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JUNE 26, 2007

## eHealth for Africa

### Opportunities for Enhancing the Contribution of ICT to Improve Health Services

E. Asamoah-Odei<sup>1</sup>, H. de Backer<sup>2</sup>, N. Dologuele<sup>3</sup>, I. Embola<sup>4</sup>,  
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<sup>3</sup>Organisation de Coordination pour la lutte contre les Endémies en Afrique Centrale

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## I. POLICY BRIEF

Information and Communication Technology (ICT) offers significant opportunity and potential for world-wide advancement in health and health care. eHealth, is the use in the health sector of ICT for clinical, educational and administrative purposes, both locally and at a distance, and a key enabler for supporting health systems and delivery of health care.

Phase II of the World Summit on the Information Society (WSIS) held in Tunis in 2005, adopted a Plan of Action that urges different stakeholders to contribute actively in harnessing the power of ICT for the achievement of the Millennium Development Goals (MDGs) and for bridging the so called digital divide. Similarly in 2005, the World Health Assembly (WHA) passed a resolution urging countries to take advantage of the potential offered by eHealth to strengthen their health systems. In 2006, the WHA also requested WHO Member States, in another resolution, to use ICT to help address the global shortage of health workers. This health workforce crisis is particularly acute in Sub-Saharan Africa where thirty-six countries have a health worker density below a critical minimum necessary for effective provision of basic health services. With a broad range of possible applications in support of health service provision, communication, education, business, and governance, eHealth offers a significant number of opportunities to address this health crisis.

A workshop held in Brussels in January 2006, sponsored by the European Commission (EC) and the European Space Agency (ESA), focused on the potential of satellite telecommunication technology to strengthen health systems in Africa, recognising that given the limited reach of land based and mobile telecommunication, satellite technology could significantly extend the reach of communication to remote and isolated areas of the continent. A Telemedicine Task Force (TTF) was therefore set up with a mandate to develop a comprehensive picture of telemedicine opportunities in Africa, focussing in particular on the Sub-Saharan region, and to formulate recommendations for future action. The TTF was composed of representatives from: the African Union Commission (AUC), the New Partnership for Africa's Development (NEPAD), the African Development Bank (AfDB), the Communauté Economique et Monétaire de l'Afrique Centrale (CEMAC), the Organisation de Coordination pour la lutte contre les Endémies en Afrique Centrale (OCEAC), the East African Community (EAC), the Economic Community of West African States (ECOWAS), the Secretariat of the African, Caribbean and Pacific Group of States (ACP Sec), the World Health Organization (WHO), the European Commission (EC), and the European Space Agency (ESA).

The TTF has since reviewed the health policies and strategies for African development of NEPAD, WHO and the EU. The review, however, revealed that overall ICT penetration in most African countries is low. For, example, despite the rapid growth of mobile phone subscribers in the last few years, the total penetration rate for the Sub-Saharan region in 2003, excluding South Africa, was as low as 3 subscribers per 100 inhabitants. The figures were significantly higher for South Africa, with 36 per 100 inhabitants (ITU 2004). Availability of computers and in particular in-

ternet access is extremely low. Africa remains the most disenfranchised region in the world as regards internet access. The TTF is convinced that by complementing terrestrial infrastructure with satellite communications, complete coverage of the African region can be achieved.

Private public partnerships can play an important role in the implementation of eHealth programs and projects in Africa. A shining example of such partnerships at work is in the NEPAD eAfrica Commission's e-Schools project, where five major consortia of private companies work in African countries with national industry and government partners to provide interconnectivity and other ICT infrastructure to schools. A typical NEPAD e-School is equipped with a so called health point. A health point is a carefully composed package of ICT applications to support health education and services within NEPAD e-Schools project. Other examples are the AMREF distance learning project of upgrading the professional capacity of 22,000 Kenya nurses; a remote consultation system in Seychelles for their 122 islands; and another project in Kenya addressing health information management systems. The potential to extend this type of partnership should be explored further.

Against this background, the TTF has aligned itself with the health policies and strategies for African development of NEPAD, WHO and the EU. The strategies all address the UN Millennium Development Goals (MDGs) and recognise ICT as an important enabler for progress towards these goals in the African region.

Consequently the TTF recommends a user-and demand-driven approach to support better access to information and knowledge for African health workers and citizens, based on well-delineated local needs and health priorities. This approach lays emphasis on support to existing initiatives (at the TTF stakeholder meeting held in Botswana on 1st March some example such as the above mentioned AMREF, Seychelles and Kenya projects were used to illustrate the potential eHealth applications) which address the needs of the stakeholders, by observing and harmonising related initiatives, promoting open markets, facilitating open systems, implementing demonstrators and proposing governance models and financial options.

In the short-term the TTF proposes concrete action to demonstrate the feasibility of satellite technology to extend the reach of eHealth and to contribute to regional efforts to overcome health workforce shortages. Short-term actions include piloting the extension of existing programmes on eHealth. It is envisaged that this piloting process will permit an immediate start for using ICT in management and use of information and knowledge for improved health in Sub-Saharan Africa in order to demonstrate the potential benefits and to allow an estimation of the costs of effective use of the available technology. Three activities are proposed: one focussing on using eHealth in support of health workforce production and training (scaling-up numbers, performance improvement, quality improvements); a second one on clinical services (to increase health service coverage, reaching isolated areas); and a third one aimed at strengthening the intelligence gathering capacity of health systems and their ability to use information for decision making. These projects will be of particular interest to the

European Commission in considering the potential expansion of eHealth as part of the EU Strategy for Africa objective of increasing interconnectivity, which will be taken forward under the 10th European Development Fund.

In the long-term, on the basis of the lessons learned from these transition phase pilot projects, a programmatic framework will be developed which will outline actions in a step-wise development of sustainable eHealth infrastruc-

ture and services, based on open standards and the needs of African countries in the priority areas as identified by the WHO Executive Board in January 2006 while at the same time respecting legal and ethical principles.

If properly implemented, these plans will help bring the power of ICT to bear positively on health sector challenges in Sub-Saharan Africa and thereby ensure improved health for its citizens.



## II. TELEMED TASK FORCE REPORT

### EXECUTIVE SUMMARY

Information and Communication Technology (ICT) has introduced significant new opportunities for extending the reach of health and health services, offering the potential to overcome some of the obstacles of health workforce shortages and to reach remote areas with training, support and remote consultation opportunities. eHealth, the combined use in the health sector of ICT for clinical, educational and administrative purposes, both locally and at a distance, is a key enabler for supporting health systems to deliver on their promise of good health for their citizens.

At a telemedicine workshop held in Brussels in January 2006, the importance of satellite telecommunication technology to complement land line and mobile communications as a powerful asset for extending the reach of health services to remote areas and supporting health system development in Sub-Saharan Africa (SSA) was clearly articulated. It was with a view to developing a complete picture of telemedicine opportunities in SSA and formulating recommendations for further steps that the Telemed Task Force (TTF) was set up. The EC, ESA, WHO, AUC, NEPAD, AfDB, CEMAC, OCEAC, EAC, ECOWAS, and ACP Sec are all represented in the TTF.

Among the world's regions, Sub-Saharan Africa with its 47 countries and 750 million inhabitants (2005 figures) suffers the highest burden of communicable diseases such as HIV/AIDS, tuberculosis, and malaria, and has the lowest health workforce capacity and the lowest level of health care expenditure globally, with 25% of the global burden of communicable disease and only 3% of the world's health workforce and 1% of international expenditure on health. The average life expectancy at birth in SSA was 46 in 2004. Health service coverage is low, with generally low immunisation coverage and the low numbers of births attended by skilled personnel. The region faces a serious health workforce crisis, due to the migration of doctors and nurses from rural to urban areas; from public to private practice or out of the health care sector; from poor to richer countries within Africa and from Africa to more developed countries. HIV/AIDS has also had a significant impact on the health and wellbeing of the health workforce, with retirement and death leading to further depletion of an already overstretched workforce.

The TTF has reviewed the health policies and strategies for African development of NEPAD, WHO and the EU with respect to Information and Communication Technologies (ICTs). All these strategies address the UN Millenni-

um Development Goals (MDGs) and recognise ICTs as an important enabler of progress towards these goals in Sub-Saharan Africa. The World Summit on the Information Society (WSIS) held in Tunis in 2005 adopted a Plan of Action that urges different stakeholders to contribute actively in harnessing the optimal use of ICTs for the achievement of the MDGs and to bridge the digital divide. With the broad range of possible applications for the support of health service provision, communication, education, business, and governance, ICTs and especially Telemedicine and eHealth offer great opportunities for the Sub-Saharan region.

Currently, however, overall ICT utilisation in most of the Sub-Saharan region is low. Despite the rapid growth of mobile phone subscribers in the last few years, the total penetration rate for SSA excluding South Africa was as low as 3 subscribers per 100 inhabitants in 2003 compared to 36 subscribers per 100 in South Africa. Fixed-line penetration stagnates at around 1 subscriber per 100 inhabitants in Sub-Saharan Africa excluding South Africa, where the figure is around 11. WSIS 2005 recognized Sub-Saharan Africa as the world's most digitally disadvantaged region.

Against the background of health priorities and the current state of health-related infra-structure in Africa, in particular in the Sub-Saharan region, the Telemed Task Force (TTF) recommends pursuing a user- and demand-driven approach to support better access to information and knowledge for health workers and citizens, based on the local needs and health priorities of the region.

In the short-term, during the year 2007, piloting of the use of satellite technology to extend the reach of health services which cannot be served by land based and mobile ICT is recommended. This piloting will help future consideration of satellite communication as a major opportunity for enhancing interconnectivity in Africa, which is considered a key objective of the EU Africa Strategy and which will be a priority for EC financing under the 10th European Development Fund, which begins in 2008. Concrete action should be taken to demonstrate the feasibility of satellite communications to complement other ICTs to extend the reach of eHealth in Africa (the TTF approach). The TTF recommends 2-3 projects which build upon existing initiatives in Africa in order to demonstrate how satellite technology can be used to extend the reach of both education and training capacity development, as well as of distance consultation, and to strengthen information management.



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# 1 Introduction

## 1.1 Mandate and Members of the Working Group

A Telemedicine workshop was held in Brussels on the 27th of January 2006, where through some concrete examples of Telemedicine applications the pertinence of satellite telecommunication technology was demonstrated as a key asset for supporting the health systems in *Sub-Saharan Africa* (SSA).

In his conclusions, the General Director of Development of the European Commission, Mr. Stefano Manservigi, stressed that a complete picture of Telemedicine opportunities in SSA is very much needed. In order to achieve this goal, the *Telemed Task Force* (TTF) was set up with the following objectives:

- To define a roadmap for identifying the suitable set of actions for implementing a programmatic framework for eHealth and Telemedicine in the SSA region to enhance the contribution of ICT to improve its health services.
- To support the definition of a technology-neutral cost-benefit study to evaluate the relevance of a pan-African network of Telemedicine.

In order to meet the above-mentioned objectives, the TTF should carry out the following tasks:

- Assess the status of the existing health infrastructures in SSA.
- Assess the status of the existing telecommunications infrastructure in the SSA region.
- Review the existing Telemedicine programs underway in the area of interest.
- Detail the list of Health policy priorities for each country/region.

The TTF outputs should be instrumental for defining the EC General Directorate of Development (DG DEV) future communication on the definition of the roadmap for the implementation of Telemedicine services in SSA.

The TTF activities will be complemented by the following studies:

- An analysis of benefits of the implementation of a satellite-based network of Telemedicine for each country/region to be funded by the EC.
- A study on the possible system architecture, and related costs, of a satellite-based network of Telemedicine at country/region/pan-African level to be funded by ESA.

The final report of the TTF will be presented to the stakeholders in order to support the political decision process.

So far, the following organizations are represented in the TTF:

- The *European Commission* (EC).
- The *European Space Agency* (ESA).
- The *World Health Organization* (WHO).
- The *African Union Commission* (AUC). The African Union (AU) has currently 53 Member States and covers almost the whole African continent.
- The *New Partnership for Africa's Development* (NEPAD), represented by the South African Medical Research Council (MRC).
- The *African Development Bank* (AfDB), a multilateral

development bank whose shareholders include 53 African countries and 24 non-African countries from the Americas, Asia, and Europe.

- The *Communauté Economique et Monétaire de l'Afrique Centrale* (CEMAC) with its 6 Member States: Cameroon, Central African Republic, Congo, Gabon, Equatorial Guinea, Republic of Chad.
- The *Organisation de Coopération pour la lutte contre les Endémies en Afrique Centrale* (OCEAC), a special institution of CEMAC for health problems.
- The *East African Community* (EAC) with its 5 Member States: Kenya, United Republic of Tanzania, Uganda, Burundi, and Rwanda.
- The *Economic Community of West African States* (ECOWAS) with its 15 Member States: Benin, Burkina Faso, Cabo Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.
- The *Secretariat of the African, Caribbean and Pacific Group of States* (ACP Sec) with headquarters in Brussels is responsible for the administrative management of the ACP Group and assists the Group's decision-making and advisory organs in carrying out their work.

## 1.2 Sub-Saharan Africa

Sub-Saharan Africa (SSA) comprises 47 countries and one French overseas community:

- |                                  |                           |
|----------------------------------|---------------------------|
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| 2. Benin                         | 25. Madagascar            |
| 3. Botswana                      | 26. Malawi                |
| 4. Burkina Faso                  | 27. Mali                  |
| 5. Burundi                       | 28. Mauritania            |
| 6. Cameroon                      | 29. Mauritius             |
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| 20. Guinea                       | 43. Tanzania              |
| 21. Guinea-Bissau                | 44. Togo                  |
| 22. Kenya                        | 45. Uganda                |
| 23. Lesotho                      | 46. Zambia                |
|                                  | 47. Zimbabwe              |
|                                  | 48. Mayotte (French)      |

According to figures from the World Bank [World Bank 2006 SSA-WDI] (Table 1), only few SSA countries are on track to achieve the MDGs. The region has the highest proportion of poor people in the world (44 percent of the population in 2002). But other social indicators show some progress. For example, more countries (10) are offering

girls equal access to primary and secondary school and increasing access to improved water sources (13).

Despite slow progress indicated by many social indicators in SSA there are signs that growth and poverty reduction are advancing in Africa. Seven SSA countries have achieved or are on track to achieve the target of cutting poverty rates in half by 2015. The remaining 41 countries are off track or have insufficient data to assess their progress so far.

By 2004 the region had experienced five years of continuous positive growth in per capita incomes, after nearly two decades of decline. But the share of SSA in global trade flows remained low (about 1.5% in 2004), and has changed little since 1999.

HIV prevalence rates are levelling off, but the death toll from AIDS rises. The life expectancy at birth (Fig. 1) declined between 1990 and 2004, from 49 to 46 years, chiefly under the impact of the HIV epidemic. Access to improved water supplies is increasing, but water remains a scarce resource. SSA has the lowest level of water use among all regions.

Mobile phone service is booming, but Internet access remains low. Mobile phone penetration in SSA quadrupled during 2000-2004. But only 19 per 1,000 SSA inhabitants have access to the Internet, the lowest rate of any developing region.

Table 1. World Development Indicators for SSA [World Bank 2006 SSA-WDI].

	Population	Life expectancy at birth	GNI per capita Atlas <sup>a</sup>	Primary completion rate	Ratio of girls to boys in primary and secondary	Child malnutrition	Under-5 mortality rate	Prevalence of HIV adults	Access to improved water source
	millions	years	\$	%	%	weight	per 1,000	15-49	%
	2004	2004	2004	2000-04 <sup>b</sup>	2004	1995-2004 <sup>b</sup>	2004	2003	2002
Sub-Saharan Africa	726	46	601	62	84	-	168	7.2	58
East Asia & Pacific	1,870	70	1,416	99	-	12	37	0.2	78
Europe & Central Asia	472	69	3,295	94	-	-	34	0.7	91
Latin America & Caribbean	546	72	3,576	97	-	9	31	0.7	89
Middle East & North Africa	300	69	1,972	88	90	15	55	0.1	88
South Asia	1,447	63	594	82	-	48	92	0.8	84
<i>Selected economies:</i>									
Angola	15	41	930	-	-	31	260	3.9	50
Benin	8	55	450	49	71	23	152	1.9	68
Botswana	2	35	4,360	92	-	13	116	37.3	95
Burkina Faso	13	48	350	29	76	38	192	1.8	51
Burundi	7	44	90	33	82	45	190	6.0	79
Cameroon	16	46	810	63	87	18	149	6.9	63
Cape Verde	0	70	1,720	95	100	-	36	-	80
Chad	9	44	250	29	58	37	200	4.8	34
Congo, Dem. Rep.	56	44	110	-	-	31	205	4.2	46
Congo, Rep.	4	52	760	66	-	13	108	4.9	46
Cote d'Ivoire	18	46	760	43	-	17	194	7.0	84
Ethiopia	70	42	110	51	73	47	166	4.4	22
Ghana	22	57	380	65	91	22	112	2.2	79
Kenya	33	48	480	89	94	20	120	6.7	62
Madagascar	18	56	290	45	-	42	123	1.7	45
Malawi	13	40	160	58	98	22	175	14.2	67
Mali	13	48	330	44	74	33	219	1.9	48
Mozambique	19	42	270	29	82	24	152	12.2	42
Mauritania	3	53	530	43	96	32	125	0.6	56
Mauritius	1	73	4,640	100	103	15	15	-	100
Niger	13	45	210	25	71	40	259	1.2	46
Nigeria	129	44	430	75	84	29	197	5.4	60
Ruanda	9	44	210	37	100	24	203	5.1	73
Senegal	11	56	630	45	90	23	137	0.8	72
Sierra Leone	5	41	210	-	-	27	283	-	57
South Africa	46	45	3,630	96	-	12	67	21.5	87
Sudan	36	57	530	49	88	41	91	2.3	69
Tanzania	38	46	320 <sup>c</sup>	57	-	29	126	8.8	73
Uganda	28	49	250	57	97	23	138	4.1	56
Zambia	11	38	400	66	93	23	182	16.5	55
Zimbabwe	13	37	620	80	-	13	129	24.6	83

Note: Figures in italics are for years or periods other than those specified.

<sup>a</sup> Atlas method: see WDI Statistical methods. <sup>b</sup> Data are for the most recent year available. <sup>c</sup> Data refers to mainland Tanzania only. Source: 2006 World Development Indicators database, World Bank, April 2006.

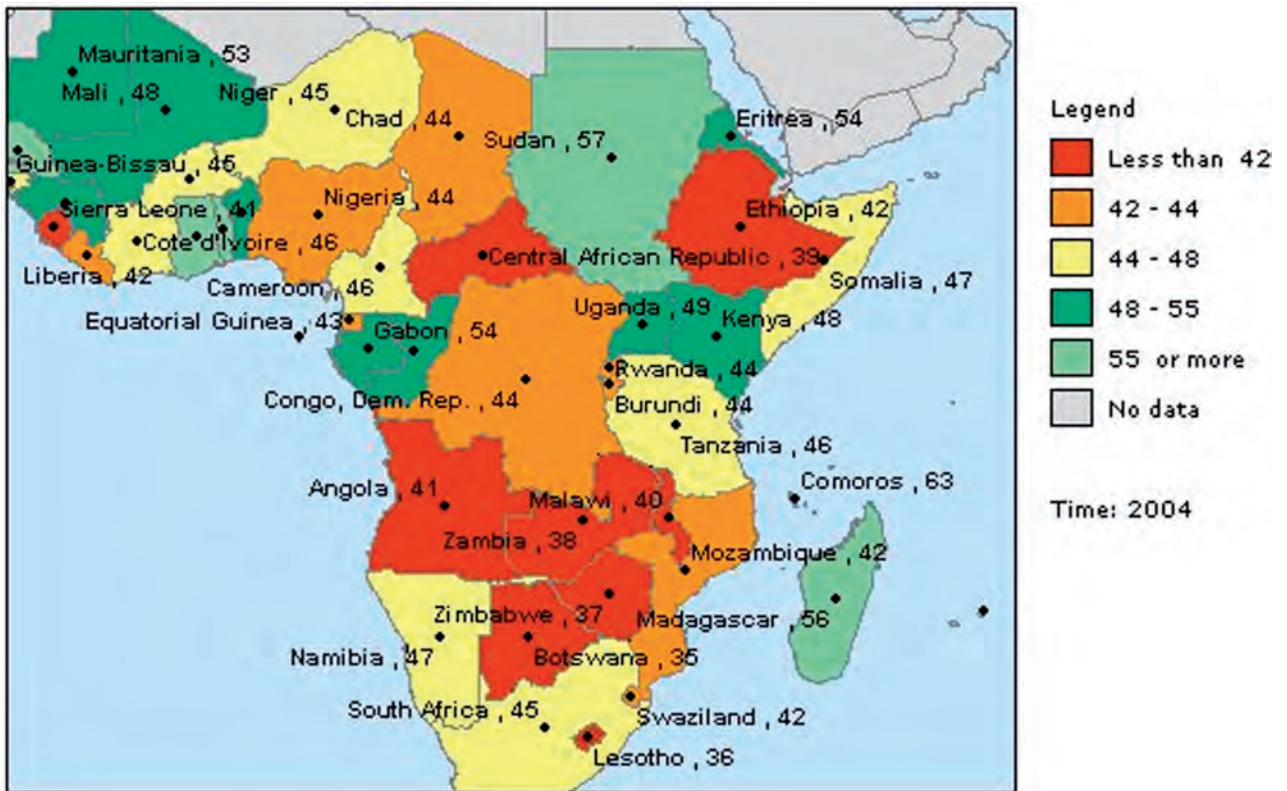


Fig. 1. Life expectancy at birth in SSA in 2004, total (years) (Source: World Bank).

## 2 Current state

The current state of eHealth and Telemedicine as an enabler for enhancing the contribution of ICTs to improve health services in SSA is reflected in the health policy priorities, the existing health infrastructures and resources, the current state of, and trends in, telecommunications, and the ongoing or planned programs and activities in Telemedicine and eHealth. These were reviewed by the working group and strengths, weaknesses, opportunities, and threats were identified and analysed.

### 2.1 Health policy priorities

#### 2.1.1 Common orientations

The TTF has reviewed the health policies and strategies for African development of NEPAD, WHO and EU with respect to ICTs. All strategies are addressing the United Nations (UN) *Millennium Development Goals* (MDGs, cf. 2.1.2) and recognize ICTs as an important enabler of progress towards these goals in SSA. The Phase II of the World Summit on the Information Society (WSIS, cf. 2.1.6) held in Tunis in 2005 adopted a Plan of Action that urges different stakeholders to contribute actively in harnessing the optimal use of ICTs for the achievement of the MDGs and to bridging the digital divide. With the broad range of possible applications of ICTs for the support of health service provision, communication, education, business, and governance, these offer great opportunities for the SSA region, especially for Telemedicine and eHealth.

Frequently adopted actions to realise the potential achievements of ICTs include:

- Strengthening health systems with emphasis on human resources.
- Scaling up health interventions, especially control programs for communicable and non-communicable diseases, and programs to reduce the disease burden, especially those due to pregnancy and childbirth.
- Improving equity, governance, and stewardship.
- Bridging the digital divide by improving access to ICTs and empowering capacities to uptake the new services.

The AU and NEPAD have identified Telemedicine and eHealth as priorities and have started to design and implement several projects in this area (cf. 2.1.3). The WHO (cf. 2.1.4) has been assessing the potential of satellite communications and Telemedicine and eHealth applications to strengthen health systems and acknowledges its potential as part of future EC strategic support to the AU. Telemedicine and eHealth are considered to be potentially important components of the EU commitment to strengthen interconnectivity in Africa, and to strengthen the capacity of the health system to respond more rapidly and effectively to poor people's needs.

In May 2005, the WHO adopted, with the support of the EC (cf. 2.1.5), the resolution of the World Health Assembly on eHealth [WHO 2005 May 25] [WHO 2005 April 7] which requested the Director General to support regional and interregional initiatives in the area of eHealth. It was recognised that adequate use of ICTs contributes significantly to strengthening health systems and staff performance through Telemedicine solutions, eLearning, knowledge management [WHO 2006 KM], disease surveillance

and response to epidemics, and e-supported resource management, and that it can improve equity by reaching poor populations and poor resource settings.

#### 2.1.2 The Millennium Development Goals

In September 2000, the largest-ever gathering of Heads of State ushered in the new millennium by adopting the *UN Millennium Declaration* [UN 2000 RES 55/2]. The Declaration, endorsed by 189 countries, was then translated into a roadmap setting out goals – the so called *Millennium Development Goals* (MDGs) [UN 2001 A/56/326] – to be reached by 2015, framed as a compact, which recognizes the contribution that developed countries can make through trade, development assistance, debt relief, access to essential medicines and technology. These goals are to:

1. Eradicate extreme poverty and hunger.
2. Achieve universal primary education.
3. Promote gender equality and empower women.
4. Reduce child mortality.
5. Improve maternal health.
6. Combat HIV/AIDS, malaria and other diseases.
7. Ensure environmental sustainability.
8. Develop a global partnership for development.

The eight MDGs build on agreements made at UN conferences in the 1990s and represent commitments to reduce poverty and hunger, and to tackle ill-health, gender inequality, lack of education, lack of access to clean water and environmental degradation.

Three of the eight goals (4, 5, and 6), eight of the 16 targets and 18 of the 48 indicators relate directly to health, and health also contributes significantly to other goals. The health-related goals are:

- to reduce child mortality by two thirds;
- to reduce maternal mortality by three quarters;
- to halt, and begin to reverse, the incidence of HIV/AIDS, Malaria and other major diseases by 2015, in comparison with 1990 levels.

Further health-related issues such as drug availability, environment, and safe drinking water, are addressed by other MDGs. Even if the MDGs do not directly address issues such as health systems, including human resources, the actual achievement of the MDGs implies that these issues are addressed at both national at international levels.

The significance of the MDGs lies in the linkages between them: they are a mutually reinforcing framework to improve overall human development. Better health, in all its forms, makes a major contribution to the reduction of poverty, and other MDGs contribute significantly to health improvement.

In 2005, a report on the health-related MDGs, issued by WHO in collaboration with several UN agencies, stated that “overall, the data are not encouraging: they suggest that – despite progress and efforts made – if trends observed during the nineties continue, the majority of poor countries will not meet the health MDGs”. In order to accelerate the progress towards the achievement of the MDGs, the authors made the following five key recommendations:



- Strengthen the health systems and ensure that they are equitable.
- Ensure that health is prioritized within overall development and economic policies.
- Develop health strategies that respond to diverse and evolving needs of countries.
- Mobilize needed resources for health in poor countries.
- Improve the health information basis underlying the monitoring of progress towards MDGs and resource allocation for better health.

The *United Nations Development Program* (UNDP), the UN's global development network, is an organization advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. UNDP's network links and coordinates global and national efforts to reach the MDGs. Its focus is on helping countries build and share solutions to the challenges of democratic governance, poverty reduction, crisis prevention and recovery, energy and environment, and HIV/AIDS [UNDP 2006].

### 2.1.3 The NEPAD Health Strategy

The *NEPAD Health Strategy* [NEPAD 2003] was adopted at the first AU Conference of Health Ministers held in Tripoli in April 2003 and by the AU in Maputo in July 2003. It is a medium-term strategy based on the recognition of what is required to persistently tackle the huge burden of avoidable disease, premature death and disability in Africa. This health strategy recognizes the broader socio-economic and political factors that are at the root of much ill health on the continent and emphasizes the broad contribution of NEPAD to improving health. The strategy further identifies the specific actions that need to be taken by the health sector.

The NEPAD's strategic directions are to:

- Enhance the stewardship role of governments in mobilizing and harnessing the multi-sectoral effort required, and, to involve the resources of government, civil society, private sector, regional and international partners for health development.
- Strengthen health systems and services so that they can provide effective and equitable healthcare built on evidence based public health practice, incorporating the potential of traditional medicine.
- Scale up communicable and non-communicable disease control programs, especially recognizing the unprecedented challenge posed by HIV/AIDS and the burden of tuberculosis, malaria, etc.
- Strengthen and scale up programs to reduce the disease burden due to pregnancy and childbirth.
- Empower individuals, families and communities to act to improve their health, achieve health literacy, and integrate effective health interventions into existing community structures.
- Mobilize sufficient sustainable resources to enable health systems and disease control programs to operate at the level required to reach health targets.

### 2.1.4 The WHO work programme and strategy

The *11<sup>th</sup> General Programme of Work* (GPW) [WHO 2006 GWP11] that was adopted by Member States during the 58th World Health Assembly proposes a broad global agenda for health, taking the year 2015 as a time horizon in line with the MDGs. It recognizes health as a key element of human rights and social justice. Every country in the

world is now party to at least one international treaty that recognizes the right to health and/or other health-related human rights. Health's centrality has been affirmed in a wide range of international agreements over the last 20 years and by a wide set of stakeholders, going far beyond the health sector and Ministries of Health.

The document identifies four global key issues characterized as gaps in: social justice; responsibility and synergies; implementation; and knowledge. It notes the importance of new tools, technologies and cost-effective approaches to tackle the triple burden of disease, adverse demographic and epidemiological trends and an ageing population. Knowledge, skills, and enhanced capacities are considered as vital elements of a motivated and accomplished workforce and for strengthening the performance of health systems. It also notes the "serious problems" that arise when health workers become an attractive export and move abroad, depriving the domestic market of their expertise.

The global agenda proposed by the 11<sup>th</sup> GPW comprises the following ten key priorities: ensuring universal coverage and promoting equity in health; building individual and global health security; promoting health-related human rights and gender equality; reducing poverty and its effects on health; tackling the social determinants of health; promoting a healthier environment; building fully functioning and equitable health systems; ensuring an adequate health workforce; harnessing knowledge, science and technology; and, strengthening governance and leadership. For adequate implementation, this agenda needs to be adapted to the specific context of each region and country.

The WHO regional strategic orientations for Africa which were endorsed by the 55th Session of the WHO Regional Committee in 2005 take into consideration the MDGs, the AU and NEPAD resolutions and strategies, the WHO GPWs, and relevant resolutions, as well as the key global and regional health initiatives. In addition to strengthening WHO support to countries and facilitating partnership coordination, the strategic orientations are to:

- Strengthen health policies and systems by helping countries to build functional health systems, emphasizing community involvement and district strengthening, introduction of appropriate technology, sourcing of essential medicines and development of human resources for health.
- Promote the scaling-up of essential health interventions by supporting Member States in scaling up proven and cost-effective interventions with emphasis on efficient methods of health promotion, prevention, treatment and rehabilitation.
- Enhance response to the key determinants of health by strengthening the capacity of countries to implement multi-sectoral interventions aimed at mobilizing individuals and communities, and focusing on health promotion and on prevention.
- Strengthen and expand partnerships for health by supporting alliances with communities, civil society, academic and research institutions, private sector, global development partners, and regional and sub-regional institutions.

### 2.1.5 The EU development strategy

The *European Development Consensus* [EU 2006 EDC] reaffirms EU commitment to poverty eradication and sets

as the primary and overarching objective of EU development cooperation the eradication of poverty in the context of sustainable development, including pursuit of the MDGs. The consensus highlights the importance of developing infrastructure, communications and transport to increase global connectivity and makes a commitment to support an increased use of ICTs to bridge the digital divide.

The commitment of the consensus to bridge the digital divide is also reflected in the *EU Strategy for Africa: Towards a Euro-African pact to accelerate Africa's development* [EU 2005 COM 486]. This strategy has the achievement of the MDGs as a principal objective. In addition to direct action to tackle the MDGs, such as making basic social services available to the poorest, there is recognition that limited access to communication services constrains development. The strategy makes a commitment to establish a Partnership for Infrastructure to support and initiate programs that facilitate interconnectivity at the continental level. In the framework of this partnership, efforts to bridge the digital divide are prioritised, including through initiatives to develop sustainable low-cost electronic communications [EU 2006 COM 376].

The EU commitment to support greater connectivity is also reflected in efforts to directly tackle the MDGs by strengthening health services. The value of ground-based and space-based electronic communications infrastructure and services to support eHealth and Telemedicine initiatives has been expressed in health-specific policy commitments, particularly as part of the international response to the critical shortage of health workers in many developing countries. The Communication *A European Programme for Action to Confront HIV/AIDS, Malaria and Tuberculosis through External Action* [EU 2005 COM 179], adopted in May 2005, identifies the lack of health workers in poor countries as a major barrier to progress in tackling these three diseases and to progress towards achieving MDGs 4, 5 and 6. On 24 May 2005 the EU Council welcomed the analysis in the action plan, and asked the Commission to present a Communication identifying innovative responses to the human resource crisis. In December 2005 the Commission adopted a Communication entitled *An EU Strategy for Action on the Crisis in Human Resources for Health in Developing Countries* [EU 2005 COM 642]. This strategy highlights the potential of ICTs to improve communication between health sector service levels, and to support distant working and learning of the health workforce.

### 2.1.6 The World Summit on the Information Society (WSIS)

The *World Summit on the Information Society* (WSIS), held in Geneva, December 2003, and Tunis, November 2005, adopted a Plan of Action that urges different stakeholders to contribute actively in harnessing the optimal use of ICTs for the achievement of the MDGs and to bridging the digital divide. More specifically the plan of action affirms that:

- Governments have a leading role in developing and implementing comprehensive, forward-looking and sustainable national e-strategies. The private sector and civil society, in dialogue with governments, have an important consultative role to play in devising national e-strategies.
- International and regional institutions, including international financial institutions, have a key role in integrating the use of ICTs in the development process and making available necessary resources for building the Information Society and for the evaluation of the progress made.

Furthermore, connecting health centres and hospitals with ICTs is one of the objectives of the Plan of Action.

## 2.2 Health infrastructure and resources

### 2.2.1 Health service coverage

The 46 countries of the WHO African region (this is SSA without Somalia and Sudan, plus Algeria) include over 4,200 health districts, 760 tertiary care facilities, 700 secondary care facilities, and over 80,000 primary care facilities.

The health service coverage is low in the majority of SSA countries (Table 2). Of the 47 SSA countries, only 16 (34%) and 21 (45%) have an immunization coverage equal or above 80% for measles and DTP3 (diphtheria, tetanus, polio), respectively. Most populated countries have low immunization rates which make the average for both measles and DTP3 around 66%. 22 countries (47%) have the antenatal care coverage (ANC) at 1 visit for 80%, or more, of their pregnant population, while only 4 countries (9%) have 80%, or more, of those pregnant receiving ANC at 4 visits. Concerning the percentage of births attended by skilled personnel, only 5 countries (11%) have reached such coverage of 80% or more. The contraceptive prevalence rate is much lower, since only 3 countries (6%) reported more than 50%.

### 2.2.2 Human resources for health

A major gathering of experts in human resources for health in Addis Ababa, Ethiopia, in January 2002 [WHO/WB 2002] put the African Region's health workforce crisis firmly on the international agenda. Delegates at the meeting reported alarming figures. For example, 50% of doctors in Namibia were expatriates, and medical doctor vacancy rates in the public sector in 1998 were reported to be 43% in Ghana and 36% in Malawi. Nurse vacancy rates in the public sector in Lesotho were reported to be 48% in 1998. The meeting noted that for 15 years there had been no public recruitment of health personnel in Cameroon, while Ghana, Zambia and Zimbabwe estimated losses of 15–40% of employees in the public sector every year. This underscores the attrition of the health workforce and the severity of the problem in some countries to fill existing vacancies [WHO 2006 ARHR].

Many factors have contributed to the growing shortage of health workers across the Region. Among them is the loss of many healthcare workers due to death, migration and poor conditions of service. Human resources for health policies and plans have not been able to address the increasing demands of health service delivery, while often weak health system infrastructures have not adapted to population growth and needs. The devastating impact of the HIV/AIDS pandemic has drastically cut large swathes of the health workforce in some African countries and made working conditions extremely difficult in the health sector.

Until recently, scant attention was paid to human resource issues such as remuneration, deployment and continuing education. A WHO survey, published in 2004 on trends in Cameroon, Ghana, Senegal, South Africa, Uganda and Zimbabwe over the period 1991 to 2000, found that although the absolute numbers of health professionals had increased, the overall doctor to population ratio had fallen. Health workers migrate within countries from rural to urban practices, from the public to the private sector, and be-

Table 2. Health service coverage in SSA (Source: WHO 2006 WHS).

Nr.	Country	Population (millions) 2005	Immunization coverage among 1-year-olds			Antenatal care coverage			Births attended by skilled health personnel		Contraceptive prevalence rate	
			Measles	DTP3	HepB3	At least 1 visit	At least 4 visits					
			(%) 2004	(%) 2004	(%) 2004	(%)	(%)	Year	(%)	Year	(%)	Year
1	Angola	15.9	64	59	...	...	...		47	2000	6.2	2001
2	Benin	8.4	85	83	89	88	61	2001	66	2001	18.6	2001
3	Botswana	1.8	90	97	79	99	97	2001	94	2000	40.4	2000
4	Burkina Faso	13.2	78	88	...	72	18	2003	57	2003	13.8	2003
5	Burundi	7.5	75	74	83	93	79	2001	25	2000	15.7	2000
6	Cameroon	16.3	64	73	...	77	52	1998	62	2004	26.0	2004
7	Cape Verde	0.5	69	75	68	...	99	2001	89	1998	52.9	1998
8	Central African Rep.	4.0	35	40	...	...	...		44	2000	27.9	2000
9	Chad	9.7	56	50	...	51	13	1997	14	2004	7.9	2000
10	Comoros	0.8	73	76	77	...	...		62	2000	25.7	2000
11	Congo	4.0	65	67	...	...	...		...	...	...	...
12	Dem. Rep. of Congo	57.5	64	64	...	...	...		61	2001	31.4	2001
13	Côte d'Ivoire	18.2	49	50	50	84	35	1998-99	63	2000	15.0	1998-99
14	Equatorial Guinea	0.5	51	33	...	...	37	2001	65	2000	...	...
15	Eritrea	4.4	84	83	83	...	49	2001	28	2002	8.0	2002
16	Ethiopia	77.4	71	80	...	27	10	2000	6	2000	8.1	2000
17	Gabon	1.4	55	38	...	94	63	2000	86	2000	32.7	2000
18	Gambia	1.5	90	92	90	92	...	2000	55	2000	9.6	2000
19	Ghana	22.1	83	80	80	90	69	2003	47	2003	25.2	2003
20	Guinea	9.4	73	69	...	74	48	1999	35	1999	6.2	1999
21	Guinea-Bissau	1.6	80	80	...	89	62	2001	35	2000	7.6	2000
22	Kenya	34.3	73	73	73	88	52	2003	42	2003	39.3	2003
23	Lesotho	1.8	70	78	67	91	88	2001	55	2004	30.4	2000
24	Liberia	3.3	42	31	...	...	84	2001	51	2000	...	...
25	Madagascar	18.6	59	61	61	91	38	1997	51	2003-04	27.1	2003-04
26	Malawi	12.9	80	89	89	94	55	2000	61	2002	30.6	2000
27	Mali	13.5	75	76	73	53	30	2001	41	2001	8.1	2001
28	Mauritania	3.1	64	70	...	63	16	2000-01	57	2001	8.0	2000-01
29	Mauritius	1.2	98	98	98	...	...		99	1998	...	...
30	Mozambique	19.8	77	72	72	71	41	1997	48	2003	16.5	2003
31	Namibia	2.0	70	81	...	85	69	2000	76	2000	43.9	2000
32	Niger	14.0	74	62	...	39	11	1998	16	2000	14.0	2000
33	Nigeria	131.5	35	25	...	61	47	2003	35	2003	12.6	2003
34	Rwanda	9.0	84	89	89	93	10	2001	31	2000	13.2	2000
35	Sao Tome and Principe	0.2	91	99	99	91	...	2000	79	2000	29.3	2000
36	Senegal	11.7	57	87	54	82	64	1999	58	2000	10.5	1999
37	Seychelles	0.1	99	99	99	...	...		...	...	...	...
38	Sierra Leone	5.5	64	61	...	82	68	2001	42	2000	4.3	2000
39	Somalia	8.2	40	30	...	...	32	2001	34	1999	...	...
40	South Africa	47.4	81	93	92	89	72	1998	84	1998	56.3	1998
41	Sudan	36.2	59	55	...	...	75	2001	...	...	...	...
42	Swaziland	1.0	70	83	78	...	...		70	2000	27.7	2000
43	Tanzania	38.3	94	95	95	96	69	1999	46	2004-05	25.4	1999
44	Togo	6.1	70	71	...	78	46	1998	49	2000	25.7	2000
45	Uganda	28.8	91	87	87	92	40	2000-01	39	2000	22.8	2000-01
46	Zambia	11.7	84	80	...	94	71	2001-02	43	2001-02	34.2	2001-02
47	Zimbabwe	13.0	80	85	85	82	64	1999	73	1999	53.5	1999
48	Mayotte	0.2	...	...	...	...	...		...	...	...	...
	Total	749.86										
	Minimum		35	25	50	27	10		6		4.3	
	Maximum		99	99	99	99	99		99		56.3	
	Average		66	66								
	# Countries with ≥ 80%		16	21	14	22	4		5			
	# Countries with < 50%		5	6	0	2	17		21			

tween countries, in search of better working conditions, higher salaries, and opportunities for training and recogni-

tion. Table 3 shows the number of doctors and nurses from African countries working in foreign countries. They repre-

Table 3. Number of doctors and nurses from SSA countries working in foreign countries (Source: WHO regional Office for Africa, 2003, Brazzaville).

Home country	Number of doctors and nurses	Country of workplace
Burundi	127	Belgium, Benin, France, Rwanda
Cameroon	82	Canada, Central African Republic, France, Namibia, Senegal, UK, USA
Central Africa Republic	176	Cameroon, France, Cote d'Ivoire, Senegal
Cote d'Ivoire	641	Canada, France
Democratic Republic of Congo	337	Canada, Cote d'Ivoire, France, Senegal, USA, Zambia
Gabon	128	Canada, France
Gambia	233	USA, UK
Ghana	1,169	Gabon, Saudi Arabia, South Africa, UK, USA
Kenya	1,734	Saudi Arabia, UK, USA, Zambia
Madagascar	341	France, Zambia
Malawi	484	UK, USA
Mali	93	Cameroon, Canada, Cote d'Ivoire, France, USA, Zambia
Nigeria	213	France, Gambia, Kenya, Namibia, UK, USA, Zambia
Sao Tome and Principe	103	Gabon, Namibia, Portugal
Tanzania	446	Botswana, Comoros, Equatorial Guinea, Kenya, Mauritania, Namibia, UK, United Arab Emirates, USA, Zimbabwe
Zambia	974	Botswana, UK USA
<b>Total</b>	<b>7,281</b>	

sent more than 30% of the stock of doctors in the source countries.

International efforts are under way to address Africa's growing health workforce crisis. The World Health Assembly passed a resolution on migration and human resources for health in 2004 and the High Level Forum meeting to discuss progress towards the health-related MDGs in 2004 also recognized human resources for health as vital for achieving the goals.

Efforts are also made by countries to develop and implement motivation and retention strategies with the support of development partners as part of these countries' national health plans. These include allowing health workers to engage in private practice while working in the public sector, raising salaries and improving working conditions, retaining certificates of graduates until they have returned to their country of origin, allowing communities in decentralized systems to recruit and pay their health workers directly. While recognizing the right of individuals to migrate, governments can also use this to mutual benefit through, for example, bilateral exchanges of specialists. Scaling up training, especially of midlevel cadres, to fill in staffing gaps, including distance learning and continuing medical education, use of Telemedicine and eHealth methods can also help to achieve better staffing and service coverage.

### 2.2.3 Health information systems

Evidence and accurate data are vital for planning, monitoring and evaluating progress made by public health programs and for decision making in general including in the health financing area. *Health Information Systems* (HIS) are the ICT tools to support acquisition, storage, communication, and retrieval of such data, encompassing essential issues such as vital registrations, causes of disease

and death, medical records, health services coverage, health resources including infrastructure, manpower and financing.

Despite limited resources some African countries have managed to develop information system policies, national health indicators and integrated data collection forms over the last decade. Some others have also developed and maintained user-friendly databases that are models of efficient health data collection from the level of primary care to the Ministry of Health.

Among the weaknesses are the fragmentation of the national HIS and lack of coordination and consistency, the distortions of the system by better funded projects or initiatives, and the inaccuracy of the demographic data. In addition, efforts in the Region to strengthen the health information systems is hampered by negative factors such as limited computer literacy, lack of computer hardware; poor internet connections; weak telecommunication systems, the lack of sustainable energy sources; and a shortage of adequately trained personnel. In addition, countries often use different definitions, sources and methods for collecting data, rendering international comparisons difficult.

There is, however, increasing support for unified methods of providing improved population health data which can be converted into evidence for policy-making, such as *Multiple Indicator Cluster Surveys* (MICS), and *Demographic and Health Surveys* (DHS). Global initiatives such as the *Health Metrics Network* (HMN) have started to help countries improve and align their health information systems, including the quality of vital registration, which is a crucial prerequisite to a more responsive and appropriate use of health systems resources. By April 2006, 25 countries had applied for funds and help as part of the HMN in the African Region, and 19 of those applications had been

approved. HMN will strongly support vital registrations as basis of essential health indicators.

#### 2.2.4 Health technologies and medicines

Medical imaging technologies, laboratories, essential medicines and blood safety are amongst the most important components of health technologies. There is a lack of accurate and consolidated data on the situation of these technologies in the region except for essential medicines and blood safety.

Concerning the essential, thirty Member States now have national medicine policies, including traditional medicine which is an important increase from three such countries in 1991. Full implementation of these policies, however, is hampered by many factors, including the shortage of skilled workers, insufficient funding, poor planning and management, and conflict and poverty.

Medicines account for the second largest share of the health budget after salaries in countries in the African Region. Government resources allocated to medicines are insufficient to provide for the whole population. There is a need to improve the efficiency of the medicines supply system, including rational selection, procurement, effective distribution and use. Furthermore, prices for new medicines for the most prevalent diseases – HIV/AIDS, tuberculosis and malaria – are often high.

According to the *WHO Medicines Strategy* [WHO 2004 MS], equitable access to essential medicines can only be ensured by meeting several criteria: rational selection and use; affordable prices; adequate and sustainable financing; and reliable supply systems which implies effective use of ICTs. A WHO supported price survey performed in 2004 showed that prices of similar medicines vary considerably and are often unaffordable in ten surveyed countries. In the absence of affordable and good quality medicines, some people in the region unwittingly resort to poor quality or cheap counterfeit medicines.

Local production of traditional medicines is one solution to the lack of availability of essential medicines, but only when there is evidence to show that the medicines are safe and effective. For example, the plant *Artemisia annua* was introduced from China to the United Republic of Tanzania in 1990, where it is now cultivated commercially and will allow local production of effective anti-malaria drugs.

Ensuring that blood supplies are safe is one example of the challenges health systems face in Africa. Blood transfusions save many lives each year, but many people also die when blood supplies are inadequate or unsafe. Women and children are particularly affected. By 1999, only 14 countries had a national blood transfusion policy, and even these were not always fully implemented. Haphazard practices exposed many patients and healthcare staff to potentially fatal risks. In 2002, only half of the entire blood supply in the Region came from unpaid donors, while about 44% came from family or replacement donors and 4% from paid donors. In 2005, national blood quality systems have been established fully in only 12 countries, and partially in 15 countries. Twelve other countries in the Region currently have no quality assurance of blood transfusions.

#### 2.2.5 Health financing

The per capita government expenditures 2003 on health at average exchange rate ranged from US\$ 1 (Burundi, DR Congo) to US\$ 382 (Seychelles) and were less than US\$ 34

in 35 out of the 46 countries of the WHO African region, while only 6 countries spent more than US\$ 100 per capita on health [WHO 2006 WHS]. African countries spent on average 5% of their gross domestic product (GDP) on health, 51% of which were government expenditures. The median share of government expenditure on health funded by external resources is 26%, with a wide range of countries' share of government expenditure on health funded by external resources is large, from less than 1% to over 75%. Expenditures on health by the private sector (households, nongovernmental organizations, private enterprises, and insurance) on average made up 49% of total expenditure on health, with households representing the largest share (80%).

Donor funding, on average, represented 16% of overall healthcare spending. In the Maputo Declaration, African Heads of State urged donor countries to honour their pledge to allocate 0.7% of their gross national product as official aid to developing countries to boost funds for health and development.

The *WHO Commission for Macroeconomics and Health* estimated that a minimum expenditure of US\$ 34 per person per year was required to provide an essential package of public health interventions in order to achieve both the relevant MDGs and NEPAD's targets. Thus, governments in the 35 Member States that are currently spending less than US\$ 34 on health per capita per year need to increase their budgetary allocations to reach the recommended minimum health spending.

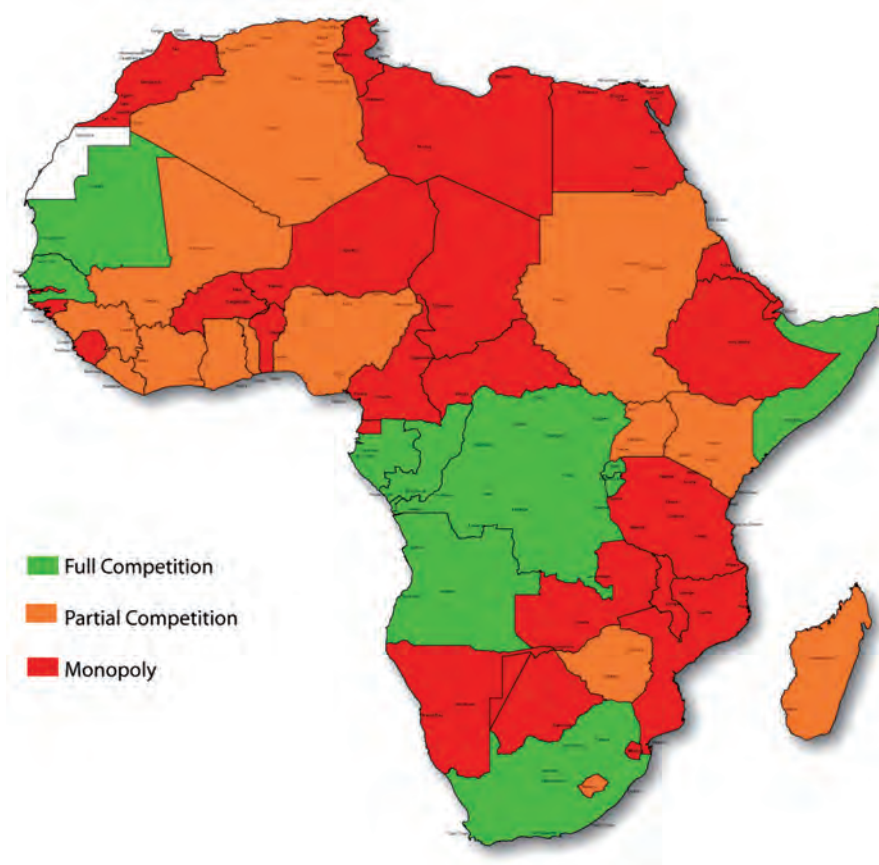
In April 2001 Heads of State of countries in Africa made in their Abuja Declaration [Abuja 2001] the commitment to allocate at least 15% of their annual budgets to the health sector. By the end of 2003, only one country's government had spent 15% or more of its national budget on health, including spending funded by external resources, while the other 45 countries of the WHO African region need to take appropriate steps to honour the commitment made by their Heads of State. In 2005 the commitment was reconfirmed by African Heads of State in the *Gaborone Declaration* at the October 2005 session of the Conference of African Ministers of Health in Botswana [AU 2005 GD].

#### 2.2.6 Inequities in health

From information about 33 African countries presented in the *World Health Report 2006* [WHO 2006 WHR], it appears that very important inequities exist in the region among and within countries. With regard to key indicators such as Under-five Mortality Rate (U5MR), birth attendance by skilled health workers, and measles immunization coverage the following observations could be made:

- The U5MR ranges from 70 to 327 in rural areas and from 43 to 178 per 1,000 in urban areas. In some countries, the rate in rural areas is double the rate in urban areas. In the highest wealth quintile, the U5MR can be four times lower than in the lowest wealth quintile. As regard the level of education of the mother, it can be 2.5 to 2.8 times higher in the lowest level of education category.
- The percentage of births attended by skilled health workers in rural areas varies from 2.3% to 76% and from 35% to 96% in urban areas. The urban to rural ratio can reach 9 to 15 within one country which means that a woman may have 15 times better chances get assistance if she lives in an urban area. If wealth and level of education are considered, the ratio can even reach 18 to 28.





*Fig. 3. Level of ICT Competition in Africa (Source: ITU World Telecommunications Regulatory Database, 2004, 2005).*

rope: 28.5), 0.7 Internet users per 100 inhabitants (SA: 6.8, global: 13.6, Europe 31.1), and around 1 Internet hosts per 10,000 inhabitants (SA: 62, global: 422, Europe: 363) at the very end of the ranking for connectivity access.

Mobile telephony has been extremely important in enabling access to telecommunications in Africa. Mobile penetration exceeded 6.2% at the end of 2003, while fixed-line penetration languished at 3%. Key drivers behind the increase include demand, sector reform, the licensing to new entrants, competition and the emergence of important strategic investors.

There are positive trends for ICTs in Africa [ITU 2004 Kelly]: Between 2000 and 2003, the ICT market has doubled in size; Africa is the world's fastest growing mobile economy, surpassing 50 million mobile users in 2003; it is the world's fastest growing regional Internet, surpassing 12 million Internet users in 2003; its mobile market is competitive, with 75% of African economies having more than one mobile operator; the region is establishing effective, independent regulators, their numbers rose from 5 in 1992 to 40 in 2003.

But there are troubling indicators, too. Despite the high growth rate for mobile phones the overall mobile penetration in Africa is, with 6.2 per 100 inhabitants in 2003, the lowest of any region (Europe: 51, global: 22) [ITU 2004 ATI]. According to the ITU report, the percentage of the African population within the range of a mobile signal is estimated at only 60%, the lowest in the world (see also Fig. 4). And so far only a small share of this population has been able and willing to take up the new technology.

It is clear that mobile telephony has boosted access to telecom services, but it is not certain to what extent. Available figures are unclear, but the report's authors estimate that as many as half of the total mobile subscribers already had access to fixed-line services.

Low fixed-line penetration (compare Fig. 5 for ICT fibre network interconnections) is a major barrier to traditional Internet services, and the report indicates potential for wireless Internet through technologies such as SMS, WAP, GPRS and even 3G IP-based services. SMS and WAP usage are growing in African countries, with South Africa leading the field.

The vast majority of Internet users in SSA are located in urban areas, due to their greater wealth and an urban bias in network deployment, as well as tariff structures that can result in higher long-distance rates for rural areas to connect to the Internet. Affordability is the greatest barrier to Internet usage in the region. This is partly due to Africa's limited infrastructure and the high cost, as several African countries, particularly landlocked ones, do not have ready access to undersea fibre optic cables. Furthermore, regional voice and data traffic is often routed through Europe and North America due to the lack of Internet Exchange Points within the region (compare Fig. 6).

GPRS has been launched in a number of markets, with more ready to follow. South Africa was the first, launching GPRS in 2002, but only 1% of mobile subscribers have taken up the service. Some countries are using fixed wireless networks to provide 3G services, and Angola is likely to launch a mobile 3G network. The ITU report also indicates the potential of technologies such as Wi-Fi and Wi-Max for providing high-speed access. Transmission costs are relatively low, but modem-equipped computers are still fairly expensive, which makes it likely that only those people who already have suitable PCs will benefit from such new services.

A key point to ensure advancement of ICTs is a transparent and competitive market (compare Fig 3). Countries



Fig. 4. Geographical GSM Coverage in Africa 2005 (Source: infoDev/ Alcatel 2005).

with competition have significantly higher rates of mobile penetration than monopoly markets, even where per capita incomes are the same. The ITU report states that high growth rates where there are incumbent monopoly mobile operators are usually driven by the threat of impending competition. This prompts operators to introduce new cost-effective technologies or to reduce prices.

The ITU report concludes that an effective regulatory environment is an essential condition for future growth of ICTs in Africa. Interconnection issues have been a major problem throughout the continent, and the failure of incumbents to sign agreements has had a stifling effect on competition. These difficulties present a significant barrier to

investor confidence and must be removed to ensure sustained development. According to the World Bank, during 1990–2003, telecommunications projects accounted for 12% of Foreign Direct Investment (FDI) in developing countries. Low-income countries received just 6% of such investment.

### 2.3.3 Digital opportunity

As a response to calls from the international community and following the explicit recommendation of the WSIS, the ITU has, in cooperation with other organizations, developed two important indexes to measure “digital opportunity” of economies, based on core ICT indicators [ITU 2005 CII].



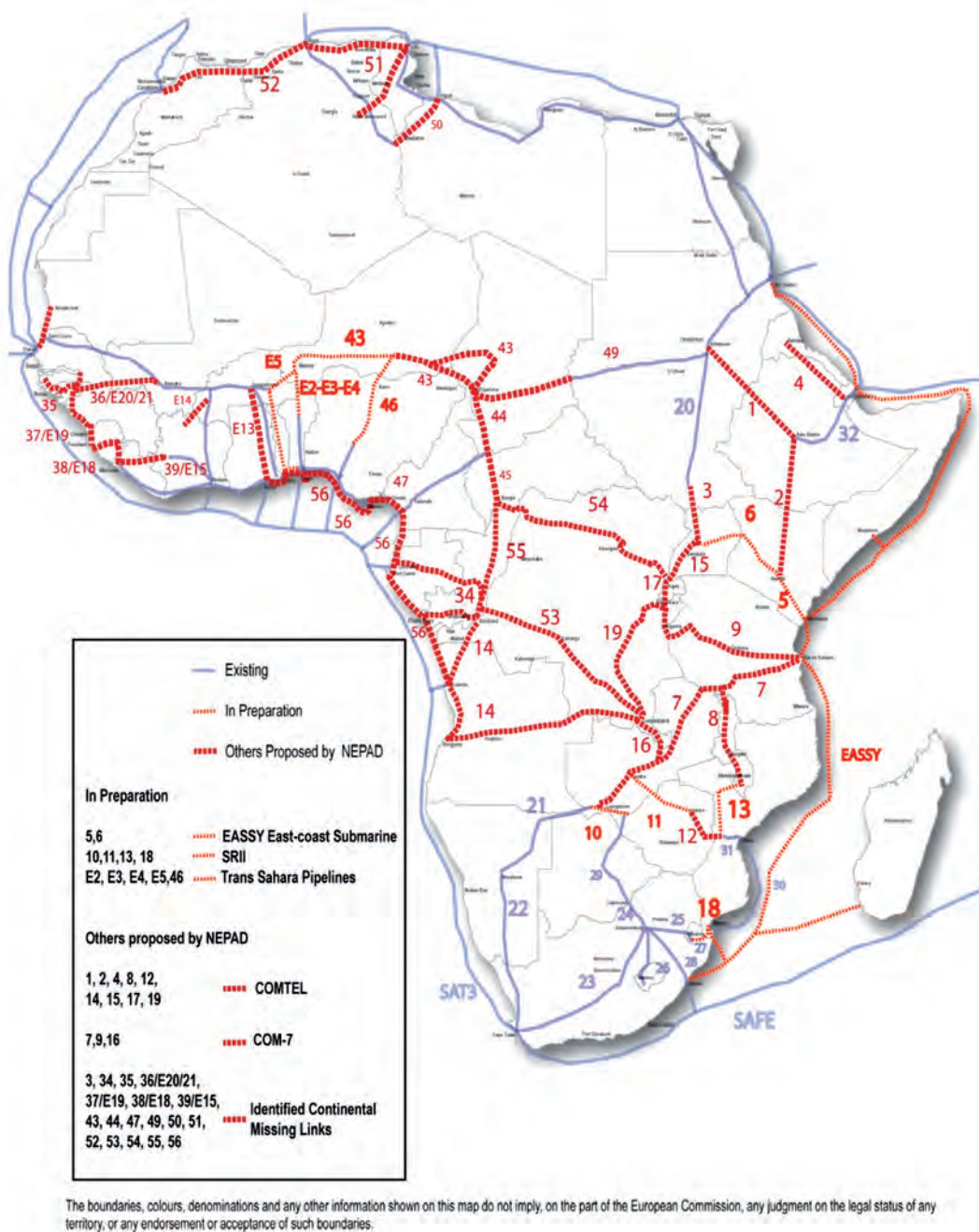


Fig. 5. ICT Fibre Network Interconnections in Africa (Source: EC 2006 COM 376).

The first one is the *ICT Opportunity Index* [ITU 2005 IOI], which uses 17 core ICT indicators. It is available for 139 economies and compares Infostates, which are an aggregation of *Infodensity* (sum of all ICT stocks: capital and labour) and *InfoUse* (consumption flows of ICTs per period), against an imaginary economy called “Hypothetica”. *Infodensity* is measured in terms of networks (main telephone lines, waiting lines, digital lines, cell phones, cable TV subscribers, Internet hosts, secure servers, international bandwidth) and skills (adult literacy rates, gross enrolment ratios for primary, secondary, and tertiary education). *InfoUse* is measured in terms of *Uptake* (TV equipped households, residential phone lines, PCs, Internet users) and *Intensity* (broadband users, international outgoing and incoming telephone traffic). The

*Digital Divide* is, based on this index, defined as the relative difference in Infostates among economies. The *ICT Opportunity Index* is the only measuring tool today that can, by design, provide cross-sectional and time series results. The index’s latest results are based on 2003 data, but the measurements cover the period 1995 to 2003, providing the perspective of almost a decade of evolution.

The calculated indices range from 7.9 to 254.9 and are divided into five groups: high (192.1–254.9), elevated (114.5–175.7), intermediate (72.8–111.1), moderate (33.7–69.6), and low (7.9–31.2). The 32 economies with Low Infostate represented about 15% of the world’s population in 2003. Most of them are African economies, with Chad, Ethiopia, and the Central African Republic at the

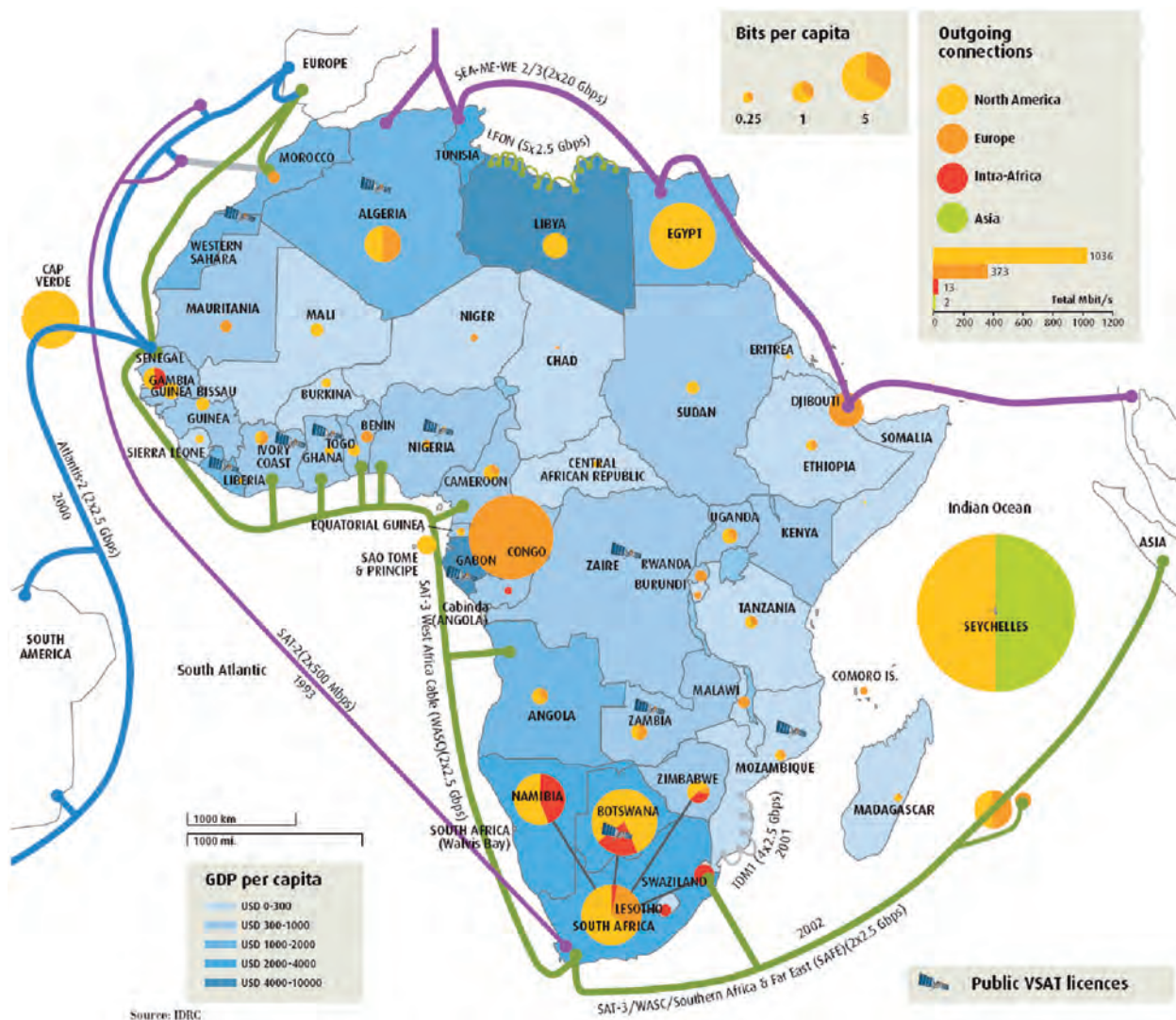


Fig. 6. Connectivity in Africa (Source: infoDev/Alcatel 2005).

very bottom. The 34 economies with Moderate Infostate accounted for 29% of the world’s population, including the SSA countries Botswana, Gabon, Gambia, Togo, and Zimbabwe. The 26 economies with an Intermediate Infostate represented one third of the world’s population. In this group we find the relatively advanced SSA countries Mauritius and South Africa. There are no SSA countries in the groups with elevated and high Infostates. The complete figures describing the Infostate evolution of SSA countries from 1995 to 2003 is available from [ITU 2005 IOI] (see also Table 4).

The second index is the *Digital Opportunity Index (DOI)* [ITU 2006 WISR], which uses 11 core ICT indicators. It is a composite index, available for 180 economies, that measures the possibility for citizens of a particular country to benefit from access to information that is "universal, ubiquitous, equitable and affordable" (WSIS Tunis Commitment). The DOI is based on the categories: *Opportunity* (accessibility to and affordability of ICT services); *Infrastructure* (households with a fixed line telephone, mobile cellular subscribers, households with Internet access at home and mobile Internet subscribers, households with a computer); and *Utilization* (extent of ICT usage on different quality

levels, e.g. ratio of broadband subscribers among Internet subscribers, separated by fixed and mobile).

The world average DOI score is 0.37, for Africa it is 0.20, mainly due to limited Utilization and fixed line infrastructure. When compared to other regions, Africa ranks last with an average regional DOI score of barely one-third that of Europe (0.55). Africa’s strong-performers are the SSA countries Mauritius and the Seychelles, and the North African countries (see Fig. 7). The DOI map shows a pattern of high scores among the North African economies (Algeria, Egypt, Libya, Morocco and Tunisia). Egypt is also the only African country in the Top 15 gainers in the DOI, having realized a gain of 32% in digital opportunity over the period 2000 to 2005. By contrast, low-ranking economies are mostly inland, in the SSA, including economies such as Chad, Eritrea, Ethiopia, Niger and Sierra Leone.

Nevertheless, despite the overall situation, many African countries are making progress in reducing their internal gaps and digital divide. The tendency to promote mobile coverage and utilization over fixed services makes the DOI’s mobile components particularly useful for monitoring advances in African markets. From a telecom-

Table 4. Infostate evolution of SSA countries (Source: ITU 2005 IOI).

Nr.	Country	Indices									Infostate Level*
		1995	1996	1997	1998	1999	2000	2001	2002	2003	
1	Angola	2.2	3.3	4.7	5.9	7.7	8.9	10.3	11.0	12.6	1
2	Benin	2.5	4.4	6.7	8.1	10.2	14.4	16.7	18.9	21.0	1
3	Botswana	9.3	11.0	23.4	28.2	37.0	42.6	49.8	51.9	53.5	2
4	Burkina Faso	1.2	2.3	4.8	6.4	7.2	8.9	10.3	11.0	12.6	1
5	Burundi	...	...	...	...	...	...	...	...	...	...
6	Cameroon	4.3	4.9	5.7	6.6	12.0	16.4	18.2	19.9	21.1	1
7	Cape Verde	...	...	...	...	...	...	...	...	...	...
8	Central African Rep.	2.0	4.4	5.2	6.0	7.2	7.7	7.8	8.2	8.8	1
9	Chad	1.4	1.6	2.1	2.9	3.7	6.4	6.3	7.4	7.9	1
10	Comoros	...	...	...	...	...	...	...	...	...	...
11	Congo	...	...	...	...	...	...	...	...	...	...
12	Dem. Rep. of Congo	...	...	...	...	...	...	...	...	...	...
13	Côte d'Ivoire	2.0	7.6	10.5	13.6	16.7	20.5	26.3	28.4	30.7	1
14	Equatorial Guinea	...	...	...	...	...	...	...	...	...	...
15	Eritrea	2.4	2.5	3.9	4.3	5.6	9.3	9.2	10.5	11.9	1
16	Ethiopia	0.7	1.3	2.2	2.5	4.2	5.1	6.4	7.5	8.6	1
17	Gabon	7.9	8.2	15.8	20.0	22.3	33.2	36.1	38.6	44.1	2
18	Gambia	5.0	7.3	9.7	12.0	16.5	18.5	27.8	32.2	33.9	2
19	Ghana	3.9	7.4	9.9	11.2	14.3	16.3	16.7	20.4	21.8	1
20	Guinea	3.1	3.9	5.0	6.2	11.3	12.7	12.3	14.0	14.6	1
21	Guinea-Bissau	...	...	...	...	...	...	...	...	...	...
22	Kenya	3.6	6.9	9.4	11.0	14.7	19.1	21.1	24.0	25.7	1
23	Lesotho	...	...	...	...	...	...	...	...	...	...
24	Liberia	...	...	...	...	...	...	...	...	...	...
25	Madagascar	3.1	4.9	6.6	8.8	12.4	14.0	13.3	14.6	15.4	1
26	Malawi	2.1	3.0	3.8	4.7	6.5	8.5	9.7	11.0	12.2	1
27	Mali	1.4	3.0	4.1	4.9	7.0	9.5	9.9	10.7	12.1	1
28	Mauritania	3.3	3.3	4.6	7.3	14.2	16.8	18.7	21.1	22.7	1
29	Mauritius	17.5	30.1	39.8	54.7	63.9	79.2	90.7	96.9	102.8	3
30	Mozambique	1.6	2.6	5.4	6.8	8.4	11.2	12.9	14.8	15.9	1
31	Namibia	10.7	15.4	23.0	33.3	35.7	48.9	53.7	56.4	60.8	2
32	Niger	...	...	...	...	...	...	...	...	...	...
33	Nigeria	5.3	6.4	8.2	10.2	11.5	12.5	14.1	17.6	19.6	1
34	Rwanda	...	...	...	...	...	...	...	...	...	...
35	Sao Tome and Principe	...	...	...	...	...	...	...	...	...	...
36	Senegal	4.1	7.8	10.5	14.1	19.2	23.2	27.5	28.7	31.0	1
37	Seychelles	...	...	...	...	...	...	...	...	...	...
38	Sierra Leone	...	...	...	...	...	...	...	...	...	...
39	Somalia	...	...	...	...	...	...	...	...	...	...
40	South Africa	38.8	45.1	53.2	62.3	67.8	72.6	73.0	74.5	76.1	3
41	Sudan	1.3	2.0	5.3	7.3	9.9	14.4	18.3	21.9	29.1	1
42	Swaziland	...	...	...	...	...	...	...	...	...	...
43	Tanzania	2.6	3.7	5.7	6.8	9.8	13.1	13.9	15.5	18.3	1
44	Togo	2.5	4.9	11.7	14.7	18.8	27.1	29.1	33.0	34.9	2
45	Uganda	3.4	4.5	5.5	9.3	11.0	12.6	11.6	13.8	15.0	1
46	Zambia	8.6	9.5	10.0	12.5	17.3	20.1	19.0	20.9	22.3	1
47	Zimbabwe	5.6	7.4	13.8	17.7	23.9	29.0	30.6	39.7	41.9	2

\*1=low, 2=moderate, 3=intermediate, 4=elevated, 5=high; ...=data missing

munication policy perspective, high-ranking countries illustrate the influence of liberalization and competition in promoting opportunity and infrastructure deployment. For example, Senegal and South Africa have opened their fixed and mobile markets to competition and are rapidly increasing high-speed network deployment. Competition is helping to reduce tariffs and introduce service packages that respond better to the needs of the population.

### 2.3.4 Satellite communications

SSA is covered or will be covered, respectively, by several satellites, working in different frequency bands [Telespazio 2006]:

- *RASCOM* (Regional African Satellite Communications Organization) will have a pan African C-band coverage offering full interconnectivity for the whole African continent and associated islands (Fig. 8). In fact, the coverage also includes most of Western Europe. A Ku-band multi-spot will cover the whole African continent, too, supporting services by small satellite terminals. The satellite will probably be operational at the beginning of 2008.
- *Eutelsat* (European Telecommunications Satellite Organization) has – with the satellite W3A at 7°E – a well-positioned beam coverage of SSA in the Ku-band, allowing efficient connections with Europe, as well. The satellite is in orbit, having limited capacity available.



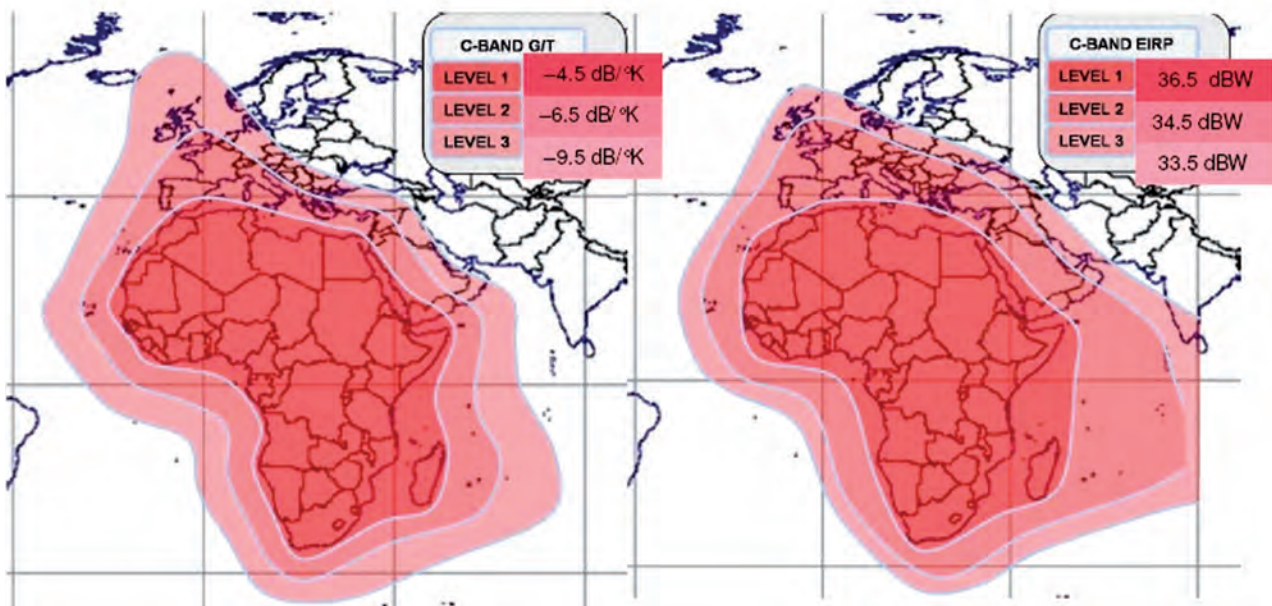


Fig. 8. RASCOSAT satellite C-band coverage of the African continent and West Europe (Source: Telespazio 2006).

way. Lack of safe blood supply in Tanzania is a major cause for deaths among children and pregnant women. Therefore, creating a modern national blood transfusion service is a major task for the Tanzanian healthcare system. This 5-year project (starting in 2006) aims to establish a regional blood bank service, and to provide teleeducation, teleconsultation, and other teleservices.

- *ePORTUGUESe*. An initiative established to support, generate, manage, share and use knowledge through any information channels necessary to strengthen health systems in the Portuguese speaking WHO Member States. ePORTUGUESe aims to establish and maintain an alliance of health-related institutions in Portuguese-speaking countries for promoting better health through the development of Portuguese language knowledge communities and the sharing of Portuguese-language information resources.  
[www.who.int/eportuguese/en/](http://www.who.int/eportuguese/en/)
- *Health InterNetwork Access to Research Initiative (HINARI)*. Provides free or very low cost online access to the major journals in biomedical and related social sciences to local, not-for-profit institutions in developing countries. [www.who.int/hinari/en/](http://www.who.int/hinari/en/)
- *Réseau en Afrique Francophone pour la Télémédecine (RAFT)*. A network for eLearning and Telemedicine in African French speaking countries. The network involves institutions in Mali, Mauritania, Morocco, Senegal, Burkina Faso, Tunisia, Cameroon, Ivory Coast, Madagascar, Niger, France, and Switzerland. It attempts to strengthen South-South cooperation schemes.  
<http://raft.hcuge.ch>
- *Telemedicine Lead program*. Medical Research Council of South Africa. This program initiates, develops and participates in a wide range of telemedicine activities in SA, in close collaboration with health service providers, such as the SA National Department of Health. In addition it cooperates with other African countries to establish and promote transnational eHealth and Telemedicine.  
[www.mrc.ac.za/telemedicine/telemedicine.htm](http://www.mrc.ac.za/telemedicine/telemedicine.htm)

- *Telemedicine Programs Database*. This database's main objective is to support diagnostic services in rural hospitals in the Eastern Cape Province, mostly in telepathology, teledermatology, teleradiology, and teledentistry.  
<http://telemet.ut.ac.za>
- *SatelliteLife/HealthNet*. An Africa-wide initiative, aiming at improving the practice of telemedicine among health professionals, run by SatelliteLife, a non-profit organisation of scientists and medical researchers, has been implemented in 20 countries throughout Africa [IOM 2004].  
<http://www.healthnet.org>
- *Walter Sisulu University Telemedicine project*. A collaboration of the Telemedicine unit at Walter Sisulu University, Eastern Cape, South Africa, with the University of Basel, Switzerland (WHO collaborating Center).  
[www.telemet.ut.ac.za](http://www.telemet.ut.ac.za)
- *West African Doctors and Healthcare Professionals Network*. A virtual meeting place for doctors and healthcare professionals. We make it convenient, easy, and provide a one stop for your medical news, updates, research, journals, disease outbreaks updates and more.  
[www.wadn.org/wadn/](http://www.wadn.org/wadn/)

Sources listing more Telemedicine and eHealth programs are, for example:

- *ITU Telemedicine Pilot projects*. ITU supported telemedicine projects.  
[www.opt-init.org/framework/pages/appendix2.html](http://www.opt-init.org/framework/pages/appendix2.html)
- *Health Informatics in Africa*. Global network dealing with health informatics in Africa. [www.helina.org/helina/default.asp](http://www.helina.org/helina/default.asp)
- *OPEN CLINICAL*. Knowledge management for clinical care. Summary information on national programs and strategies is provided by region (Europe, Americas, Middle East, Asia Pacific, and Africa). More detailed information on activities underway in certain countries and territories is included on separate pages.  
[www.openclinical.org](http://www.openclinical.org)

- *WHO Health statistics and health information systems*. A comprehensive resource for information about health indicators, classification, health statistics, and health information systems. [www.who.int/healthinfo/en/](http://www.who.int/healthinfo/en/)

#### 2.4.2 Conferences and other events

- *Pan-African Conference on Telemedicine & eHealth (PACTe) 2006*. 19–21 June, Abuja, Nigeria. Organized by the Society for Telemedicine and eHealth in Nigeria in collaboration with the Nigerian Organization for the Development of eHealth. [www.sftehin.org](http://www.sftehin.org)
- *The 2<sup>nd</sup> West Africa Satellite Communications Summit*. 31 October – 2 November 2006, Abuja, Nigeria. Organized by the Global VSAT Forum (GVF), the independent, non-profit organization of global satellite industry, with 190 members from more than 80 countries. The organization is headquartered in London. [www.gvf-events.org](http://www.gvf-events.org)
- *The 11<sup>th</sup> ISfTeH International Conference*. 26–29 November, Cape Town, South Africa. Organized by the International Society for Telemedicine and eHealth (ISfTeH), the South African Medical Research Council, the South African Department of Health and the South African Presidential National Commission (PNC). This is the first time the conference will be held in Africa and emphasises the increasing recognition of telemedicine and e-health in developing countries, particularly those in Africa. <http://www.mrc.ac.za/conference/satelemedicine>
- *World Summit on the Information Society (WSIS)*. The UN General Assembly Resolution 56/183 (21 December 2001) endorsed the holding of the World Summit on the Information Society (WSIS) in two phases. The first phase took place in Geneva from 10 to 12 December 2003 and the second phase took place in Tunis, from 16 to 18 November 2005. [www.itu.int/wsis](http://www.itu.int/wsis)
- *3<sup>rd</sup> International Open Access workshop*. 10–11 May 2005. Hosted by Eduardo Mondlane University in Maputo, Mozambique. [www.openaccess.uem.mz](http://www.openaccess.uem.mz). The Swedish International Development Agency (Sida) in collaboration with the UN ICT Task Force and The Royal Institute of Technology (KTH) has organized in 2003 and 2004 the 1st and 2nd International Conferences on Open Access Technologies. The UNICTFF has issued a comprehensive report on basis of the 2005 Maputo workshop [UNICTFF 2005].

#### 2.4.3 Further related activities

- *NEPAD e-Schools Program*. The NEPAD e-Schools Initiative is a multi-country, multi-stakeholder, continental initiative, which intends to impart ICT skills to young Africans in primary and secondary schools and to use ICT to improve the provision of education in schools. The final goal being that within 10 years of implementation of this initiative in more than half a million schools on the continent, the majority of the Africa population would possess ICT skills with far reaching implications for the development of the African society. [www.nepad.org](http://www.nepad.org)
- *Global Health Workforce Alliance (GHWA)*. The Global Health Workforce Alliance is a partnership dedicated to identifying and implementing solutions to the health workforce crisis. It brings together a variety of actors, including national governments, civil society, finance institutions, workers, international agencies, academic institutions and professional associations.

[www.ghwa.org](http://www.ghwa.org)

- *6DISS*. Project of the EU's 6th Framework Program with the goal to be a key enabler of the global introduction of the new version of the Internet Protocol (IPv6) and to remove barriers to IPv6 deployment. IPv6 is important to overcome the shortage of IP addresses in many countries, as well as to satisfy requirements for mobility and security. The project supports the deployment of IPv6 in Africa, especially by practical training workshops. [www.6diss.org](http://www.6diss.org)
- *Digital Solidarity Fund (Fonds de Solidarité Numérique)*. African initiative presented by His Excellency Abdoulaye Wade, President of the Republic of Senegal, in his capacity as of Head for new ICTs, within NEPAD. Established in accordance with the principles of the United Nations Charter, the Universal Declaration of Human Rights, the Millennium Declaration, the Johannesburg Declaration and the Monterrey Consensus. [www.dsf-fsn.org](http://www.dsf-fsn.org)
- *eHealth Standardization Coordinating Group (eHSCG)*. The group was proposed by the Workshop on Standardization in eHealth (Geneva, 23–25 May 2003). It comprises representatives of several standardisation bodies and the WHO, and was endorsed by ITU-T Study Group 16 in May 2003 (ITU, WHO, ISO/TC215, CEN/TC251, IEEE/1073, DICOM, HL7, OASIS). Overall objective is to promote stronger coordination amongst the key players in the eHealth standardization area. The eHSCG is performing informal consultation and coordination on voluntary basis and its recommendations are purely advisory. [www.ehscg.org](http://www.ehscg.org)
- *ESA Telemedicine Alliance*. ESA, WHO, ITU and the Information Society Technologies program of the EC have been working together within the Telemedicine Alliance to smooth the way for the expansion of telemedicine, and its benefits, to all European citizens. [www.esa.int/SPECIALS/Telemedicine\\_Alliance/index.html](http://www.esa.int/SPECIALS/Telemedicine_Alliance/index.html)
- *Public Private Partnerships in IT R&D for Health*. The purpose of this initiative is to explore the potential of collaborations between WHO and public or private entities involved in ICT, in order to achieve the organization's goals in the health sector and to define a framework and guidelines for ensuring that such collaborations achieve their objectives in a measurable way. [www.who.int/kms/initiatives/ict\\_for\\_health/en/index.html](http://www.who.int/kms/initiatives/ict_for_health/en/index.html)
- *The Health Academy*. A WHO initiative to support educational discussions, forums, and discourse for the professional enhancement of its members, and to promote excellence in professional communications. [www.who.int/healthacademy/en/](http://www.who.int/healthacademy/en/)
- *WHO Priority Activities in eHealth*. Some WHO activities and eHealth priority areas as approved by the 117th session of the Executive Board. [www.who.int/gb/ebwha/pdf\\_files/EB117/B117\\_15-en.pdf](http://www.who.int/gb/ebwha/pdf_files/EB117/B117_15-en.pdf)
- *Global Alliance for ICT and Development of the UN [GAID 2006]*. An initiative approved by the United Nations Secretary-General in 2006, launched after comprehensive worldwide consultations with governments, the private sector, civil society, the technical and Internet communities and academia, as a response to the need for a truly global forum that would comprehensively address issues cutting across different disciplines related to ICT in development, especially for achieving the MDGs. [www.un-gaid.org](http://www.un-gaid.org)

## 3 Analysis

Strengths, weaknesses, opportunities, and threats of ICTs in the health sector are well-understood. The following subsections summarize their major aspects, following in large part [infoDev 2006], complemented by [Cohendet 2004] and other sources.

### 3.1 Strengths

There is clear evidence that ICTs can have significant impact on the health sector of developing countries. In particular, they have shown their strength to:

- Improve dissemination of public health information and facilitate public discourse and dialogue around major public health threats;
- Enable remote consultation, diagnosis, treatment and follow-up through Telemedicine;
- Facilitate collaboration and cooperation among health workers, including sharing of learning and training approaches;
- Support more effective health research and the dissemination and access to research findings;
- Strengthen the ability to monitor the incidence of public health threats and respond in a more timely and effective manner;
- Improve the efficiency of administrative systems in healthcare facilities;
- Support socially cohesive, non-discriminating health policies.

### 3.2 Weaknesses

Major areas where not enough is known and where further research and analysis are needed include:

- How to move from proof of concept to large-scale implementation in a range of different settings?
- How to evaluate systematically and coherently the impact of the use of ICTs on health?
- How to share information and experience and coordinate efforts (at national, regional and international levels) around the use of ICTs in the health sector?
- What can be done to strengthen the role and to build the capacity of intermediaries?
- How to develop local content that is relevant, appropriate and practical?
- How to strengthen organisational and national human resources, awareness skills and leadership to champion the further development of ICT use in the health sector?
- How to empower those most affected by poor health to voice their needs?
- How to implement the range of standards and a regulatory and legal framework that is conducive to the development of a vibrant ICT sector that responds to and supports social development processes?

These questions can help to set out an agenda for future action to enable ICTs to contribute to efforts to improve health and to achieve the health-related MDGs.

Other current weaknesses are:

- Lack of monitoring and evaluation mechanisms (that will include measurable, do-able and realistic benchmarks and indicators).
- Lack of incentives to reward those countries that demonstrate a strong commitment and good performance.

### 3.3 Opportunities

Healthcare systems can in all their aspects benefit from the use of ICTs. There are resulting opportunities are:

1. *Improving the functioning of healthcare systems* by improving the management of information and access to that information, including:
  - Management of logistics of patient care
  - Administrative systems
  - Patient records
  - Ordering and billing systems
2. *Improving the delivery of healthcare* through better diagnosis, better mapping of public health threats, better training and sharing of knowledge among health workers, and supporting health workers in primary healthcare, particularly rural healthcare, including:
  - Biomedical literature search and retrieval
  - Continuing professional development of health workers
  - Telemedicine and remote diagnostic support
  - Diagnostic imaging
  - Critical decision support systems
  - Quality assurance systems
  - Disease surveillance and epidemiology
3. *Improving communication about health*, including improved information flow among and between health workers and the general public, better opportunities for health promotion and health communication and improved feedback on the impact of health services and interventions, including:
  - Patient information
  - Interactive communication
  - Media approaches
  - Health research
  - Advocacy to improve services

Satellite communications, in particular, can help in bridging gaps on the way towards realising a satisfactory knowledge economy for Africa:
4. *Reducing the digital divide.*
  - Satellite communications can constitute the solution to the demand for universal services, i.e. services available at quality specified, for all users independent of their geographical location and specific national conditions, at an affordable price.
  - Through enabling universal services, satellite communications can rapidly ensure that the conditions exist for unfolding potential positive externalities, such as eLearning, or eGovernment.
5. *Supporting the transition to knowledge economy.*
  - Satellite communications have the potential to stan-

standardize the communication technology and help to increase interoperability, while reducing the risk of getting into a huge variety of isolated solutions.

- Due to their rapid operational readiness, satellite communications have the potential to ensure continuity of service in cases of problems with terrestrial communications.

More details on a comprehensive picture of opportunities and challenges of eHealth and Telemedicine via satellite can be found in [ESA Telemed 2005].

### 3.4 Threats

There are eight major constraints and challenges: limitations in connectivity, content, capacity, community, commerce, culture, cooperation and capital. An additional threat is the complex challenge of interoperability.

#### Connectivity

As the figures given in the previous sections show, insufficient connectivity is a serious threat. With connectivity there are issues such as the lack of an enabling telecom policy and regulatory environment; access to electricity, solar power options, UPS back-ups, insufficient infrastructure, connectivity access and high costs. Embedded in this are issues around broadcasting rights and other regulations controlling the media.

Broadband costs are very high in Africa, compared with the rest of the world. Local Loop Unbundling (LLU) as a crucial step forward in order to reach open competition of telecommunication service providers is a challenge for most African countries and a threat for connectivity.

#### Content

The content is a key issue to increase the uptake of ICTs. The major content factors are those related to creation, localization, and quality of content. Such factors include the lack of local content creation, the language used, cultural peculiarities, religious constraints, and the relevance of content to the local situation (see also subsection Culture, below). Appropriate language is frequently neglected in ICT programs and little content is available in local languages for health programs.

Quality and reliability of health information is a major content issue. Decentralized structure, global reach, and ability to facilitate free-ranging interchange make the Internet a channel for dissemination of potential misinformation, concealed bias, covert self-dealing, and evasion of legitimate regulation. It is very difficult to make recommendations and ascertain the credibility, motives, sponsorship, and eventual conflicts of interest in the more than 50,000 health websites in existence.

#### Capacity

Major threats related to capacity do exist with respect to: 1) illiteracy within the population; 2) lack of capability to adapt information to ensure that it is culturally appropriate and relevant; 3) inability to use ICTs effectively and also to service and maintain them; 4) failure to tackle inequities and share resources within the communities.

A skilled ICT work force is an essential ingredient for the effective use of ICTs in health services. Systems professionals, technology products, services providers and project team leaders with high skill levels and experience

in working in the sector introducing the ICTs, are important components of success. The number of technicians and scientists, and the portion of the GNP devoted to research and development are good indicators of those capabilities.

Women and marginalized groups have to be given equal access to the benefits of ICTs. It has to be ensured that women are part of the target group, and that gender deliberations are undertaken as element of the choice of appropriate ICT tools. Language or cultural norms must not exclude women from benefiting from the ICT intervention.

#### Community

The question to be addressed here is who are using ICTs? Which are the communities of users and what services exist to facilitate use and to encourage those who have not been involved in health dialogues previously?

An important approach to the design and implementation of any ICT and health program is to identify the various stakeholders who need to be involved, to find mechanisms for including their perspectives and concerns, and to find ways to mobilize their skills, expertise and resources.

#### Commerce

New technologies have made it possible to open up trade in medicines and services via the Internet. This has both positive and negative consequences. One of the key factors to consider here is the degree to which it is possible to develop effective national or domestic Internet economies that promote online transactional capabilities that will be beneficial for consumers, for businesses and for public health interests.

#### Culture

Cultural issues need to be addressed in terms of appropriate and relevant content. Another aspect of culture is the need to examine and challenge the cultural inhibitions and barriers within society and institutions that prevent effective use of ICTs. This includes a commitment to transform the rules and regulations surrounding telecommunication and broadcast systems. It also means increasing political will to ensure that government procedures are more transparent, and that information sharing between cultures is encouraged.

#### Cooperation

The use of ICTs for health and development involves local, regional and international participants as stakeholders. Neither one sector alone, nor one set of stakeholders can deal completely with the complexity involved in the effective use of ICTs in health. Technical knowledge, experience, and financial investments are needed to establish large and complex ICT initiatives. These require tapping into resources and expertise that no single organization retains. Several key groups should be considered when discussing planning efforts for ICTs and health: citizens (including patients); professionals; hospitals and academia; health-related businesses; governments; and international agencies.

The successful implementation of ICTs and health programs requires complex balancing of the competing views and concerns of the different stakeholders. This is not an easy task. People with the greatest health needs are often those that prove to be the most difficult with whom to engage. Successful engagement with health workers is also crucial to the successful integration of ICTs in healthcare. Furthermore, the effective participation of a large number of stakeholders needs to be coordinated by the public sector.



**Capital**

Generally, there is little investment in ICTs for health even in most developing countries. The picture is one of fragmentation, using many different varieties of ICTs acquired from different donors. Very few government-run health services utilize properly functioning ICTs, and there is no reliable infrastructure to enable inter-organizational transfer of information. Invariably, there is no national health information and IT infrastructure to underpin the delivery of healthcare. WHO makes the point that for technologies to be integrated into health services, they must meet basic needs if they are to be considered to be essential investments [WHO 2004 eHCD].

The only justification for using a particular ICT intervention is that the benefits justify the costs. These benefits must be identified, in monetary terms, as well as in terms of improvements in access, quality of care, better clinical outcomes, user satisfaction, and better overall community health status.

A serious threat to ICT usage in healthcare is the overestimation of beneficial results and consequent unfounded expectations. Often, sound cost benefit analyses are lacking, and this bears the high risk of running into problems with the sustainability of applications and services, includ-

ing ongoing upgrades, training, and maintenance of systems.

**Interoperability**

The interoperability of systems (technical, organizational and political systems) collaborating for the provision of eHealth and Telemedicine services has been identified as a major and ubiquitous challenge. In order to implement such type of services, technical systems (computers, databases, network components, satellites) must communicate, the transmitted contents must have a common semantic (medical and non-medical content standards), organizations (health service providers, healthcare professionals, authorities, health insurance schemes) must share responsibilities and workflows, countries and regions must interoperate on a political level. A major constraint originates in differences between the sectors health and economy. National health strategies and national economic planning strategies – for example, Poverty Reduction Strategy Papers (PRSPs) – often show a lack of congruence. The Telemedicine Alliance (ESA, WHO, ITU) has analysed this issue and recommended actions to support the development of solutions [ESA TMA-Bridge 2005].

## 4 The way forward

The TTF believes that satellite-based technology can effectively complement other forms of ICT in order to extend the reach of eHealth services to ensure that remote areas benefit from initiatives such as eTraining, eSupport and Supervision and distance consultation. The TTF also recognises the importance of building on existing initiatives already developed or underway in the region, and demonstrating the potential of satellite-based ICT to extend the reach of these initiatives to more remote and hard to reach areas. In order to demonstrate the utility and added value offered by satellite technology, the TTF recommends, in the short-term, concrete action in the form of pilot projects which will demonstrate the feasibility of this satellite-enhanced eHealth. The proposed pilot project approach will permit an immediate start for using ICT in management and the use of information and knowledge for improved health in the SSA region. Three demonstration activities are proposed: one focussing on health workforce (using eHealth to support scaling-up numbers, for performance improvement and for quality improvement in eEducation and Training of health workers); a second one on clinical services (increasing health service coverage and extending the reach of services to geographically isolated areas); and a third pilot aimed at strengthening the intelligence gathering capacity of health systems and their ability to use information for decision making. Details of these three possible pilot project proposals are presented in a separate document.

In the long-term, on the basis of the lessons learned from this demonstration phase, a programmatic framework for wider application of satellite technology to enhance eHealth in SSA will be developed, which will outline actions in the step-wise development of sustainable eHealth infrastructure and services; based on open standards and the needs of African countries. The framework should:

- Take actions to support the step-wise development of an eHealth network covering the entire SSA.
- Based on open standards and validated governance and financial schemes, fund the development of sustainable eHealth services, especially for rural SSA areas.
- Establish a program line to adapt existing medical practices to the use of eHealth services.
- Support specific actions to set up the legal frameworks for the practice of eHealth and to disseminate related information to health workers and the public.
- Build up a comprehensive and continuously updated repository on eHealth-related issues in SSA, such as programs, projects, services, studies, laws and regulations.
- Continuously harmonize the activities with other initiatives, in order to create synergies.

It is expected that with regional or country consultations more information and details about the requirements of specific countries will be known and based on this a framework for implementing eHealth services on a wide scale in Africa will be designed and realised.

## 5 Conclusion

The work carried out by the TTF has highlighted the great need for and interest in further discussion and elaboration of implementation-related concepts such as governance models and demand-driven design and operation of ICT services for health. Consultation with African stakeholders

must be continued at both the national and regional level. Short-term and long-term activities, if properly implemented, should help bring the power of ICT to bear positively on health sector challenges in Sub-Saharan Africa and thereby ensure improved health for its citizens.

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## Acronyms

ACP Sec	Secretariat of the African, Caribbean and Pacific Group of States ( <a href="http://www.acpsec.org">www.acpsec.org</a> )
AfDB	African Development Bank ( <a href="http://www.afdb.org">www.afdb.org</a> )
AIDS	Acquired Immunodeficiency Syndrome
ANC	Ante Natal Care
AU	African Union ( <a href="http://www.africa-union.org">www.africa-union.org</a> )
AUC	African Union Commission
ARV	Antiretroviral
CEMAC	Communauté Economique et Monétaire de l'Afrique Centrale ( <a href="http://www.cemac.cf">www.cemac.cf</a> )
DG-DEV	Directorate General for Development ( <a href="http://ec.europa.eu/comm/development">http://ec.europa.eu/comm/development</a> )
DHS	Demographic and Health Survey
DOI	Digital Opportunity Index
eHSCG	eHealth Standardization Coordinating Group
EAC	East African Community ( <a href="http://www.eac.int">www.eac.int</a> )
EC	European Commission ( <a href="http://ec.europa.eu">http://ec.europa.eu</a> )
ECOWAS	Economic Community of West African States ( <a href="http://www.ecowas.int">www.ecowas.int</a> )
EDCTP	European and Developing Countries Clinical Trials Partnership Programme
ESA	European Space Agency ( <a href="http://www.esa.int">www.esa.int</a> )
EU	European Union ( <a href="http://europa.eu">http://europa.eu</a> )
FDI	Foreign Direct Investment
GAID	Global Alliance for ICT and Development (UN) ( <a href="http://www.unicttaskforce.org">www.unicttaskforce.org</a> )
GDP	Gross Domestic Product
GHWA	Global Health Workforce Alliance ( <a href="http://www.ghwa.org">www.ghwa.org</a> )
GNP	Gross National Product
GPRS	General Packet Radio Service
GPW	General Programme of Work (WHO)
GSM	Global System for Mobile Communications
GVF	Global VSAT Forum ( <a href="http://www.gvf.org">www.gvf.org</a> )
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HMN	Health Metrics Network
ICT	Information and Communication Technology
IOM	International Organization for Migration ( <a href="http://www.iom.int">www.iom.int</a> )
IP	Internet Protocol
IPv6	Internet Protocol, Version 6
ITU	International Telecommunication Union ( <a href="http://www.itu.int">www.itu.int</a> )
LLU	Local Loop Unbundling
MDGs	Millennium Development Goals ( <a href="http://www.un.org/millenniumgoals">www.un.org/millenniumgoals</a> )
MICS	Multiple Indicator Cluster Survey
MRC	South Africa Medical Research Council ( <a href="http://www.mrc.ac.za">www.mrc.ac.za</a> )
NEPAD	New Partnership for Africa's Development ( <a href="http://www.nepad.org">www.nepad.org</a> )
OCEAC	Organisation de Coordination pour la lutte contre les Endémies en Afrique Centrale ( <a href="http://www.oceac.org">www.oceac.org</a> )
PC	Personal Computer
PNC	Presidential National Commission (of South Africa)
PRSP	Poverty Reduction Strategy Paper
RASCOM	Regional African Satellite Communications Organisation ( <a href="http://www.rascom.org">www.rascom.org</a> )
REC	Regional Economic Community
SA	South Africa
SADC	Southern African Development Community ( <a href="http://www.sadc.int">www.sadc.int</a> )
SIDA	Swedish International Development Agency
SMS	Short Message Service
SSA	Sub-Saharan Africa
TTF	Telemed Task Force
U5MR	Under-five mortality rate
UN	United Nations ( <a href="http://www.un.org">www.un.org</a> )
UNDP	United Nations Development Program ( <a href="http://www.undp.org">www.undp.org</a> )
UNICTTF	United Nations ICT Task Force ( <a href="http://www.unicttaskforce.org">www.unicttaskforce.org</a> )
WAP	Wireless Application Protocol
WDI	World Development Indicators (World Bank, <a href="http://www.worldbank.org">www.worldbank.org</a> )
WHA	World Health Assembly
WHO	World Health Organization ( <a href="http://www.who.int">www.who.int</a> )
WSIS	World Summit on the Information Society

## III. PILOT PROJECTS PROPOSAL

### 1 Introduction

Against the background of health priorities and the current state of health-related infrastructure in Africa, in particular in the Sub-Saharan region, the Telemed Task Force (TTF) recommends pursuing a user- and demand-driven approach to support better access to information and knowledge for health workers and citizens, based on the local needs and health priorities of the region.

In the short-term during the year 2007, up to three pilot projects which demonstrate the potential utility of satellite based technology to extend the reach of health services and

to complement other forms of ICT in support of eHealth are proposed. These demonstration projects will be used to inform and to help develop a framework for extending eHealth, which should be considered as part of the EU Strategy for Africa commitment to utilise ICT to enhance inter-connectivity in Africa. The potential of this greater interconnectivity, which will be supported under the 10th European Development Fund to extend the reach of health and health services will be tested and demonstrated through these proposed projects.

### 2 General Requirements and Risks

The pilot projects must meet the following general requirements:

- The projects must demonstrate clear benefit in satisfying an urgent demand of the inhabitants, building upon existing initiatives which have already demonstrated strong African ownership.
- They must enjoy the commitment of the stakeholders.
- The created service must be innovative, yet be based on existing and easy-to-use components.
- Ideally, the projects should take advantage of successful service implementations, including infrastructure, governance models, and regulatory aspects.
- The projects must have a clear business plan ensuring a good chance for sustainability of the created services after investment funding.

In order to reduce the risk of failure:

- The geographical choice of target areas should be made by a continent-wide African organization (e.g. AU/NEPAD) and should aim to build upon already existing mechanisms (e.g. NEPAD e-Schools initiative).

- The training of users and technicians in the isolated area is crucial for a reliable operation of the communication facilities.
- The language issue must be addressed.
- The projects should involve relatively few stakeholders, only, in order to keep it manageable.
- To ensure feasibility, the project should not depend on complicated and/or failure-prone technical configurations.
- In order to address connectivity, the projects should not serve a single country, only,
- The projects should not create considerable amount of new content, since this is a time-consuming and costly task.
- The creation of business cases converting the project scenarios into sustainable services is a challenge.

The projects should implement services, each of a different type (addressing up-scaling of workforce, providing clinical services, enhancing management), and should address highly relevant strategic goals.

To cover the financial needs, the 9<sup>th</sup> European Development Fund should be explored.

## 3 First Project: Medical eContent via Satellite for African Health Work Force

### 3.1 Mission

Offer continuing professional education via satellite to health workers in selected remote areas.

### 3.2 Objectives

- Address selected areas in 3-5 different countries which are isolated and suffer from a significant burden of disease, yet have health workers who are able and willing to utilize ICTs for continuing education purposes.

- Select medical content from the many high-quality sources, preferably from centres of excellence inside Africa. This scheme must take the form of a self-sustainable service. Pay special attention to the maintenance of the eContent, with frequent updating. An example for such high-quality resources in the Sub-Saharan region are poison centres, e.g. in South Africa, Tanzania and Zimbabwe, and the AMREF programme for nurse education.
- Facilitate satellite-based access to the eContent through different end-user devices, especially mobile devices

(e.g. mobile phones, personal digital assistants, tablet personal computers). Where available, utilize open source software and international standards. Combine low-cost, easy to use components with low electricity consumption to serve a broad range of application scenarios and to achieve good acceptance.

- Demonstrate the pioneering delivery of these services to isolated areas that have not been reached before. Conduct a thorough and careful analysis of the specific needs of each of the selected areas, based on consultation of the stakeholders (health workers, health administration, eLearning provider). Apply methods such as workshops, questionnaires, and interviews, complemented by revision of published material, to gain a reliable picture of the situation and the demands.
- In less busy periods, make the service available for other purposes such as entertainment (music downloads, media), since this can both support the acceptance of the service, as well as increase the business opportunities.
- Choose the content and its providers, the technical solutions, the piloting areas, as well as the governance such that they are appropriate (and a model for future initiatives) to create a business case and, by this, contribute to the African knowledge economy.

### 3.3 Rationale

The education of a large number of health workers (tens or hundreds of thousands at the same time, instead of thousands, only) through eLearning applications can play a key role in meeting the human resource crisis which Africa, in particular the Sub-Saharan region. Monitoring the available health workforce can create a tool for informed response on needs.

### 3.4 Approach

Priority must be put on the incorporation and strengthening of African resources. There are numerous activities inside

Africa suitable to contribute to this project. For example, nursing training courses exist from ongoing health workforce up-scaling initiatives. Criteria such as the quality, the update frequency, and the reliability of the content provider should be taken into account for the selection of content. The implementation of the project will be based on synergies with other initiatives, which are driven by African stakeholders (such as the NEPAD e-Schools project).

### 3.5 Deliverables

- A pioneering eLearning service for isolated areas.
- A concept for implementation of eLearning services.
- Publications about the project and accompanying research.

### 3.6 Timeline

The main activities of the project can be sequenced as shown in the chart. The selection of suitable remote areas includes an assessment of user needs, so activities 1 and 2 are to be considered as interlinked after a pre-selection of a bigger set of candidates in the first month. The selection and adaptation of content and service provider (activities 3 and 4) follow the specific demands of the target areas identified before. In parallel, the technical concept, followed by the technical setup (activities 5 and 6) are done, with the goal to satisfy the demands with solutions that are as standard, simple, robust and cost-effective as possible. The training of technicians and users (activity 7) mainly accompanies the technical setup activity and goes further. It is, in fact, continued on a lower intensity, throughout the whole project, in the sense of support (which might partly be done as eSupport). Piloting (activity 8) shall be accompanied by ongoing thorough documentation, monitoring and evaluation (activity 9), as well as the dissemination of (intermediate) results (activity 10). The creation of business cases (activity 11) is an ongoing task.

2007/2008	S	O	N	D	J	F	M	A	M	J	J	A
1. Selection of the isolated areas	█	█										
2. Acquisition/analysis of demands		█	█									
3. Selection of the expert centres			█	█								
4. Negotiation/shaping of services				█	█	█						
5. Technical concept			█	█								
6. Technical setup					█	█						
7. Training of technicians / users						█	█					
8. Piloting of the service								█	█	█	█	█
9. Evaluation of pilot phase									█	█	█	█
10. Dissemination of results										█	█	█
11. Creation of a business case											█	█

### 3.7 Coordination

Telemed Task Force.

## 4 Second Project: Satellite-Based Clinical Services for Remote Areas

### 4.1 Mission

Establish electronic communications between healthcare facilities in a few isolated areas with high burden of diseases and medical centres of excellence in Africa, for HIV/AIDS, tuberculosis, and malaria. For these areas implement a satellite-based clinical service to support health workers.

### 4.2 Objectives

- Offer diagnostic (e.g. teledermatology), therapeutic (e.g. medication follow-up) and logistical support (e.g. emergency management) by means of communication services (via speech, still images and sensor data). By providing different options for the combination of media and communication type (synchronous / near-synchronous / asynchronous, high / low bandwidth, text and numerical / audio and video data, etc) serve a broad range of scenarios fitting for peculiar demands.
- Beside connections with the medical centres of excellence, the communication service, also permit communication between inhabitants of the isolated areas. Health workers in the isolated areas should get the opportunity to give advice to colleagues in other areas. This is expected to be of benefit in particular with respect to practical medical issues. It also shall support building networks of health workers.
- Explore, as a further utilisation of the service, the provision of telepharmacy functionality. The delivery of pharmaceutical services to isolated areas is highly relevant and a challenging problem. The clinical service could, for example, be used to connect pharmacists to dispensing health workers in the isolated area.
- In addition to the medical use, make the communication facility available – in less busy periods – for other purposes such as social communication (or possibly academic networking). The collection of epidemiological data (from sensors, automated consultation recordings, etc.) to support health surveillance and public health administration, as well as the support of multi-regional trials are potential side-applications.
- Explore a business plan, with a core idea of offering a telecommunication link that can be used for clinical services and other purposes. The business case shall build on open technology to foster competition. It shall be attractive for African companies. Appropriate regulation in the chosen remote areas is a prerequisite. Another important element to take into account is that medical expertise is not for free.
- Address the high risk lying in the difficult task of balancing the degrees of isolation, skilled workforce, demand for clinical services, and quality and frequency of contact/connectivity (roads, electricity, etc.) between the isolated area and the outside.

### 4.3 Rationale

Connecting isolated areas to health centres for the decision of how to manage a patient can save transportation costs and improve the clinical outcome. Connectivity to health centres providing clinical services to inhabitants in rural areas can counteract the rural migration. Virtual pharmacies can optimize the distribution of pharmaceuticals. Delivering health information on mobile devices can support emergency management and prevention. Connectivity via ICTs, once established, can be enabler for many areas, including eGovernment and eBusiness.

### 4.4 Approach

Medical centres of excellence in Africa will be selected to serve as medical help desk in this project. The centres must be able to communicate in at least English, French, and one of the local languages of the remote areas. Potential candidates will be evaluated with respect to their medical experience in the specific field, their experience with telemedicine, and the quality and cost of service delivery (permanent, not for the project, only).

### 4.5 Deliverables

- A pioneering clinical service for isolated areas.
- A concept for implementation of clinical services via satellite.
- Publications about the project and accompanying research.

### 4.6 Timeline

The chart below shows the recommended sequence of main project activities. As in the first project, the selection of suitable isolated areas includes the evaluation of user needs, linking activities 1 and 2 in terms of a pre-selection of candidates in the first month, followed by final selection of the isolated areas. According to the specific demands of the target regions, candidate expert centres are identified and service conditions are negotiated, ending up in a final choice of centres for the project (activities 3 and 4). In parallel, the technical concept, followed by the technical setup (activities 5 and 6) are done, with the goal to satisfy the demands with solutions that are as standard, simple, robust and cost-effective as possible. The training of technicians and users (activity 7) partly accompanies the technical setup activity and is continued, on (tele-) support level, throughout the whole project. Piloting (activity 8) shall come along with ongoing documentation, monitoring and evaluation (activity 9), as well as the dissemination of (intermediate) results (activity 10). During the whole project, the creation of a business case shall be an ongoing task (activity 11).



2007/2008	S	O	N	D	J	F	M	A	M	J	J	A
1. Selection of the isolated areas												
2. Acquisition/analysis of demands												
3. Selection of the expert centres												
4. Negotiation/shaping of services												
5. Technical concept												
6. Technical setup												
7. Training of technicians / users												
8. Piloting of the service												
9. Evaluation of pilot phase												
10. Dissemination of results												
11. Creation of a business case												

#### 4.7 Coordination

Telemed Task Force.

## 5 Third Project: Regional Integrated eHealth Management Information System for East Africa

### 5.1 Mission

The broad objective of the project is to promote eHealth practice in East African Community (EAC) through the establishment of a Regional Integrated eHealth Management Information System (RIHMIS) and Geographical Information System (GIS) database and ICT infrastructure in the region.

### 5.2 Objectives

- Set up, host and manage an EAC RIHMIS/GIS database.
- Establish RIHMIS/GIS units for offices in Kenya, Tanzania, Uganda, Rwanda, Burundi, and Arusha (head office) and link these offices via electronic communications. Establish connectivity of key database servers located in dedicated sites within East Africa through a Wide Area Network (WAN) on the internet, secured by Virtual Private Network (VPN) technology.
- Promote, amongst the relevant stakeholders, the exchange and dissemination of information on Integrated Disease Surveillance (IDS) and other disease control activities in a standardized way. Harmonize disease surveillance systems in the region. Ensure continuous exchange of expertise and best practices for disease surveillance and control.

### 5.3 Rationale

The RIHMIS/GIS databases are considered by the EAC as a fundamental asset for improving the quality of data on communicable diseases and the flow and sharing of information to improve the health of the East African population.

### 5.4 Deliverables

- RIHMIS/GIS database mapping health and eHealth facilities, as well as communicable and non-communicable diseases, based on digital maps at location, sub-location, district and provincial level using satellite images and geographical position system (GPS).
- A standardized automated procedure for collecting of such eHealth data from local to national and regional levels and subsequent processing data into GIS layers for graphical presentation.
- An eHealth data sharing platform and infrastructure that facilitates information exchange from the sub-location level to national level and to regional level.
- A regional ICT infrastructure for eHealth practice in East Africa.

### 5.5 Coordination

East African Community.

## 6 Conclusions

Based on the results gained during the pilot projects phase, a programmatic framework should take actions to support

the step-wise development of an eHealth network; based on open standards, fund the development of sustainable

eHealth services, especially for the Sub-Saharan region; build up a comprehensive and continuously updated repository on eHealth-related issues, such as programs, projects,

services, studies, laws and regulations; support specific actions to set up the legal frameworks; and continuously harmonize.