication engineers, economists, intellectual property specialists to name a few.

UNAIDS

UNAIDS is the UN agency established to coordinate the multidisciplinary resources necessary to mount an effective campaign against the global HIV/AIDS epidemic. Its e-health initiatives focus on using ICTs for data collection, analysis and exchange, patient monitoring and management, and sharing results of therapeutical trials. In addition it uses ICTs in its prevention and education campaigns, including in isolated areas. In collaboration with numerous academic research centres,

UNAIDS has accumulated a wealth of experience in the use of e-health technologies in disadvantaged areas, and in the expert use of state-of-the-art technologies in rural areas .

International Telecommunication Union

The International Telecommunication Union (ITU) has from the outset played a pioneering role by supporting, for over 25 years now, telemedicine pilot projects in developing countries, in order to test the technical feasibility of advanced technologies in the local healthcare context. The initiatives pursued have been most effective in those cases where the participation of local players could be counted on.

Following these pilot phases and with the recent worldwide boom in mobile telephony (for example, from five million mobile telephones in Africa in 2002 to 120 million today), the priorities are now shifting towards support for regional broadband infrastructures and associated services, for which significant investment and regional coordination are necessary. This essential mission is in the process of becoming a reality, judging by the success of the "Connect Africa" conference coordinated by the ITU in Kigali in October 2007. The meeting resulted in political agreement among the 54 countries represented and a financial commitment of several billion dollars on the part of various players such as the World Bank, the African Development Bank and the European Union. In the e-health field, the ITU has for a long time now been establishing important policy initiatives and supporting relevant resolutions (see WTDC-06 Resolution 54 on information and communication technologies). This includes related matters such as data security, confidentiality and protection, and respect for diversity. A working group on telemedicine regularly publishes a report on the areas of experimentation currently being pursued.

In what represented a major leadership initiative, ITU organized the World Summit on the Information Society (WSIS), which held its first phase in Geneva in 2003 and its second in Tunis in 2005. Both phases of the Summit led to the approval by the representatives of over 140 countries of resolutions and action plans identifying the strategic priorities for combating the digital divide.

Together with education, e-health was recognized as a major strategic goal. The outcomes have been widely disseminated and, together with the above-mentioned WHO resolution, constitute a key political point of departure for the development of sectoral, national and regional policies.

The roles of the different entities are clear: ITU must point out the technological opportunities, coordinate the technical discussions among States and foster norms and standards; WHO must be the guarantor of health content and of the integration of the corresponding approaches in health systems; while specific agencies such as UNAIDS are invited to make the best possible use of these instruments, in a coordinated manner, in pursuing their respective mandates.

The World Bank

The World Bank, whose global mandate is to ensure development, has from the outset supported initiatives aimed at combating the digital divide, which they view as hindering development opportunities. One special unit, known as Infodev, publishes regular reports on this subject, prepares inventories of best practices and puts forward recommendations for the development of appropriate policies. These have included "Making sense of ICT for development: linking knowledge and action" and "Policy for backbone networks in Africa".

Financial support is provided to e-health projects on an ad hoc basis, although more often than not in coordination with other applications. An allocation of USD 41.6 billion was granted in December 2007 to the International Development Association (IDA), a specialized agency of the World Bank which supports the world's 80 poorest countries, representing 2.5 billion individuals with an income lower than USD 1065. This fund should allow for the financing of global integrated projects (infrastructure, education, health) and for promoting sound governance in the beneficiary countries. It is a noteworthy fact that China, a former beneficiary of the fund, has for the first time become a contributor alongside South Africa and other, traditional, donors.

UN Global Alliance for ICT and Development

The New York-based Global Alliance for ICT and Development (UNGAID) was set up in 2006 by the United Nations Secretary-General to combat the digital divide and foster cooperation between the public and private sectors. This entity grew out of the UN ICT Task Force, which brought together diverse stakeholders, including governments, foundations, academics, industry, NGOs and UN agencies. It is financed by voluntary contributions, which are used to promote and encourage ICT initiatives and advocate investing in ICTs for development.

Their advocacy approach emphasizes the need to develop ICT applications and secure infrastructure in line with local requirements and human capacity using the "bottom up" and not only the "top down" approach. Respecting local languages, culture, customs and locations is a key factor in ensuring the long-term viability of the applications. In addition it is necessary from the outset to have appropriate training plans for local experts including technicians and engineers if implementation plans are to meet with success. This investment in training, which must be seen as long term, is often underestimated or underfinanced despite being the underpinning for future success. Cooperation, particularly via the Internet, with external training centres is extremely useful, mutually beneficial and relatively easy to implement. This is true whether the centres are academic or otherwise, foreign or domestic. Such collaboration can extend as far as the recognition of diplomas and student participation in research programmes. Numerous developing countries have demonstrated the technical and economic viability of this joint approach.

Generally speaking we can say that any project that lacks an associated training plan with solid foundations has little chance of surviving in the long term. This is particularly true in the field of e health, where the operational constraints are more burdensome than in other sectors.

UNESCO

UNESCO's mandate lies in the areas of education and culture. Aware as it is of the importance of ICTs, this organization has for some years now been a leader in using ICTs and access to information, communication and education, which can also have a direct impact on health in countries.

Apart from a number of telemedicine initiatives, including the creation of academic chairs, its main contribution has been the development of educational software packages (toolkits) for computer-assisted learning that are suited to the health sector. Although these software packages do not correspond directly to the conventional approaches for health sciences education they are nevertheless extremely useful since they can be exchanged between numerous players. They are also useful in setting up educational libraries that are of low cost, rapidly available and user-friendly, particularly in the context of developing countries.

Collaboration on shared challenges

Nearly all of the United Nations agencies (UNITAR, FAO, UNHCR, etc.) are to a greater or lesser degree involved in the development, use or support of e-health applications. One has only to visit their respective websites to remain abreast of their latest initiatives, but it is clear that the driving force in the field of e-health lies with ITU on the telecommunications development side, and with WHO for health policy and content.

A number of shared challenges have arisen requiring a collaborative approach, for example where the sale of drugs over the internet is concerned. A distinction has to be drawn here between legitimate practices, i.e. the sale of certified products, with or without a prescription according to the country in question, and fraudulent practices including the sale of imitation goods. This issue is becoming very important and is obliging States or groups of States to take appropriate measures to defend intellectual property rights, public health and safety, cybersecurity with the possibility of civil or penal sanctions being imposed on anyone involved in the chain of service, including internet service providers. These are complex multidimensional issues which cannot be addressed by one country, company or agency alone.

It is therefore the latter's duty to implement procedures for monitoring the types of content that are conveyed via the internet in the interests of preventing the dissemination of illegal, pornographic, racist or inflammatory materials.

The World Trade Organization

At the same time, particular attention will be focused on the ongoing negotiations within the World Trade Organization (WTO). These could one day result in international agreements concerning services, including health services – albeit with numerous restrictions relating to the sovereignty of States. This trend is already taking shape in the fields of teleradiology and teleradiology, for example in the form of the second medical opinion or remote analysis of radiological data. Should this continue to develop, it is indeed likely to draw the health field further into economic globalization, with significant consequences for high-income and developing countries alike.

Researchers and academic bodies

One is struck by the fact that most of the world's universities, including medical faculties, have thematic cooperation plans that bring together the human and financial resources of high-income and developing countries to work together on a given health issue such as HIV/AIDS or tuberculosis. Such collaboration, while very useful, is also very scattered. As such, these projects do not improve the total health picture and are often unable to survive the drop in international financing that follows the initial enthusiasm.

By contrast, few research centres take an interest in health systems per se or in the tailoring of ICTs to local problems. A number of efforts have recently been financed by European Union research programmes in the interests of developing products, equipment and operating systems that are genuinely tailored to local requirements in terms of robustness, accessibility, and ability to withstand climatic and environmental conditions. The efforts by the Massachusetts Institute of Technology's Media Lab to develop a computer costing USD100 (even though the end price is twice that amount) and market it ("buy one and pay for two: the second one will be donated in the developing countries") have done a great deal to mobilize the international community. Numerous initiatives of a similar nature are now being supported by States or multinationals, often with differing pedagogical approaches.

Nevertheless, it remains the case that theoretical and practical public health research focusing on the renovation of health systems in developing countries through the use of information and communication technologies would be extremely useful and of immediate benefit.

National and regional decision-makers

The role of national and regional decision-makers is clearly essential: strong political enthusiasm is a sine qua non and will always be the key prerequisite for success. Such enthusiasm must be all embracing; it must reside in all of the players, including the ministries responsible for health, telecommunications and education, and not only in a single player which will be unable to carry through its project for want of support or resources. Numerous heads of State have understood these stakes and are giving their support to national or interregional action plans, for example "eRwanda", NEPAD initiatives, etc.

The political enthusiasm must be reflected in:

- an openly-declared, resolute and ongoing (spanning several years) readiness to take action at the highest levels; the integration of national & regional e-strategies, aligning health and ICT sectoral policies and planning;
- specific measures involving financing and the creation of basic infrastructure (e.g. broadband communications);

- the implementation of the necessary legal and regulatory framework: liberalization of the telecommunication sector, competition, tariff structure, transparent bidding procedures;
- and, where ICT applications are concerned, in the mobilization of human and financial resources that are not all necessarily dependent on the State but may be provided by other sources if the sponsors feel confident about the project's reliability.

Where this general framework is lacking, projects are unlikely to be viable in the long term. Conversely, an apparently modest yet effective approach that abides by these criteria on a step-by-step basis, engaging all of the decision-makers in the health and telecommunication spheres (as, for example, in the Sultanate of Oman) can have remarkable results. Public health is the sovereign responsibility of States. No health or e-health project can be implemented in the field without the agreement of the competent authorities. Any other course of action would constitute a serious breach of confidence and run the risk of rejection.

Collaboration with neighbouring countries, particularly those sharing the same language, is extremely welcome as a means of reducing costs and expediting progress. Certain linguistic groupings are already well aware of the benefits of exchanging e-health products

Health professionals

Health professionals are the first to be concerned by changes brought about through e-health solutions. In many cases they are ill-prepared for such change, particularly as training programmes are often rudimentary or totally lacking. Further, they may also dread significant change out of a fear of losing authority or recognition.

The active collaboration of health professionals is an essential component in the implementation of e-health solutions. In addition three factors are of the utmost importance, namely information and training, a win-win-win approach, and the role played by opinion leaders.

Information and training, in the language of the partners and with due respect for their traditional modus operandi, needs to be prepared and implemented from the very earliest stages of any project.

The win-win-win approach (www as in World Wide Web, but with a different meaning) is a useful one, the aim being to demonstrate that the e-health application to be developed is beneficial to the patient (in terms of time, quality of care received, cost), beneficial to the professional (in terms of productivity, competencies and professionalism), and beneficial to the community (in terms of public health, the economy, international recognition).

The role of opinion-leaders: In all countries of the world, certain conservatism is to be found in healthcare circles. Thus the role of the elders – from the faculty research professor to the village sage – is decisive. Under no circumstances must e-health products result in the destabilization of local health systems – on the contrary. The policy of mobilizing opinion-leaders is implemented to good effect by the pharmaceutical industry and is an example worth following. International recognition through inter-university coordination exercises – for example, actions carried out locally – is an effective driver for mobilization and relatively easy to implement.

Donors

Health has no price, but it does have a cost. Regardless of the arrangement used for financing health systems (e.g. the Beveridge model based on taxes, or the Bismarck model based on voluntary social security contributions), any new health cost is initially perceived as negative by financiers. This attitude is reflected in a lack of investment financing or refusal to reimburse treatment. Three approaches for financing health systems in countries with varying levels of development are described below.

A first approach that works particularly well in developed countries with an efficient health system involves the drawing up of case presentations that highlight the cost/benefit and cost/efficiency

advantages of e-health services. This approach is well-suited to advanced democracies where healthcare decisions are taken close to the level of the user, such as the health regions in Scandinavian countries.

A second approach consists in having the intermediate investments (not the basic infrastructure) financed by research or development funds. The next step is to demonstrate little by little the irreplaceable nature of the services provided, and ultimately negotiate procedures for the reimbursement of treatment with the support of all concerned: health professionals, users and politicians. This approach is enjoying rapid and widespread development in numerous developed countries with an intermediate level of income.

A third approach consists in having both development and operations funded by external financial bodies, this clearly being a key approach in developing countries. During the time it takes for the local system to become sufficiently robust in financial terms to permit self-financing, the financial input of end users, however modest, will make an extremely useful contribution to ensuring the adequate tailoring of the systems. Local, national or international subsidies, justified by the need to improve the local economy (agriculture, fisheries, forestry, etc.), by the needs of the community (controlling infectious diseases) or by international considerations (poverty, human rights, migration), are common and in many cases indispensable. International funds such as the Digital Solidarity Fund as well as grants from foundations and multinational companies are active and effective in this domain.

Securing the financial aspect of e-health implementations is of course fundamental. However, the widely varying range of resources available to be deployed means that serious and deserving cases should not be blocked by this dimension. A number of international consultancy firms make their services available to countries and institutions in the search for financial resources for e-health.

Non-governmental organizations (NGOs)

With their highly diverse *raison d'être* (political, economic, religious), with which it is important to be familiar from the outset, NGOs have been – and more often than not continue to be – the driving force behind e-health initiatives in developing countries. Their contribution may of course be financial, but also and above all takes the form of invaluable human and technical resources. Together with general logistical assistance, this ensures that projects are not carried out in isolation but are interconnected by veritable networks of solidarity. This contribution, which allows for the exchange of problems and solutions, is essential.

A number of initiatives (on the part of Indonesia, for example) have been developed in order to foster the proposal that international volunteer corps, skilled in the field of information technology, should be set up to provide ad hoc assistance to States at their request. Other initiatives such as Web-based networks of *Télécoms Sans Frontières* (TSF) are likewise very useful.

Although the dynamism of NGOs and the human resources available to them are often underestimated, the local activities of NGOs should under no circumstances be left to themselves, without coordination or oversight on the part of the local health authorities.

The private sector and associated industries

At the global level the private sector is the driving force behind technological innovation and the development of ICT products. Nothing would be possible without it. We are talking here about the companies that provide the basic components, networks and services, and whose capital stock is at the forefront of the world's stock exchanges.

Such industries rank among the world's most wealthy and dynamic. For them, the health sector constitutes a relatively modest market that is far less dynamic than the banking, trade or process automation sectors. It is, moreover, a market that is highly fragmented and complex on account of the many different legislative frameworks to which it is subject. Apart from a handful of technical standards that are shared with other ICT sectors (exchange protocols, formats), few standards have as

yet been put in place in the health sector, making for higher development costs and a brake on market development.

These industries are nevertheless the driving force for the implementation of solutions and are at pains to introduce players to the new facilities that are available to them.

Accounting as it does for almost 10 per cent of the gross domestic product of developed countries, the health sector represents a considerable growth area for the producers of products and services.

The prime segment within this market has obviously been the hospital segment. This began with administration and logistics, then computerization of medical and technical services such as radiology and laboratories. It is followed by delivery of medical services, in parallel with medical records and assistance for diagnosis and prescription. This phase has more or less been completed in most of the major hospitals in wealthier countries.

The second market segment consists of the setting up of networks linking hospitals and including the healthcare centres and general practitioners in the surrounding urban areas. This phase is being rapidly developed to enable the exchange of results and medical records, ongoing training, reimbursement management and essential operational coordination.

The third market segment involves bringing the network directly to patients and citizens in their homes and places of work or education. This segment is at the emergent stage, and we are currently witnessing a proliferation of Internet-based health services.

Economic forecasters tell us that the e-health market will represent some 5 per cent of health expenditure between now and 2010, compared to 7 per cent for medicines and 3 per cent for radiology. When set against the current figure of 1 to 2 per cent, it is clear that the development prospects for e-health are enormous and that the growth of industries serving this sector will continue to be expressed in two figures over the coming years. This explains why one of the main congresses in the U.S. on this theme attracts over 25,000 participants each year, and why similar events are increasingly being organized in other parts of the world, including Europe and Asia.

The developing countries are not an economic priority for the sector's industrial leaders, owing not only to the obvious question of solvency but also because products that are developed for the wealthy nations are not at all tailored to the health problems and systems at the local level. Nevertheless, the economic dynamism of the emerging countries is resulting in a proliferation of healthcare centres of excellence equipped with the latest facilities, including on the ICT side. The Bahrain initiatives (City of Health), for example, are symptomatic of the rapid progress that is to be expected in countries with stable and growing economies: South Africa, Brazil, India, China, Viet Nam.

Such progress produces indirect benefits for the developing countries, including lower product costs, the availability of freeware products, system miniaturization and lower maintenance and replacement costs.

All things considered, the attitude of the industries concerned may be characterized as follows: the telecommunication and network industries support the rapid implementation of high-speed networks and are investing heavily in this sector. This includes optical fibre, undersea cables, satellites and WiMax. The e-health services industries then follow on the basis of solvent markets and economic studies. Nevertheless, and above all out of a concern for their image, almost all ICT companies maintain a portfolio of pilot operations in developing countries, supporting the fight against infectious diseases and the implementation of educational programmes. For reasons of credibility and continuity, the latter are in many cases coordinated with the corresponding United Nations programmes. A policy of choice over many years has been to donate recycled computer equipment. However, this approach may no longer be altogether appropriate, given the attendant performance considerations (rapid obsolescence), maintenance difficulties, high levels of electricity consumption (an important factor where resources are scarce) and environmental concerns (pollution caused by decommissioned equipment).

The Media

As with all other aspects of the information society, the media play an obvious role in the area of e health. This role, be it positive or negative, can have a major impact on public opinion, since everyone without exception is concerned by health.

In a domain as technical and as complex as e-health, publicizing effects such as those produced by the Lindberg project, which demonstrated the feasibility of online telesurgery between New York and Strasbourg, clearly have a significant impact on general public awareness. Any e-health project has to be accepted by local users who may be ill-informed or anxious – a factor that can be demotivating for those engaged in the project and can block appropriate initiatives. It is here that the local media outlets (newspapers and magazines, radio, television.) can be an ally in influencing public opinion and helping set expectations. Politicians are often sensitive to the international knock-on effects and press reviews to which such a project can give rise.

The importance of the media's role for the implementation of an e-health project can only be accentuated by the current convergence of different media applications (mobile telephony, television, Internet, etc.) into a single digital platform.

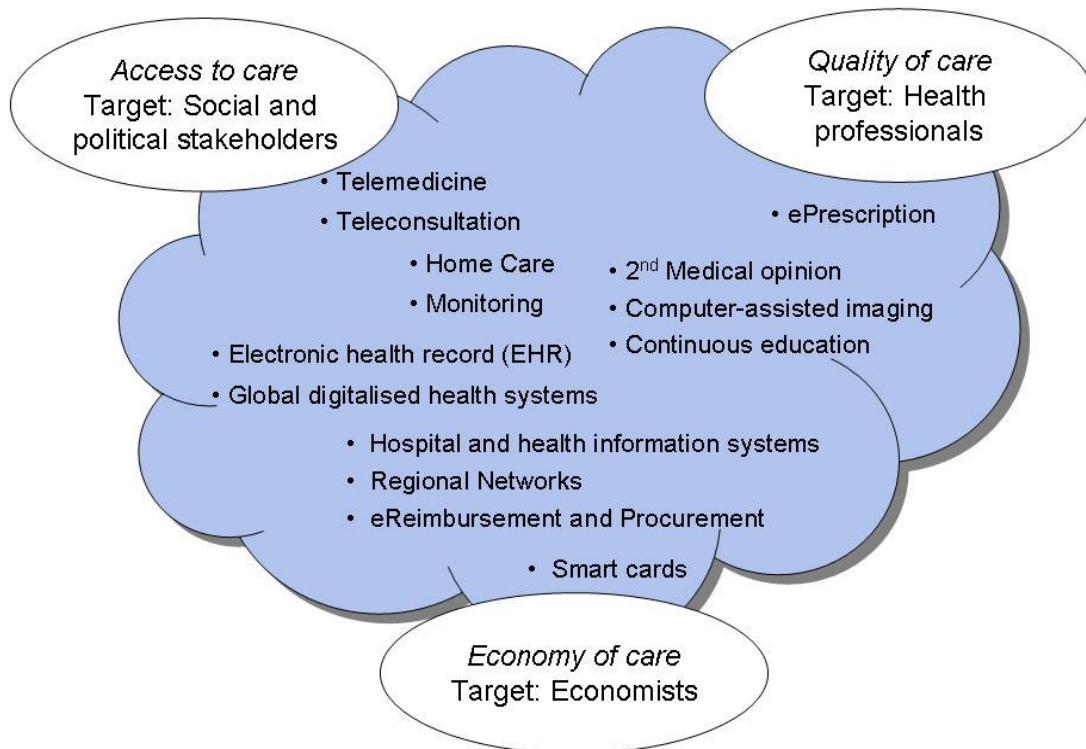
Coordination between players

Given the great diversity and heterogeneity of the players, a global perspective has to be taken. One way of presenting e-health that is simplistic, to be sure, but at the same time operationally sound, is to position the various e-health solutions within a cloud (Figure 1) that has three points of entry:

- The first point of entry consists in convincing the politicians. For example, telemedicine applications for remote or island populations will be relevant and fairly easily accepted given the lack of alternatives and the rapid return on investment.
- The second point of entry has to do with convincing health professionals. This group will be open to the opportunity to improve the quality of healthcare by means such as second medical opinion, ongoing training and easier access to laboratory results.
- The third point of entry focuses on convincing economists and financiers by highlighting the cost reductions brought about by, for example, health cards (lower administrative costs, monitoring of expenditure and of medical nomadism).

The value of this approach is that each of these three groups will, little by little, come to understand the needs and interests of the other, neighboring e-health services and will gradually converge towards adoption of the electronic health record (EHR) and healthcare networks, which are becoming the cornerstones of future health systems.

e-health solutions



JC Healy, 2005

This step-by-step progression can be put in place on either a parallel or a consecutive basis. But it will take a great deal of time, estimated at between 10 and 15 years in the developed countries, bearing in mind that protocols and relationships between social groups cannot be changed as easily as one changes one's computer. Fortunately, this progression has already been long under way in numerous countries. In fact, the milestone of the interoperable medical file has already been approved by ten European countries in the interests of facilitating the cross-border referral of patients and free circulation of workers between States (eHealth Conference, Berlin 2007). This example of international regional cooperation is clearly one to keep an eye on. One of the more relevant political reasons for expediting such implementation lies in the need to wage a fast-moving and effective battle against illicit drugs that have not been authorized within the States concerned but can be obtained through the Internet.

4.4. Administrative, legislative and regulatory frameworks

Appropriate administrative, legislative and regulatory frameworks are essential to the implementation of a national or regional e-health project. Their absence is almost a sure-fire guarantee of difficulties in the medium or long term. This is not the place for going into the subject in detail, but in general we may say that the administrative, legislative and regulatory framework must allow for the normal use of information and communication technologies within the health sector. This wide-ranging subject has a bearing on the fundamental rights of the citizen, e-commerce, health and a large number of international regulations governing the technical and economic spheres. The main (and non-exhaustive) aspects of this framework have to do with three major aspects.

- On the general level, this includes: rules governing security, respect for human rights and protection of the citizen, including the protection of personal nominative data, respect for intellectual property, sound economic governance and market transparency; regulations on the legal status of electronic documents and signatures; instruments relating to the implementation of directives and international standards, particularly in the field of security and data confidentiality and e-commerce; and rules on environmental protection and waste management and on equal opportunities for citizens.
- On the technical level, this includes: liberalization of the telecommunication sector and absence of any monopoly in this sphere; transparent bidding procedures, a reasonable taxation policy, independent arbitration and regulation systems for telecommunications; and respect for international norms and standards, and related regulations.
- On the medical level, this includes: codes of ethics for health professionals; protocols for the certification and type approval of medical equipment; rules for the protection of health professionals in the exercise of their duties (radiological protection, contamination, etc.); rules governing hygiene and safety in regard to hospital wastes; sound rules governing the production, distribution and management of medicines; and rules governing the status of medical records.

There are three important remarks to be made in regard to this vast subject:

- The mere fact that basic legislative and legal documents exist does not necessarily mean that they will be applied, and it is here that local administrative machinery is essential.
- Nothing is cast in stone and changes are possible. Where properly justified and based on elements that are of benefit to the country, new regulations – in many cases inspired by experience elsewhere – may be proposed to the competent authorities (which are often open to specific changes inspired by positive experiences in other countries).
- Regional cooperation between States can play an important role. The exchange of medical records between States can legitimately take place only where a similar level of personal data protection prevails in each of the countries. There can be no question of conducting clinical trials in country A, where legislation is lax, and then transferring the data to country B where the legislation is rigorous. Regional cooperation in this area can be facilitated by partnerships with international bodies, which can serve as the guarantors of codes of good conduct, credibility and project continuity.

5. E-HEALTH IN DEVELOPED AND DEVELOPING COUNTRIES

Given the degree to which e-health applications are dependent on technologies (networks, high-speed transmission, access facilities and the associated costs), local network infrastructures – which in turn are highly dependent on local economies – are the first step in the chain of implementation.

We may therefore broadly base our consideration on the typical classification of countries into three main economic groups, based on average income per inhabitant:

- The "rich" countries, where the average annual income per person is in the order of USD 10,000; this includes the G8 countries. One billion of the planet's inhabitants live in these countries.
- The least developed countries, with an average annual income per person of less than USD 1,000, account for two and a half billion people.
- Countries in transition with middle income levels, particularly countries undergoing rapid developments such as China, India, Brazil and Viet Nam. Some of these countries came together in a group known as G20 during the WTO international negotiations and have been developing a coordinated strategy on approaches to the global development of trade (Doha Round). Three billion individuals live in these countries.

Although overall global poverty has diminished by some 20 per cent over the past ten years, the situation continues to cause concern, particularly in countries characterized by ongoing armed conflict. Finally, the gap between rich and poor countries continues to grow, particularly in the case of countries without mineral or mining resources.

The infrastructure situation in the wealthy countries is already good and constantly improving: networks are up and running, infrastructure and operating costs are acceptable, research bodies are engaged in developmental work, legal and administrative regulations are in place, and funds are available for establishing new health or economic units. E-health initiatives are driven by the prospect of productivity gains in well-functioning sectors, by the necessary renovation of poorly-functioning sectors and, in general, by global competitiveness. By contrast, development in some countries is hindered by an aversion to progress, resulting in social inertia; by administrative regulations whose great number is matched by their obsolescence; and by a political wariness about stepping on the toes of pressure groups or powerful interests afraid of change that represents a threat to well-established structures. These remarks are especially pertinent in the field of health, where progress can be seen as a series of political compromises between the desire to accelerate the reform of traditional health systems and the extent to which professionals and end users are prepared to tolerate change. This having been said, it is nevertheless a fact that after 20 years of inertia and reticence, most players are now convinced of the value of e-health solutions and are contributing, both individually and through health professionals' and patients' associations, to their advancement. On paper, then, all of the economic and social prerequisites for the viability of e-health projects are in place.

For these countries, the prospect of participating in the founding of the third pillar of the healthcare industry, after the pharmaceutical and medical imaging branches, is an attractive one. During the first 20 years, large-scale undertakings in this domain were hampered by the inadequate and limited user-friendliness of mainframe systems, poor ergonomics and high cost. Today, however, such impediments have been overcome through the widespread availability of personal, user-friendly and networked equipment, with which some 95 per cent of health professionals are now equipped (bearing in mind that in any society there will always be pockets of resistance to new technologies).

In parallel, most patients in the middle-class income bracket are fully at ease in navigating the many health-related websites before, during and after their medical consultations in order to gain a more in-depth understanding of the procedures applicable to their case. This new proactive attitude on the part of users confirms the research done by economists on information asymmetry in commercial protocols. This well-understood attitude, whereby the user is no longer merely a consumer but a participant in the action, can only help to improve the quality of healthcare. At the same time, and in

contrast to the old days, these same middle-class players, whose professional lives are governed by the principle of total quality, are less and less inclined to tolerate medical errors inasmuch as they can be avoided through available means such as second medical opinion and standardized procedures.

In the emerging countries, the context is altogether different. These countries, which are neither very rich nor very poor but whose growth rate runs to two figures, are often marked by a strong political will to be present on the international stage. The use of ICTs is a key instrument for accelerating economic and social progress. The authorities are fully aware that the conventional approach to healthcare education and provision will be inadequate when it comes to responding effectively to the ever-growing public demand particularly that of the new middle classes who are able to pay for the services received. ICTs are at the heart of the new type of response now being proposed, and it is in the emerging economies (for example, South Africa) that the most dynamic policies for their implementation are to be found.

Considerable investment, in many cases with the aid of international organizations, is being put into the implementation of e-service applications in the areas of education, health and finance. The attitude of the partners, politicians, professionals and users is positive. However, a number of bottlenecks need to be overcome. These include the scarcity of available funds in some cases, the limited number of products in the local language, the lack of product customization to suit local circumstances, and the lack of competent individuals across the board, from the design stage to the maintenance level. This having been said, the global situation is changing very rapidly, and it would come as no surprise in the relatively near future to see wealthy countries beginning to take their cues from the solutions developed by their emerging counterparts. The progress being made in terms of the number of mobile telephones and associated services is breathtaking, with the annual increase in the number of mobile handsets in China exceeding the total market for that item in certain wealthy countries. Likewise astounding is the rate at which software industries and call centres are developing in the emerging countries.

These observations testify to the undeniable credibility of current products. Having assimilated mobile telephony, this vast and dynamic market is now supporting the development of broadband communications and preparing for the mainstream availability of integrated digital platforms bringing together voice, music, image, video and high-speed Internet access.

In these countries, the authorities rarely put the health sector high on their list of priorities. However, the combination of infectious diseases, long distances and the migration of health workers from the countryside to the city is a compelling reason for developing e-health systems. This is the case in South Africa, where telemedicine is widely used in village communities, meeting a need which it would otherwise be impossible to satisfy.

Finally, it is worth noting that e-education – a field that is highly complementary to e-health – is advancing at a similar rate in the emerging countries.

In the remaining countries, the opportunities are far more limited and viability far less assured. Everything is lacking: electrical and ICT infrastructures, money, credible political backing in some cases, a minimum of meaningful administrative regulations, and local human resources. Other than in the case of mobile telephony, the situation has barely changed in the last 20 years. These countries have together witnessed thousands of e-health or e-education initiatives, scattered here and there and referred to as "pilot phase" or "testbed" by international bodies and finance agencies with a short-term horizon. However, the common fate of such initiatives is to wither and die once the financiers and sponsors withdraw, leaving the disappointed users to either carry on in some way, transition the project, or secure new funding themselves.

However, the remarkable success of the mobile telephone over the past five years allows us to hope that change is under way and that the demand is there. New and effective economic models are being introduced thanks to microcredit arrangements and entrepreneurship. The positive experience of the fisherman in Mauritania who finds that the mobile telephone will help him sell his catch, or of the farmer in Burkina Faso who can use it to consult the latest prices for his crop, is a clear illustration of

the feasibility and economic sense of using ICTs. And indeed we can look forward to rapid progress in this sphere in the coming years including the cabling of Africa by 2015, diffusion of WiMax technologies and increasingly affordable satellite access.

DRAFT

6. BRIEF OVERVIEW OF E-HEALTH TRENDS

6.1. E-health in the service of citizen-based health systems

E-health services were initially developed some 30 years ago by academic research centres concerned at the time with imaging applications (x-ray, computerized tomography, nuclear magnetic resonance) and laboratory automation. The more recent trend, however, has been away from a historical approach focusing on the doctor and the disease towards a patient-oriented approach (healthcare networks and electronic medical records) and most recently towards an approach focusing on health and the citizen, aimed at helping the latter to manage his or her own health at home, at work, at school and in the community. This new approach corresponds to the direction being taken by health systems in developed countries, which are moving away from a historical approach based on medical care, the treatment of diseases and hospitals towards an approach which focuses on maintaining good health, prevention, and educating citizens on how to look after themselves. Internet-based e-health technologies, which ensure a personal approach while having a mass impact, are the public health instrument par excellence for giving effect to this new vision.

6.2. Technical and financial trends

The technical and financial trends are the same as those which prevail for other e-service applications, the key considerations in this regard being as follows:

Further to the major investment that has been made in the developing countries, it is to be hoped that operating costs, currently in the order of two or three times greater than those in the wealthy countries, will fall rapidly.

International initiatives and cooperation will be necessary in order to achieve this objective and thus enable the market to take its natural course.

One important stage will have been achieved once the developing countries have the human and financial resources necessary to develop their own applications, including websites in the local language.

A key factor in this process is a highly-motivated migrant workforce which, while maintaining strong ties to the country of origin, is an important source of financial and human resources capable of accelerating the process.

7. LESSONS LEARNED: ANALYSIS AND SYNTHESIS

7.1. The traditional cycle of telemedicine projects

While 40 years (1960-2000) of initiatives in the e-health sector in developing countries, irrespective of the heading used at any given time (telemedicine, health telematics, etc.), gave rise to the development of thousands of pilot sites, trials, tests, and so on, the overall result is fairly disappointing with few of the initiatives having survived beyond the end of the initial funding period.

The typical development cycle of a project during the above period was as follows:

- A telemedicine project, more often than not aimed at controlling diseases, essentially infectious diseases (AIDS, tuberculosis, malaria), is designed by ICT or health researchers in the wealthy countries with financing from public or charitable funds covering a period of one to three years, and is set up in remote locations in developing countries.
- The standard phase of project preparation is followed by the implementation phase. Following an initial period of enthusiasm lasting some six months, during which the working group motivates and gathers together researchers from academic centres, staff from non-governmental bodies and health professionals from the country concerned, the first difficulties begin to arise.
- The initial problems have to do with the daily reality of the maintenance of technical systems and software, including the maintenance of a simple and reliable electric power supply.
- The next problems to arise concern the required tailoring of the new system to the local healthcare working conditions, it being the case that in many developing countries, and especially in rural areas, the point of entry into the healthcare system is the community clinic rather than the doctor or hospital.
- After two years of effort, the e-health project has undeniably produced positive results on both the healthcare and scientific sides, but not to such an extent that the community wishes to accord it priority status and come up with the human, technical and financial means to make it sustainable.
- Then comes the end of the project. The money is all used up and the local population has not moved far from the health situation it was in at the outset, while feeling bitter about the relatively (in terms of the country's own means) large sums of money that have been spent for little in the way of tangible results. The researchers circulate their report, issue scientific statements and publish their findings before moving on to another project elsewhere, for which they will request and obtain fresh funding.
- An optimistic estimate is that fewer than 10 per cent of the telemedicine experiments carried out in developing countries in the twentieth century were a success; that 45 per cent were halted after one year; and that the remaining 45 per cent ultimately petered out after three years of effort.

This situation is clearly no longer acceptable, so how are we to avoid such errors?

7.2. Need for a global vision in regard to health

As in other sectors of the economy, e-solutions and e-health solutions are intended not merely to resolve an ad hoc issue but to serve as the instruments for changing and improving the health system itself.

An example of this: the computerized collection and transfer via satellite of epidemiological data relating to a given infectious disease is certainly interesting and of scientific benefit. While it can provide faster and more reliable means of collecting data over time, other than in cases of great urgency it will have no direct impact on the approach being pursued for eradicating that disease in a given region.

Another example: radiological telediagnosis is unquestionably a powerful diagnostic instrument in the wealthy countries, but can be of value to developing countries only when the entire treatment chain can be made available to everyone at the same time.

In these countries, the priorities have to do with clean water, toilet facilities, proper nourishment, education for girls and women, preventing diseases and immunization.

A global vision of the country's current and future health situation is the basic prerequisite for any action. This vision may be documented on the basis of the annual country health status reports published by WHO, or of the same organization's "Global Vision, Local Insight" report that was published for the Tunis phase of the World Summit on the Information Society (WSIS). It is only when a vision is in place that e-health solutions can be put forward as instruments for action in the service of a cause, and not as an objective per se.

This global vision must of course aim to bring about changes in the behaviour of individuals (citizens, patients, doctors, nurses). E-health solutions both now and in the years to come will be no more than a support to enable such changes to be ushered in and subsequently maintained.

Thus, for instance, if the spread of the AIDS virus is the current priority in a given country, information and education campaigns will certainly be of benefit. What role can customized interactive services, based on the Internet or mobile telephony, play within this chain? How are we to establish their added value (mass outreach, lower operating costs, etc.)? What is the nature of the relationship with other players in the prevention sphere? How is the service to be tailored to local customs and languages? Which type of products will be acceptable in schools or places of work? And so on ...It is clear that the magic of Internet access alone is not going to be enough to prevent the spread of AIDS.

However, in the majority of cases, this health vision is related to issues of public health and not directly to a specific medical problem per se. To use an analogy, it could be said that e-health solutions represent for public health (and therefore for States) what medicines represent for individual healthcare, i.e. agents to bring about beneficial change, to be prescribed in full knowledge of the indications (and contraindications) and in specific doses.

Without a global vision of health there can be no continuity in e-health projects. Of course, this vision and the priorities that are associated with it must be defined and proposed by health professionals, but at the same time must have the support of the authorities and the community. Without a shared vision there can be no shared viability in the future.

7.3. Integration of ICT into health systems

Numerous telemedicine projects in the developing countries have been developed with aid from wealthy countries in collaboration with local health professionals (doctors, for example) and local authorities, with the general idea being to "cut and paste" solutions already having proved to be effective elsewhere in the originating country in question.

This "top-down" approach is almost bound to fail in the medium term, even if the solutions may function at a technical level in the short term, since the procedures and systems will be different. By way of evidence: the 27 countries of the European Union, with closely related conditions, cultures and economies, developed 27 different health systems that are only minimally – and in some cases not at all – compatible with one another.

By contrast, where the overall approach is defined by common accord, a key factor in the future success of any given application is the appropriation of the corresponding solutions by local operatives.

There are two consequences to all this:

- Systematic and regular collaboration with the local authorities and leaders is essential. What is the problem? Where are the difficulties? What do you propose? E-health solutions must not be

solutions that are brought in from outside and grafted onto the health system. Instead they must be components desired by stakeholders for incorporation into their system. Such solutions also serve as instruments for enhancing the social cohesion of the professional group.

- A comprehensive programme of education and training for the partners is essential. Education and training call for a great deal of time and money. Most project-bearers have a tendency to underestimate this item, to which some 40 per cent of the available time and total budget should be allocated. Moreover it must be put in place at the outset of the project and not at the end as a mere afterthought. This educational component may be developed together with academic bodies which could recognize the required competencies and award diplomas to successful students. Indeed, public acknowledgment of such training is an essential part of the picture. International cooperation in this area is welcome.

7.4. Sound business plans and financial resources

Paradoxically, the inadequacy of financial resources should not pose a huge problem to a credible project, either during its design and development phase or during its implementation. However, these two aspects must be taken into account from the outset so as to avoid failures that might otherwise occur.

The first valuable lessons in this connection have to do with developing a proper business plan covering all aspects of the project, including the results expected by all participants in the value chain. Many cases of failure have been due to isolationist approaches focusing solely on research, the humanitarian angle or healthcare aspects. Taken individually, these approaches are of course entirely valid, but their limitations must be made clear to everyone from the outset so that false hopes are not generated.

The business plans must be developed professionally, with inputs, including risk analyses, from economists and accountants, and not only technicians or doctors. This requirement entails a multi-stakeholder approach that is not characteristic of the health sector. It is an approach that must be long-term and not limited to a single phase of the project or merely to its development phase.

Apart from exceptions necessitated by ad hoc operations (crisis management, for example), the vision has to span a minimum of five years. This action plan must naturally be separated into a series of successive phases, including periodic evaluations (e.g. once a year) to allow for adjustments as necessary.

Lessons also need to be learned in regard to the partners in the project, where shortcomings can again result in its failure. In short, one can only recommend public-private (PPP) and non-professional organization partnerships, in which the various partners proposing different resources and expert services obviously require different levels of return on investment:

- **The public sector**, at the ministerial, regional or local level, must provide the necessary political, administrative and legal staff. Their expectations have to do with securing the best possible health services for the population, as well as with issues of employment, general economics and growth and development aid. For this, stability and continuity are essential. Financial inputs are not the strong point of these authorities, which are often lacking in financial and human resources. But while the above-mentioned supports do not have to be costly, they are essential since no one else can provide them
- **Non-governmental organizations** and donor organizations can provide significant financial and human contributions, but quite rightly demand supporting arguments and positive results to present to their own donors. Such organizations, in many cases international, are governed by rigorous financial regulations and rules of sound governance which have to be respected. The return on investment expected by any given organization will depend on its status. Generally speaking, however, such partners are for the most part sensitive to the media impact of the actions undertaken and public awareness of the project. For this reason it is useful to have an external

communication plan from the outset and to define clearly the roles and responsibilities of the various players in that regard to ensure coordination and accord. Indeed, nothing is worse than to have discordant and uncoordinated channels of communication.

A major project may involve various sources of financing, some of them tending more towards research, some towards short-term medical benefits and others towards the economic effects. The linkage of these different areas of activity is often beneficial when it comes to dealing with intellectual, financial and operational issues. The different modules may progress at different speeds, but each module must be managed by a dedicated manager and coordinated by an overall coordinator of acknowledged standing who is answerable to a programme or steering committee.

- **The private sector** clearly has an essential role to play. Whether we are looking at local partners (access providers, for example, or development enterprises) or multinational partners, the objective is obviously economic. However it is not solely economic since the success (or otherwise) of a project can have knock-on effects and create levels of awareness that in many cases exceed the financing directly committed to a given action. This medium- to long-term perspective can help to facilitate solutions of both a material (loan or donation of equipment) or financial (reduced invoicing of development costs) nature in return for a medium- to long-term operating contract.
- **The role of international bodies** is likewise valuable, not so much in terms of the financial aspects but rather of their ability to mobilize additional resources and of their credibility.
- Last but not least, emphasis must be placed on the increasing role of **microfinance entities and local microcredit organizations**. The founder of this approach, Muhammed Yunus and the Grameen Bank, were awarded the Nobel Peace Prize in 2006. Following the project development phase which is financed through traditional means with external contributions, a microfinance type of arrangement is certainly capable of sustaining a project's continuity in the medium term. In this connection, the experiences and methods described in the Grameen Bank's "Village phone replication manual" are instructive.

Finally, to come back to the all-embracing view that there can be "no development without health, and no health without development", the implementation of a sustainable and effective health system constitutes a major contribution to all-round economic development, such that economic and financial considerations relating to the implementation of a well-organized and successful e-health project should not represent an insurmountable obstacle.

7.5. Ensuring the engagement of stakeholders

This is a critical area of concern. It is obvious that we cannot expect players to change their behaviour overnight, and it has to be remembered that in the wealthy countries it often took in the order of 17 years – almost half a generation – to achieve full acceptance by health professionals of significant advances such as new medicines and new medical imaging technologies. The health sector with its many stakeholders is typically a highly conservative sector in all countries and any change is bound to take time. Clearly then, the focus should not be on the performance of the equipment or ICT systems, but on the need for acceptance on the part of users, both professionals and patients.

A global trend is beginning to be seen in e-health, where the forces for change have hitherto been the scientific data emanating from universities and researchers. It is now increasingly citizens with access via the Internet to recent expert medical information written in their own language who are becoming the force for change, either individually or through associations of patients or their families. Interested citizens now keep themselves informed of the latest developments and effective solutions and are no longer prepared to put up with errors, omissions or irrelevant solutions. While in the wealthy countries this trend is being reflected in a significant increase in the number of legal cases against professionals and institutions, in the developing countries it can be seen in a demand for higher performance levels and in the rapid acceptance of modern solutions. This trend, which has to be channelled in order to avoid misuse, is a force to be harnessed.

In order to mobilize the human resources necessary for such change, there clearly has to be information and education. An effective approach is to develop a "www" (win-win-win) attitude, whereby all of the players involved in a restructuring exercise brought about by e health solutions must benefit from the progress made. Indeed, from the outset of any such project it is important to identify the aspirations of each of the groups concerned by the change to be undertaken (doctors, nurses, patients, authorities, financiers, etc.) so that they can be taken adequately into account. It is here that the role of international bodies and non-governmental organizations can be critical, particularly where they are able to mobilize external support in the form of medical or ICT experts, students, or competent volunteers, who are willing to guide and assist local staff through the change process.

7.6. Promoting an enabling legal environment

Under the Hippocratic Oath, physicians are bound to "first, do no harm" (*primum non nocere*). This requirement is equally valid for those engaged in e-health projects, which must under no circumstances destabilize the social, political or medical equilibrium of the local system. eHealth projects require not only strong technical and project management, they also require the proper public administrative environment. This includes sound governance, public accounting transparency, telecommunication liberalization, personal data protection and data security. Without this context, the project has no chance of success in the medium term.

The e-health project, similar to e-government initiatives, can serve to highlight problems and spark improvements in legislative frameworks and administrative rules, but it is totally out of the question for it to transgress local laws. Where such a risk exists, it is better to postpone implementation rather than plunge headlong into difficulties and the possibility of sanctions. It is here that the support of international organizations can be a decisive factor. Indeed, since WSIS, United Nations agencies, particularly ITU and WHO, have stepped up their advisory work. Through numerous channels, such agencies can invite States to make the kinds of changes in their legal frameworks that will enable them to benefit fully from the information society. At the same time, regional associations of States can make a useful contribution to moving things in the same direction.

If the project is not viable, it is better to bring it to a close. The loser in such cases will clearly be the patient, who should be advised on how to contact appropriate charitable or humanitarian organizations.

7.7. Responsiveness to local demand

A classic source of difficulties lies in the "cut and paste" approach to projects, whereby "what works in wealthy countries must also be good for the developing countries". eHealth should be introduced based on the evaluation of local health and medical priorities, and should respond to specific needs, using ICTs as a tool.

It must always be remembered that the aim is simply to improve local situations; it is not to put on a show for the media. No solution can be directly transposed from one State to another without considerable adaptation to local linguistic, social and cultural conditions.

It is preferable and more effective to implement a small e-health project with limited and achievable objectives with high impact (such as telematic assistance to midwives or nurses in rural areas) than to undertake and be unable to complete a major and technology-intensive project.

In all of this, the current difficulties stem from the limited number of e-health products that respond to local demand (with the exception of educational and training products). The reason for this is found in the lack of profitability for manufacturers. Nevertheless, some progress has been achieved on the software side, for example by promoting the credibility of WHO-supported content and through financial support provided by non-governmental organizations. On the equipment side, many researchers have attempted in vain to develop products that are portable, low-cost, robust, resistant to severe climatic conditions (temperature, moisture), low-energy, user-friendly and able to communicate easily using standard protocols such as the Internet. Such specifications will perhaps soon be adequately met by MIT's OLPC, next-generation integrated telephones and handheld personal digital assistants. E-health research programmes, such as those being pursued in the European Union, are beginning to take an interest in these issues, and it should be noted that such programmes are now open to broad collaboration, including with researchers in developing countries. Curiously, however, this opportunity has thus far sparked little interest within the health sector.

7.8. Project size and scope related to objectives and resources

Here is yet another source of failure. This has less to do with the inadequacy of resources, of which we spoke above, and more to do with the relationship of the project's size to the stated objectives.

If, for example, the objective is to support HIV/AIDS programmes, the project must be dimensioned accordingly. In other words, the project will need to cover a relatively broad geographic area over several years and have a follow-up component. The project must also take into account the national or regional approach to e-health in that it must reflect and fit the overall e-health context.

When a project is doing well it is difficult to resist the temptation to go along with requests to broaden its scope or tack on related research projects. This calls for the utmost caution since the initial project must not be diverted from the original objectives for which it was financed. In addition, a large number of secondary projects can cause confusion and spread resources too thinly. It is essential to ensure the successful conclusion of the initial project, even if this means changing its scope in the light of annual assessments and with the agreement of the project steering committee. The budget should never be depleted in the interests of marginal secondary operations. This consideration becomes particularly acute when the project is at an advanced stage. The hidden costs are often underestimated; indeed it is often joked that the average cost is the sum of the minimum cost and the maximum cost, multiplied (rather than divided) by two.

Finally, the choice of a project's location and size is crucial. A key factor in the decision process is risk analysis, and the location and size presenting the least risk should be chosen. It will always be possible, provided the project is a success, to propose that the effective methods validated at the reference location be replicated in other locations soon afterwards and under the right logistic conditions.

7.9. The need for a “plan B”

Any e-health project is obviously intended to succeed; however, we do not have the right to replace a healthcare process which works (even if not very well) with a process which does not. An alternative plan – known as a plan B – must therefore be drawn up in order to guarantee healthcare continuity and avoid any deterioration in the local situation. In the event of failure the best thing is to be in a position to revert to the previous situation. However this is not always possible if, for example, human resources have been retrained and moved on to other tasks.

The project chief must therefore identify risk areas and propose to the project steering committee alternative measures to be implemented should the need arise, with the corresponding resources and crisis management methods as necessary. It is unusual for a project not to experience difficult circumstances for reasons unconnected with the project, such as unavailability of the leaders, problems with equipment (delays in delivery, breakdown), and other types of risk. These should be anticipated and agreed contingency measures should be put in place as soon as required.

8. GENERAL METHODOLOGY FOR THE IMPLEMENTATION OF E-HEALTH SERVICES IN DEVELOPING COUNTRIES

With respect to the foregoing consideration of factors leading to e-health project success or failure, we may now discuss a general management approach. This methodology is based on classical project management methods. These include project lifetime and life cycle, feasibility study and implementation planning. The corresponding instruments include risk management, total quality management, cost-effectiveness studies and related assessments.

More often than not e-health projects have to be integrated within existing healthcare processes and systems over which they have no direct mandate. There may be other e-health projects planned or already under way. Furthermore, such projects comprise so many variables that general solutions are not directly applicable and have to be tailored to each case.

8.1. Preliminary phase

E-health projects are often initiated by the following stakeholders: the local, regional or national authorities responsible for the health or, occasionally, the telecommunications sector; local users (professionals or patients); and international bodies or academic institutions aware of local health problems and proposing e-health as a tool to improve the situation.

Sometimes e-health projects are initiated to accompany or justify other projects of major economic importance, such as the development of mining resources or major communication networks.

During the preliminary phase, the initiating party's motivations and expectations must be clarified. The first goal of this phase is to develop a reference document setting out the objectives and estimated duration of the project. It must be founded as far as possible on factual and quantitative bases and must clearly identify the health target and the expectations vis-à-vis the e-health solutions. Measurable targets must be established so that the project, when implemented, can be evaluated against these metrics.

The second goal of this phase is an in-depth analysis of the assumptions and plan, including the context (policy environment, resources and risk). This validates and refines the above reference document and sets out the main prerequisites for success. A first round of discussions with health sector stakeholders may then commence.

The first stage in stakeholder consultations is to outline and agree on the underlying health vision so as to avoid applying "technology-driven" approaches that are more media-focused than medical. A medium- to long-term projection will need to be made in order to define the prerequisites for ensuring the project's sustainability following the development phase. To the extent possible the discussions will need to be based on objective and quantitative data (such as number of patients, disease prevalence, availability of human resources, estimated development and operational costs.). Once this aspect has been clarified, there is then the question of how much added value is created by e-health solutions as against other possible forms of action. In some cases the answer is simple (for example, no other alternatives for isolated areas), while in other cases combined solutions may be discussed, always using bases that are the most quantitative possible.

Once the added value of an e-health solution has been determined, one then has to seek evidence and lessons learned from exercises of the same type. Case studies and research can yield important information and benchmarks regarding the results, the infrastructure and human resources required, costs and administrative environment, as well as the evaluation metrics used. It is helpful for those involved in proposed e-health initiatives to draw on experience of similar projects conducted in other parts of the world, even though the specific needs may differ and the technologies may have evolved. The Internet in general and the ITU, WHO and EU websites in particular are key sources of information.

Once these elements have been brought together further discussions can then be held to determine the scope of the project, with additional stakeholders (e.g. ministries responsible for telecommunications, education or agriculture, United Nations agencies, NGOs, company representatives) being invited to contribute. Project governance in the form of a steering committee (or task force) and related working groups is normally set up during this phase.

As the discussions progress, the project can be further refined. Project aspects include: goals and objectives, nature and coverage of services, expected results and beneficiaries, milestones, partners, monitoring and control, risk and change management, technical infrastructure and resources directly allocated, capital and operating costs, local, regional and national sources of support, regulatory frameworks to be developed, etc. and related elements.

This preparatory period can be lengthy (from several months to several years), but is essential if major difficulties are to be avoided during the later phases. For as long as the agreements between the parties have not yet been approved, the negotiations remain at the pre-project stage and must not become the subject of media hype. At each step in the negotiations the pre-project may be halted if the motivation and commitment of major stakeholders is lacking. The costs of this preliminary period are often borne by the project initiator and partners from their own funds.

At this stage it is better to put an end to a poorly-prepared project than to press ahead with it in the knowledge that there is little real chance of success. The expertise of neutral international organizations can be useful when it comes to making this key decision.

8.2. The planning phase

On the basis of the agreements secured during the preliminary phase, work may begin on the planning phase itself. The purpose of this phase is to establish a credible, all-embracing document describing the project's technical aspects in detail. This activity must be led by neutral professionals having at their disposal the technical and other human resources necessary for developing projects. Calls for bids may be issued with a view to their recruitment, bearing in mind that candidates must have concrete experience in planning complex healthcare-related ICT projects. Indeed, the work to be done is at least as complex as the work involved in designing a new hospital unit.

There are only a handful of international consultancies with experience in the field. In the past, most projects of this kind were entrusted directly to multinationals capable of providing the necessary equipment, carrying out the work and subsequently maintaining the project. This approach remains useful but must be supported by other, external inputs. The planning phase must result in a clear presentation of the various stages of the project, including the different tasks and responsibilities, milestones, deliverables and budgets. Different choices or groups of solutions may be proposed and evaluated prior to taking clear decisions. Another important task is to establish a schedule for the various progress reports to be provided in the form of deliverables. For reasons of internal and external communication, the project should be given a title which, to the extent possible, should be self-explanatory.

Contacts with donors and funding bodies will be maintained in parallel with this technical study. Working meetings will be held with the professionals concerned with establishing or operating the system. They have a shared interest in success and should be engaged and encouraged to collaborate towards the successful outcome of a project which will ultimately belong to them.

Once the working plan has been drawn up, it is submitted to the project steering committee for approval. This may initially take the form of a preliminary draft, then in successive versions leading up to the final version taking into account all of the remarks and contributions made.

The time needed for this phase will range from a few months in the case of simple projects with a limited number of partners, to two years for complex and highly innovative projects. Given the rapid evolution of ICTs, a planning phase lasting over three years may run the risk of coming up with

solutions that are already obsolete by the time they are implemented. In such cases it would be preferable to reconsider the project's main assumptions, scope and technical components.

The selection of a project leader is crucial. The ability to manage in a systematic, rigorous and competent manner is essential, but experience shows that the ability to listen and work in a spirit of consensus are also key factors for carrying through a project with a significant change management component. Attitude, character and behaviour, coupled with a proven ability to exercise authority are as important as a candidate's educational background and skills. The project leader reports to the project steering committee, and it is an honest relationship built on trust that is necessary in order to overcome the difficulties typically experienced in these new sectors.

8.3. Development phase s

- a) In order to limit the attendant risks and facilitate the budgetary process, it is normal to divide a project into phases. Each of these has clearly defined objectives, resources, deadlines and results.

These sub-phases allow for the identification of administrative and legal difficulties as they arise (e.g., data security, ethics, intellectual property regulations) and which need to be handled together with the competent authorities. During this process the support and expertise of international bodies is valuable when it comes to updating the relevant legal texts and linking to appropriate international conventions.
- b) During this phase a unit should be set up to maintain a "technology watch". This unit monitors e-health developments worldwide through information support provided by industry and organisations such as ITU and WHO. Where appropriate the unit draws attention to new solutions, resources and examples of relevant projects. Contacts via the Internet, teleconferences and face-to-face meetings will serve to develop a genuine global network of experts from the sector with whom mutually-beneficial exchanges can take place. In addition, regular participation in specialized meetings is a valuable way in which to develop this human network with a view to comparing methods and results. Information shared with international bodies and disseminated via their portals is very welcome, including for the purpose of attracting additional contributions, both technical and financial.
- c) During the course of a project's development, it is unusual not to receive proposals for additional initiatives (for example on the research side). While such initiatives can be of benefit, under no circumstances must the plans, budgets and resources allocated to the initial project be diverted from their objective. Any new subsidiary project must be managed according to the same principles as the main project, although some synergies may be possible.
- d) Methods of financing the project and the allocation of money should also be considered during this phase. In any e-health project it is normal to allocate in the order of 60 to 70 per cent of the budget to human resources in general (and to training in particular), in the order of 10 to 15 per cent to specialized equipment (over and above the basic common infrastructure), 10 to 15 per cent to operating expenses, and 10 to 15 per cent to other items of expenditure. Any economies of scale that can be achieved by sharing the costs of development or adaptation to local conditions with similar projects nearby, any use of standard medical or technical protocols and any transfer of operational modules developed by other credible partners are welcome inasmuch as they help to reduce costs and ensure the project's continuity and maintenance.
- e) Finally, the development phase also involves the choice of technical protocols and operating system for the initiative. The use of standard technical or medical protocols (e.g. Dicom for imaging, XML, HL7, ICT 10 for the exchange of medical data.) is essential. The choice of operating system is a delicate one: on the one hand there are the freeware products made available by numerous dynamic developers, and on the other hand there are the sector heavyweights. No particular advice can be given in this regard, other than to make a choice that ensures the maintenance and continuity of the project.

While adhering to the international rules governing intellectual property, multinationals are often open to specific agreements for developing countries, especially where health and education are concerned. These should be explored in the context of other initiatives that may be under way or under development in the country, including in other sectors.

Here again, international bodies can help in the local replication of financial protocols that are already in place in other parts of the world, and national and interregional authorities are invited to harmonize the solutions adopted.

- f) During this development phase, the necessary training programmes must be designed and selected as appropriate

8.4. Implementation phase

The objective in this phase is to hand over the operational product to the end users in accordance with the established schedule and budget. In the interests of motivating both players and media, a public ceremony is often proposed.

The transfer of technology and transition of the management of various modules to users can be staggered over weeks or months. It is here that training programmes are absolutely essential, in addition to which periodic evaluations will be necessary.

As soon as the users begin to provide feedback and make comments, adjustments can be made to the project. Project implementation challenges are virtually inevitable. They must be acknowledged and given serious attention and resolved, with the users being kept informed of the progress being made.

The setting up of a help point in the form of a telephone helpline or a physical presence is essential. A competent person familiar with the relevant medical terminology and well informed on local working conditions would be ideal for this sensitive post, which requires both politeness and understanding. The mindset for this post must be "We are at your service". Review meetings will be organized at the local level, dealing both with technical issues and with the medical, healthcare and social questions arising out of the project's implementation.

A first serious impact assessment may be envisaged after one to two years of operations. The ideal situation would be for the system to be so well integrated that it has ceased to be a topic of conversation, and for further applications to be envisaged on the strength of that success.

In addition to the reports that have to be submitted to the project steering committee, oral or written updates to the regional and international healthcare and medical communities are useful and often bring valuable returns while enabling successful approaches to be shared with the international community.

Any disappointment and frustration arising under this new way of working must be dealt with seriously. It often takes the form of fear or incomprehension that can be traced back to shortcomings on the training side. Resolving such situations obviously has to do with listening, training and giving the individual a sense of self-esteem in his or her new functions.

8.5. Evaluation, final adjustments and further development

The evaluation phase is essential both for the future of the project and as a response to requests from sponsors. This phase and the associated indicators must be designed at the time of the preliminary study. An evaluation (medical, administrative, financial, operational) at time T0 must be conducted at the outset of any project, expressed in quantitative terms and recorded. The main trends related to the project's expected impact will be noted and used in the study of a projection to a point in time five or ten years hence.

On the basis of this initial presentation it is possible to forecast the medical, healthcare, economic and other situations in five years' time with and without e-health solutions. At that time, the evaluation should be conducted again and the results measured against the projected or expected results.

In most cases implementation of the project will have changed the procedures in force and the initial indicators will no longer appear very relevant. Nevertheless, the evaluation will need to respond to the questions posed by the three major groups of partners concerned with the health system, namely the professionals, the economists and the politicians. Each has a different approach, and a simple linear methodology such as those developed to evaluate medicines or medical instruments will not enable an adequate response. "Diffuse technologies" such as telecommunications are often more important on account of their indirect effects than of their direct effects. In e-health, for example, the systematic second medical opinion via telemedicine for certain types of cancer will be just as important for the patient (quality of the diagnosis) as for the physician working via the network. This same example will be perceived positively by health professionals, but negatively (at least initially) by healthcare payers, who may refuse to cover the additional costs. Fortunately, the economists will one day draw attention to safer, higher-quality care and the potential cost reductions that will flow from the smaller number of medical errors.

Within this framework a new global evaluation method based on "volume", and no longer on "linearity", has been proposed for the purpose of evaluating e-health solutions. Each edge – x, y, z – of a cube represents a given group (health professionals, economists, politicians), and the evaluations based on the criteria for each group are expressed on those axes. The evaluation can thus be seen in terms of the resulting "global volume" defined by those points. This simple method is interesting but does not resolve the metric of the evaluation points.

The evaluation is thus essential but difficult. The rule to be followed here is clear: each group must stand to benefit in its own way, the result must be mutually beneficial, and potential losers (through job losses, for example) must be identified in advance so that worthwhile alternatives can be found.

8.6. Conclusion

While there is no universal approach when it comes to implementing e-health solutions the guidelines presented here describe the basic process and components. The situation should improve rapidly in the future thanks to the increasing numbers of users who are familiar with computer technologies, to more user-friendly systems and to the rapidly-increasing number of systems in place. In addition, countries are beginning to evaluate e-health initiatives and to share these early results in order to inform new projects. We may conclude this section by stressing once again the degree to which regional cooperation in the field of e-health is both desirable and beneficial.

This document should therefore rapidly become obsolete, having served merely as a stepping stone to the future.

9. REFERENCE DOCUMENTS RELATING TO E-HEALTH

In such a vast and rapidly-evolving sector, only Internet access to dedicated websites can respond to specific and current requests. Many thousands of references are available online. Numerous entities, such as WHO for healthcare applications and the European Union for research, produce regular summary reports on the subject. This information complements the topical issues dealt with annually by over 100 international congresses and the articles published in professional journals. The question we need to look at is: What essential basic documentation should be available in any library dealing with this subject?

9.1. Generic reference documents

9.2. Local Autonomy and e-Government in Seoul

As regards basic medical and scientific documentation, several excellent educational works provide medical students with the fundamentals of information processing in the health field and describe technical solutions used in processing, archiving and exchange. Such scientific bases, at the first level of higher education, are essential to an understanding of currently available solutions, problems encountered and future development prospects.

Among the best reference texts are the following:

- Handbook of medical informatics. (1997). J.H. van Bommel and M.A. Musen, eds. Springer-Verlag, Heidelberg. Provides an excellent approach to the basic theory. Updated web version available at: http://www.mieur.nl/mihandbook/r_3_3/handbook/home.htm
- Telemedicine glossary. Fifth edition (2003). European Commission, Brussels. The volume compiles some 14,000 terms, acronyms and brief explanations in the area of e-health. http://ec.europa.eu/dgs/information_society/index_en.htm

Where applications are concerned, things are evolving rapidly and only those documents which take a more all-embracing approach are relevant. Such documents include:

- Studies in Health Technology and Informatics, Volume 100, 2004: E-health: Current situation and examples of implemented and beneficial e-health applications. I. Iakovidis, P. Wilson, J.C. Healy, eds. IOS Press, Brussels. (ISBN 978-1-58603-448-1). This succinct work was published to mark the publication of the 100th work in a series which commenced in 1990 and is devoted solely to the subject of e-health. It brings together written contributions from the most outstanding European and world specialists in the field and refers to numerous bibliographies. Available from <http://www.booksonline.iospress.com/Content/View.aspx?piid=3952>

As regards healthcare and technology situations in developing countries, we may refer to the excellent regional and country summary reports published by WHO for the Tunis phase of the World Summit on the Information Society (WSIS):

- Connecting for health: Global vision, local insight. Report for the World Summit on the Information Society (2005). J. Dzenowagis, World Health Organization, Geneva.
- Connecting for health: Global vision, local insight. Report for the World Summit on the Information Society. Country profiles 2006. J. Dzenowagis, World Health Organization, Geneva. Both reports available at http://www.who.int/kms/resources/wsis_report/en/

The two documents present the healthcare data furnished by WHO and the telecommunication data furnished by ITU. These data are essential in order to understand the diversity of healthcare issues, the corresponding priorities and the technological options for meeting the needs.

In addition, WHO publishes an annual report on the e-health situation in the 193 countries of the world, based on questionnaires completed by local correspondents. This document provides useful

indicative values, although some of the data cannot be fully vouched for. Available through WHO's Global Observatory for eHealth: <http://www.who.int/goe/>

Where the United Nations' general policy documents on e-health are concerned, we may mention the following links:

- Millennium Development Goals (MDGs) - www.un.org/millenniumgoals
- WSIS reports (Geneva and Tunis) - www.itu.int/wsis
- WHO documents:
 - E-health Resolution WHA 58/28 - http://www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_28-en.pdf
 - E-health: Report by the Secretariat - http://www.who.int/gb/e/e_eb117.html
- ITU documents and resolutions
 - ITU WTDC Resolution 54: Information and communication technology applications (Doha, 2006) - http://www.itu.int/ITU-D/cyb/app/docs/wtdc_resolution_54.pdf
 - ITU WTDC Resolution 41: e-Health including telehealth/telemedicine (Istanbul, 2002) - <http://www.itu.int/ITU-D/isap/WTDC-02FinalReport/Section4/Resolutions/Res041.pdf>
 - E-health: Report by the Secretariat - <http://www.itu.int/ITU-D/cyb/publications/2006/dohaactionplanprogramme3.pdf>
 - ITU Doha Action Plan Programme 3: e-Strategies and ICT applications (Doha, 2006) - <http://www.itu.int/ITU-D/cyb/publications/2006/dohaactionplanprogramme3.pdf>
 - ITU WTDC Resolution 2 Annex 2: Study Group 2 Question 14-2/2 on telecommunications for e-Health (Doha, 2006) - http://www.itu.int/ITU-D/study_groups/SGP_2006-2010/documents/Questions/Q14-2-2.pdf
 - ITU-T Study Group 16: Multimedia terminals, systems and ubiquitous applications <http://www.itu.int/ITU-T/studygroups/com16/e-health/index.html>
- United Nations Global Alliance for ICT and Development (UNGAID) - www.un-gaid.org
- Infodev (World Bank) - www.infodev.org
- United Nations Educational, Scientific and Cultural Organization (UNESCO) - www.unesco.org

Other documents and references accessible via the corresponding websites:

- Results of research work and publications by the European commission: - http://ec.europa.eu/information_society/index_en.htm
- American Telemedicine Association (ATA) - <http://www.atmeda.org/>
- European Federation for Medical Informatics - www.efmi.org/
- International Medical Informatics Association - www.efmi.org/
- eHealth Institute - www.ehealthinstitute.org
- Healthcare Information and Management Systems Society (annual congress on Healthcare Information Technology) - www.himss.org
- LeaderHealth - www.leaderhealth.com
- Réseau Afrique Francophone de Télé-médecine (RAFT), Geneva University Hospitals, Geneva, Switzerland - www.raft.hcuge.ch

- New Partnership for Africa's Development (NEPAD) - www.nepad.org

In addition the numerous specialized journals dealing with public health, epidemiology, health systems, medical evaluation, as well as the numerous medical societies regularly publish articles related to eHealth. Keywords for searching include combinations of the following words: information and communication technologies, health, e-health, ICT, internet .digital divide, telemedicine, telehealth.

9.3. Towards new professions

On a more general note, we are all aware that the development of a corpus of research and experiential knowledge in scientific field and its applied disciplines results in the establishment of a professional discipline. The incorporation of ICTs in the health sector has given rise to specialized disciplines and associations of professionals in areas such as e-health, and medical and health informatics, and project management in healthcare IT. On a global basis, universities and schools of public health, medicine and information technology are adding courses and degrees at the masters and doctoral level in these areas.

10. CONCLUSIONS AND FUTURE DIRECTIONS FOR ACTION BY ITU

It is clear that the implementation of e-health solutions is not an easy task, for reasons such as the number and diversity of participants, the wide range of objectives, varying costs, differing durations of development and implementation phases, and the political, administrative and legal constraints.

It is for this reason that the international community and United Nations agencies must play a driving role in assisting States and providing the necessary support, not only in the area of standards and regulations, but also in terms of technical assistance. To date, despite the numerous ad hoc initiatives taken by the various players, no globally-recognized champion has emerged to provide, on a neutral basis, the technical, medical, administrative and other services required by States. There is an opportunity to be seized for a global leader to be recognized in this domain.

In this regard, the necessary credibility could lie with two particular United Nations agencies, namely WHO and ITU. ITU already has long-standing experience and the necessary competence in the area of telemedicine projects. WHO is the guarantor of e-health system contents, and has recently taken essential political steps in that respect. It is wholly appropriate that these two entities should work together in the field of e-health.

The concrete e-health initiatives currently being pursued by ITU display a high level of dynamism associated with the rapid evolution of the corresponding technologies. However, for these to have a substantive impact on health they must be linked to and on a scale sufficient to respond to health priorities at the national level. For its part, WHO is not having an easy job of ensuring resources and getting its partners to share its vision of the kinds of reform to which e-health could lead – and the corresponding priorities.

This situation reflects that which in many cases prevails at the national level, where the progressive forces are more readily to be found in the technology sectors rather than in the more traditional sectors in which the technology is to be applied. Combined solutions therefore need to be found as we seek to move towards achievement of the Millennium Development Goals.

The following ideas are intended to help in identifying a number of possible courses of action that could be pursued in the short-to-medium term in order to secure the recognition of a leadership that would be of benefit to States.

10.1. A proposed United Nations "e-health task force"

Each United Nations agency or concerned international body would be invited to designate a contact point who is fully conversant with his or her organization's policies, experiences, resources and outlook in the field of e-health. This correspondent identifies the organization's areas of competence and expertise (technical, financial, software development, ethics, administrative regulations, etc.) and puts forward the names of experts in those fields. A databank is set up for internal use by the task force.

- The task force coordinator would lead a working group on validating the methodologies in the broad areas of concern. The necessary consultations can be conducted via the Internet, telephone and through videoconferencing.
- Information on this structure would be provided on the websites of the various agencies, by the national correspondents in the Member States, or during general assemblies.
- Acting on these bases, the group would respond to requests from States on behalf of the United Nations and not as a specialized agency. In this way it could considerably expedite the project phases by proposing its methodology and specifying the necessary expertise.
- With regard to its credibility, the group could also:
 - contribute to the mobilization of human and financial resources vis-à-vis sponsors;

- facilitate the evolution of legislative frameworks where necessary;
- disseminate best practices;
- foster regional cooperation;
- negotiate specific agreements with multinationals, or assist countries with negotiating such agreements to facilitate the implementation of their e-health programs;
- maintain a library of dedicated generic programs related to e-health;
- evaluate existing applications and develop/formulate recommendations.

The value of this group would lie in bringing together resources that are currently scattered and in enhancing their effectiveness. Under no circumstances should the group evolve into a new legal entity.

10.2. Ongoing documentation and annual review

Although numerous UN and industry websites post statistics on their respective sectors, little is available in the way of summaries (or just-in-time country profiles compiled from existing data). Such summaries would be useful to decision-makers across the spectrum and should be made technically feasible for users with today's technologies for data visualization and exchange

10.3. Support for system interoperability and training of decision-makers

Although it is still "early days", the current approach to e-health implementation is both fragmented and costly and should be evolved. On the basis of a recognized methodology and international cooperation, support for the interoperability of systems based on recognized standards would facilitate broad scale implementation and make for significant cost reductions. Such an initiative, with its technical underpinning, could not fail to result in major medical, administrative and financial benefits. WHO's work in this area would benefit from support by the ITU and assistance in its implementation in countries.

Another welcome development would be the introduction of regional training seminars on e-health solutions for decision-makers, bringing together the health and ICT sectors towards improving understanding and collaboration in countries

10.4. Implementation of such initiatives

The implementation of such initiatives should not be costly and could be effected quite rapidly. The mutual benefits are obvious. Fruitful interpersonal relationships already exist between staff members of the various United Nations agencies and other bodies.

While maintaining their sovereignty in regard to their respective health sectors, States would be happy to have a credible and unique point of entry, as well as a means for tackling shared challenges. Cooperation between telecommunication and health ministries has increased in recent years and should be further stepped up. The effective manner in which ITU organized the Kigali conference on "Connect Africa" with the World Bank, UNGAID and numerous African partners shows the value of this multi-partner approach.

10.5. The role of States

It is clear that States have a major role to play within this context, since it is they who are the prime beneficiaries of and final protagonists in the change process. This role is a political one that must demonstrate a firm readiness for change. It can be stated without exaggeration that all of the technical and human issues can be resolved through international cooperation, provided the political commitment is assured and ongoing.

This commitment must be reflected by strategic policies associated with progressive adaptation of the structures needed to usher in e-health applications; for example, telecommunication liberalization, transparent bidding procedures, legislation in regard to data protection and security, and a number of others.

Only the States themselves can take such sovereign initiatives. With this firm foundation, requests for technical and financial assistance submitted to international bodies, private entities or non-governmental organizations have every chance of succeeding if formulated in reasonable and credible terms with a clear indication of the expected returns on investment and a justifiable budget. This approach, far from being utopian, is just one of the new facets of the globalization we are currently witnessing.

10.6. Progress in e-health in countries

It will only be through focused international cooperation that significant progress will be made in e-health on a global basis. This cooperation is essential if we are to accelerate the work being done, towards the achievement of the UN Millennium Development Goals. Neutral champions with recognized technical competencies must rapidly emerge in order to meet the needs of States. This is an opportunity to be seized upon by entities such as the International Telecommunication Union and the World Health Organization, ideally working in close cooperation.

"The reasonable man adapts himself to the world;

The unreasonable one persists in trying to adapt the world to himself.

Therefore all progress depends on the unreasonable man."

George Bernard Shaw (1856-1950), Man and Superman (1903)