



EAST AFRICAN COMMUNITY

HEALTH SECTOR

PROJECT PROPOSAL & PROTOCOL

TOWARDS ESTABLISHMENT OF AN EAST AFRICAN COMMUNITY REGIONAL INTEGRATED eHEALTH MANAGEMENT INFORMATION SYSTEM (eHMIS) & GOEMATICS INTIATIVE: 2007 - 2009

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LIST OF COLLABORATORS

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2	Centre for Public Health Research (CPHR), department of Kenya Medical Research Institute – KEMRI	Kenya
3	CISCO East Africa	Kenya
4	Health Information Management Unit (HIMS) department of Ministry of Health - MOH	Kenya
5	Indigo Telecom Ltd	Kenya
6	International Centre of Insects Physiology & Ecology – ICIPE	Kenya
7	Kenya Agricultural Research Institute - KARI	Kenya
9	Kenya Data Networks	Kenya
8	Kenya Trypanosomiasis Research Institute - KETRI	Kenya
10	Kenyatta National Hospital – KNH	Kenya
11	Moi Teaching & Referral Hospital	Kenya
12	Regional Centre for Mapping of Resources for Development – RCMRD	Kenya
13	University of Nairobi – Animal Production & Clinical Studies	Kenya
14	ETRI, Iringa	Tanzania
15	Kilimanjaro Christian Medical Centre – KCMC	Tanzania
16	Ministry of Health and Social Welfare (Tanzania)	Tanzania
17	MUCHS	Tanzania
18	Muhimbili National Hospital	Tanzania
19	National Institute for Medical Research - NIMR	Tanzania
20	Ministry of Health and Social Welfare (Zanzibar)	Zanzibar
21	Mbarara University & Teaching Hospital	Uganda
22	Ministry of Health (Uganda)	Uganda
23	Mulango National & Teaching Hospital	Uganda
24	National Agricultural Research Organization - NARO	Uganda
25	Virus Research Institute	Uganda
26	Ministry of Health	Burundi
27	Ministry of Health	Rwanda
28	World Health Organization (WHO)	Switzerland



List of Abbreviations

APHRC	African Population & Health Research Centre
AMREF	African Medical & Research Foundation
CDC	Centres for Disease Control
CPHR	Centre for Public Health Research
CHW	Community Health Workers
DB	Database
DSS	Demographic surveillance system
EAC	East African Community
EAIDSNet	East African Integrated Diseases Surveillance Network
GIS	Geographic Information System
GPS	Geographical Positioning Systems
GUI	Graphical user inter-phase
HMIS	Health Management Information Systems
IPH	Institute of Public Health, Makerere University
ICT	Information Communication Technology
IT	Information Technology
KCMC	Kilimanjaro Christian Medical Centre
KEMRI	Kenya medical Research Institute
KNH	Kenyatta National Hospital
MoH	Ministry of Health
NIMR	National Institute for Medical Research
RCMRD	Regional Centre for Mapping of Resources for Development
RDBMS	Relational Database Management System
SQL	Sequential Query Language
ToT	Trainer-of-Trainers
TBA	Traditional Birth Attendants
VPN	Virtual Private Network
VRI	Virus Research Institute
WAN	Wide Area Network
WHO	World Health Organization

Abstract

There has been increasing momentum towards evidence-based health systems since the early 1990's. The capability of information communication technology (ICT) to be transformative, particularly in terms of system efficiency often provides tangible benefits in specific areas such as health. Given the right approach, context and implementation process, ICT-based solutions can indeed improve the quality, access and efficiency of healthcare provision. The East Africa countries share similar disease patterns and collectively, they have a large population with high disease burdens that may be prevented and controlled with the existing knowledge and resources. In addition, early identification of zoonotic disease occurrence through simultaneous monitoring of human and animal disease surveillance systems is critical to protecting health in both populations. The establishment of an integrated regional database and data centres is expected to enhance knowledge translation mechanisms to bridge the gap between community reported cases, health facility data, research and health policy formulation. Such mechanisms will facilitate health sector service output in line with population needs. It will avail evidence for decision-making that is timely, credible and relevant to the local contexts. A multi-layered approach will be used where health connectivity taking into account the need to recognize existence of different geographic regions and health provider entities that have different access, service and security needs. Fifteen diseases, which were purposively selected by EAC health stakeholders, will form the initial parameters that will be used in the EAC eHealth web portal development. A data center infrastructure will be developed with emphasis on scalable and availability, as well it being simple to operate, troubleshoot and easily accommodates new demands. To achieve harmony in reporting tools and proper system integration between all the proposed sites, data collection tools and databases will be synchronized and sequent standardized into a common database. The expected outputs of the project among others include harmonized digital and standardized surveillance report form, and a web portal that integrates database GIS system that runs on both ArcView and Health Mapper software. Confidentiality and ethical issues relating to data management will be taken into consideration particularly through use of passwords. The total budget for the first year is estimated at USD 718,600.



1.0 INTRODUCTION

1.1 Background

There has been increasing momentum towards evidence-based health systems since the early 1990's [Murray C & Frank J]. The World Health Organization (WHO) has been emphasizing the important role of health systems and attention is focusing on the importance of policy-making in achieving effective health systems [Murray C & Frank J; World Bank Report 2005; WHO Report 1996]. Today, the focus is increasingly on understanding the dynamics across multiple health agencies and developing an architectural information and communications technology (ICT) response [Sauerborn *et al*]. In this context, ICT architecture refers to the process of determining the principal design attributes associated with connecting people, entities and services in a planned manner in order to optimize delivery, cost and scalability. [Malaysia Public Health Report]. The capability of ICT to be transformative, particularly in terms of system efficiency often provides tangible benefits in specific areas such as health [UNESCO Report 2002]. Thus, given the right approach, context and implementation process, ICT-based solutions can indeed improve the quality, access and efficiency of healthcare provision. Realizing these benefits takes at least two years after implementation of comprehensive ICT strategies [UNESCO Report 2002; Australian Government Report 2006].

1.2 East African Regional e-Government Programme

The East African Community (EAC) regional e-Government Programme was started in 2004 when EAC partner states recognized the need for exploring the use of ICT to achieve an overall vision of regional integration and also to create wealth as well as to raise the living standards of all people of East Africa. [EAC e-Health working Report]. The EAC Regional e-Government Programme aimed at efficient use of ICTs in public administrations combined with organizational change and development of new skills. The Programme further aimed at enhancing and extending public services delivery, democratic processes that would support regional integration for political, economic, social and cultural development of the region as per the relevant provisions of the Treaty for the Establishment of the East African Community. [EAC e-HMIS working Report].

The East Africa countries share similar disease patterns [Pablos-Mendez *et al*]. They collectively have a large population with high disease burdens that may be prevented and controlled with the existing knowledge and resources. Yet, the burden persists! As in many low-income countries, this is a consequence of the “know-do-gap”, the delay in conducting research of immediate relevance to policy and decision makers striving for equity-centred health development [Pablos-Mendez *et al*]. The gap



suggests that the policy makers are often frustrated because they feel they are making policy without answers to their questions. Urgent health policy needs are clearly not reflected in current health priorities. Health care service providers, researchers and policy makers need a new and more effective way of information exchange. The East African Integrated Diseases Surveillance Network's (EAIDSNet) database will thus provide a link between policy makers, researchers, donors and health care service providers in their quest for information that will drive policy development and initiate research respectively.

1.3 East Africa Regional integrated e-Health management information system

The East African Regional Integrated e-Health Management Information System (e-HMIS), Geographic Information System (GIS) and its accompanying ICT infrastructure for e-Health and telemedicine practice is a collaborative effort of the national Ministries of Health of Kenya, Tanzania and Uganda as well as national health research and academic institutions in both the private and public health sectors throughout East Africa [EAIDSNet Bulletin, 2005]. An important aspect of this regional integrated e-Health management information and geographical information system (GIS) network is to enhance the quality of health data in order to facilitate timely flow and sharing of information to improve the health of the entire East African population. As per the relevant provisions of Article 118 of the Treaty for the Establishment of the East African Community (EAC) with regard to regional integration in the health sector, the objectives of this regional eHealth and GIS network are to, among others; 1) enhance and strengthen cross-country and cross-institutional collaboration through regional coordination of health activities; 2) promote the exchange and dissemination of appropriate information on health systems development and services provision as well as health research activities; 3) harmonize national Integrated Disease Surveillance and Response (IDSR) systems in the region; 4) strengthen regional capacity for implementing disease surveillance and control activities for both communicable and non-communicable diseases; 5) ensure continuous regional exchange of expertise and best practices for disease surveillance and control; and 6) enhance e-health and telemedicine practice as part of increasing access to quality health care provision and research in both the public and private sector throughout East Africa.[EAIDSNet Bulletin, 2005].

1.4 Integrated Human-Animal Disease Surveillance System

Early identification of zoonotic disease occurrence through simultaneous monitoring of human and animal disease surveillance systems is critical to protecting health in both populations. [Emerging Infectious Disease, 2005] The ministries of livestock as well as the Great Lake Initiative of EAC will be expected to form part of the surveillance team. Therefore, there is a need to develop system that link



human and animal disease reporting systems which can help identify and facilitate a response to known and emerging zoonotic diseases [*Emerging Infectious Disease, 2005*].

As part of the EAC integrated web-based eHMIS, a component will be included in the community reporting template. It is anticipated that the system will capture all cases occurring at the community level as reported by the community health workers (CHWs) or Traditional birth attendants (TBAs). Overall, the system will be useful in addressing the following issues: 1) quality report feedback; 2) access to correct and coordinated human and animal disease information; and 3) computer system reliability and efficiency.

1.5 Overall Project Aim

Development of an integrated regional health information system through the use of ICT infrastructures in East Africa. More specially, the proposed project has three broad objectives:-

- Creation of a standardized automated procedure for collecting of facility health data (HMIS) from national and regional levels and subsequent processing data into GIS layers for graphical presentation.
- Creating a data sharing platform and infrastructure that facilitates information exchange from the sub-location level to national level and to regional level.
- Building capacity amongst relevant stakeholders in database management and GIS operations for effective assessment, analysis and monitoring of diseases including other relevant dynamics impacting on human health.

1.6 Justification

The East African countries of Kenya, Tanzania and Uganda share a common disease burden. They have large populations carrying one of the highest preventable burdens of ill health in the world. Much of this burden is preventable with existing knowledge and resources; however, considerable delay in applying available research evidence to policy exists [*EANet Bulletin, 2005*].

Health services and facilities in the partner states demand a lot of improvement and the challenges facing this sector are many. There are a number of difficulties that are faced by all the EAC Partner States especially when thinking of launching an e-Health programme in the region. These include, among others: 1) Lack of health infrastructure and services; 2) Shortage of computer savvy healthcare personnel; 3) Lack of training facilities with regard to the ICT in healthcare; 4) Absence of ICT based healthcare in medical curriculum; 5) Unstable communication services to facilitate e-Health services. [*EAC e-HMIS*



working Report]. Closing this gap will not only be critical to improving health strategies, but also in improving the region's public health. To address these gaps, strategies are required to forge partnerships between diverse groups, such as health care-service providers, researchers, health professionals, policymakers and consumers, in both public and private health sectors.

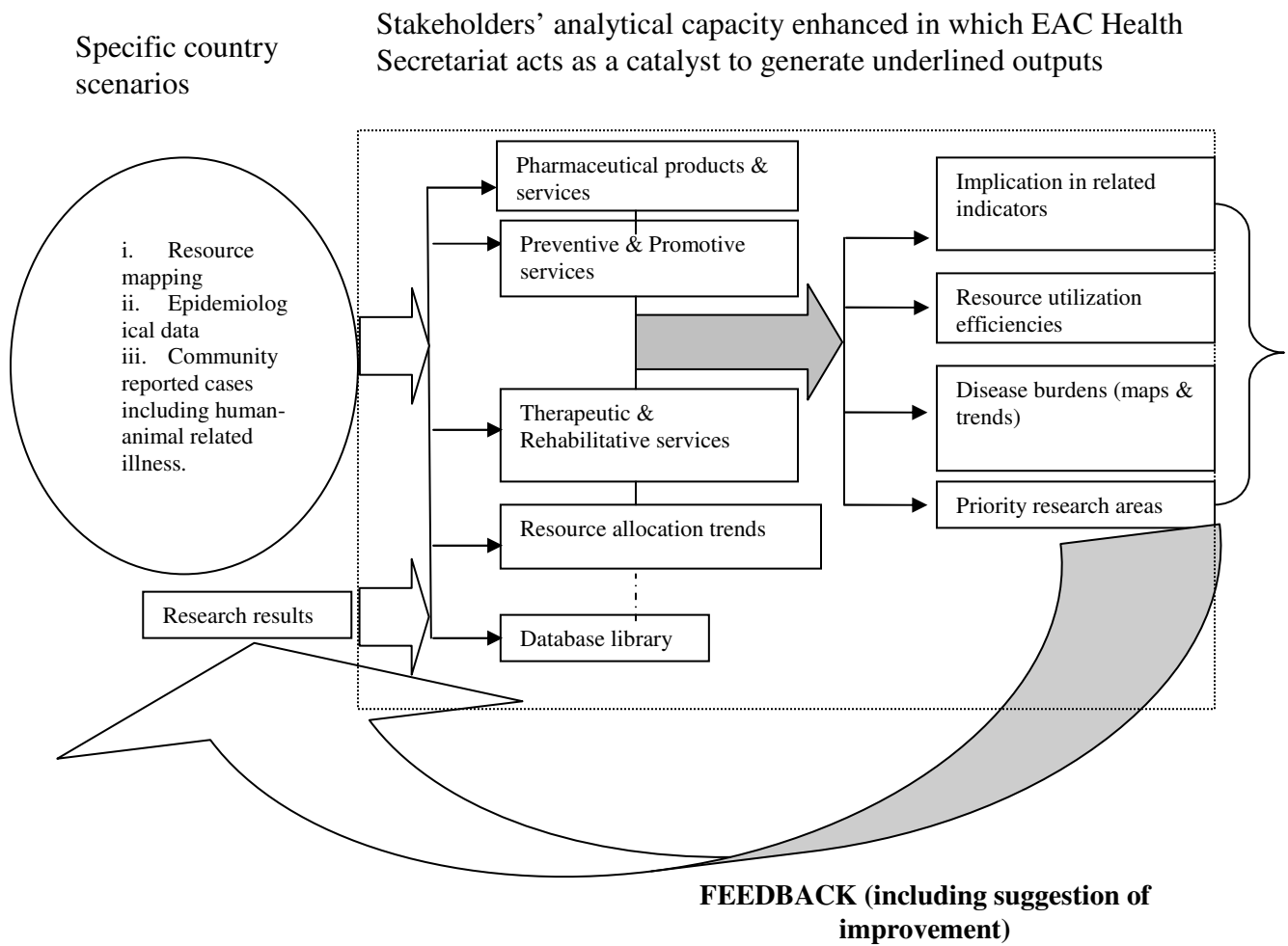
The establishment of an integrated regional database and data centres is expected to enhance knowledge translation mechanisms to bridge the gap between community reported cases, health facility data, research and health policy formulation. Such mechanisms will facilitate health sector service output in line with population needs. It will avail evidence for decision-making that is timely, credible and relevant to the local contexts.

1.7 Conceptual Framework

The role of EAC in this process will be that of a catalyst to facilitate inter-country online real time information exchange platform. A comprehensive integrated human-animal disease surveillance system will be established to generate information and data that will be used for advocacy, accountability and utility. This exercise will form part of resource mapping for effective capture and dissemination of epidemiological data. Emanating from this exercise, process output will involve classification of the information into either disease domains, mapping trends, monitoring resource allocation and establishment of a reference database library (warehouse). It is envisaged that filter mechanisms will help synthesis feedback into specific program models and thus support evidence-based decision-making (figure 1).



Figure 1: Conceptual framework





1.8 Objective

To establish an internet-based regional integrated e-Health management information system (HMIS) and Geographical Information System (GIS) database warehouse (in order to promote e-health and telemedicine practice in both the public and private sector throughout the East African Community Partner States.

1.8.1 Specific objectives

- i. Conduct a situation analysis on member country ICT capacity and policies
- ii. Establish digitized web-based forms of key surveillance forms from Ministry of Health
- iii. Conduct capacity building training on ArcView GIS and Health Mapper for data managers and operators of each member country
- iv. Integrate the functions of ArcView GIS and Health Mapper onto the regional web database interphase
- v. Establish guidelines for strengthening and implementing local area networks (LAN), wide area-networks (WAN) and computer security levels at Ministry and selected participating facilities for each country.
- vi. Establish a data backup systems located in selected sites within East African through a wide-area network (WAN) via internet / virtual private network (VPN).
- vii. Establish feedback scheme/templates for communicating findings to all stakeholders.



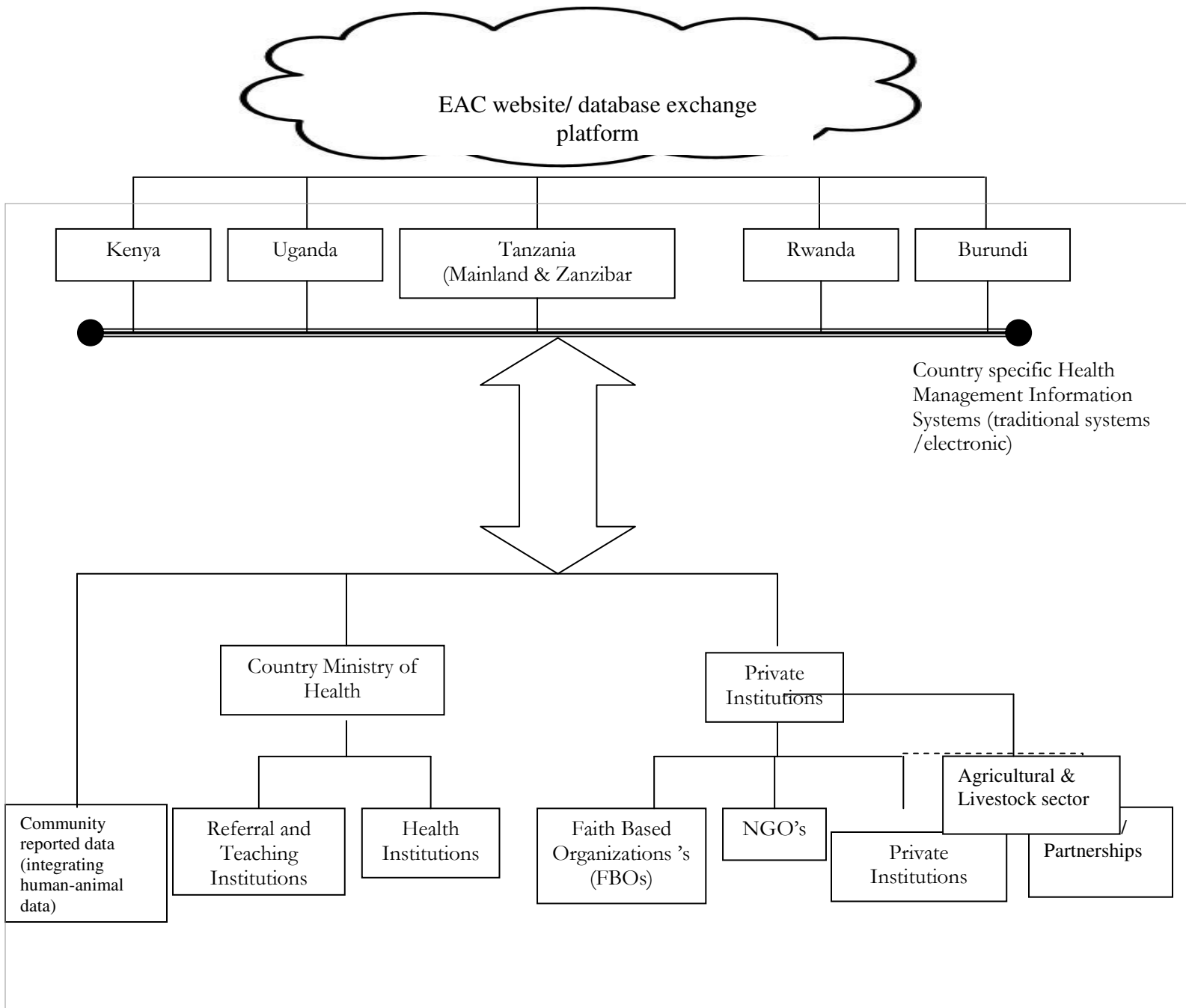
2.0 MATERIALS & METHODS

2.1 Design and Methodology

2.1.1 Organizational setup.

The role of EAC Health Secretariat is to act as a catalyst in providing rapid online exchange forum as shown in the proposed project organization setup shown below.

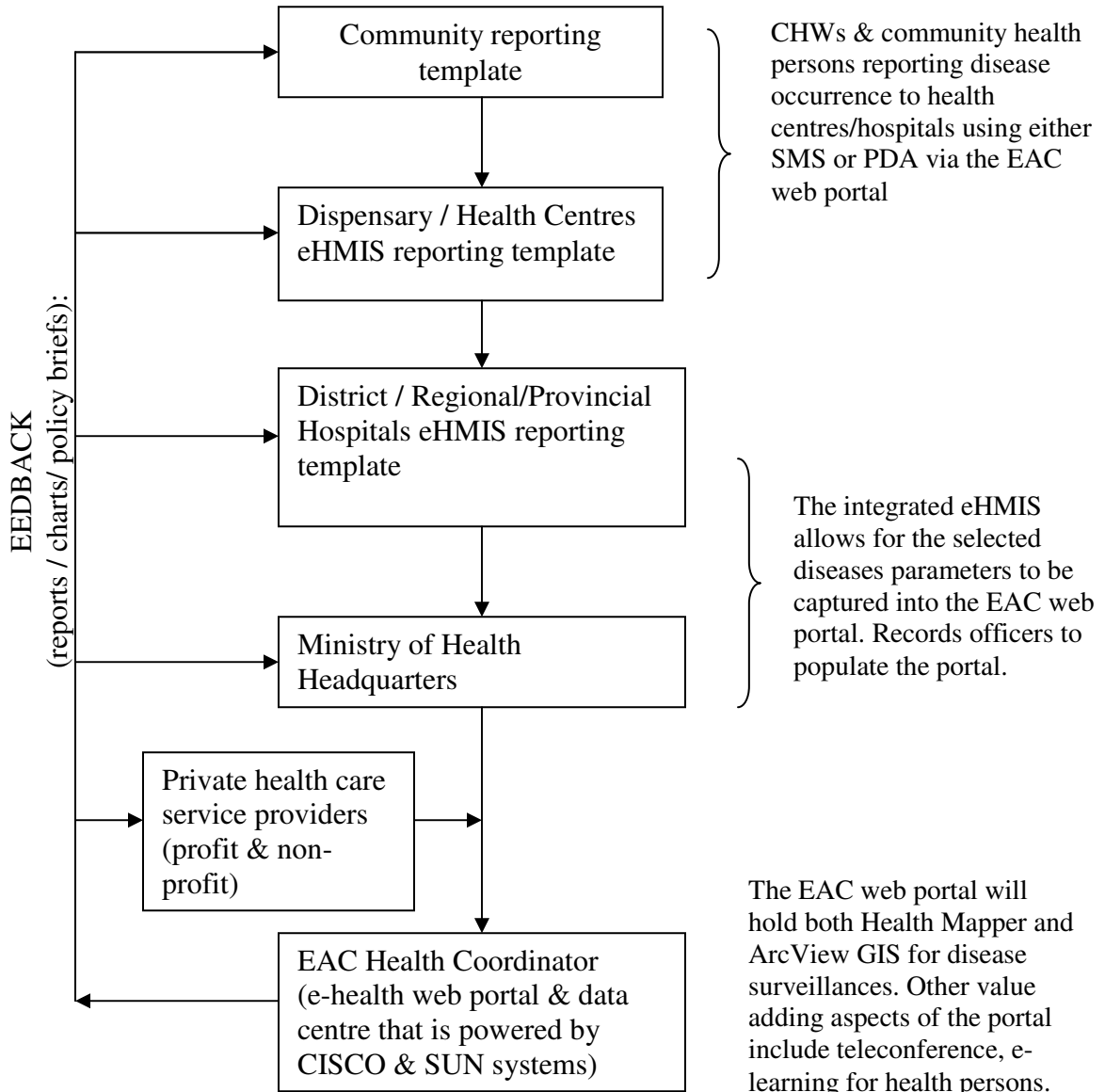
Figure 2: Overall Project organizational setup.





More specifically, community data reporting aspects will be used to compliment health facilities data. The web portal aims at assisting members states either to reinforce on the existing HMIS reporting systems or requesting EAC to create a “web pipeline” that allows data to transferred to next level of reporting without been saved at EAC data centre. Figure 3 displays how the data flow and reporting will be set up.

Figure 3: Data flow capture and reporting schema





2.1.2 Role of participating institutions

Institution		Roles & activities
1	Centre for Public Health Research (CPHR), department of Kenya Medical Research Institute – KEMRI	Coordinating research & universities health database implementation
2	Regional Centre for Mapping of Resources for Development – RCMRD	<input type="checkbox"/> Training in GIS Arc View <input type="checkbox"/> Development of shape files <input type="checkbox"/> Provide off-site database backups
3	Ministry of Health - MOH (Kenya)	Kenya country coordinator & custodian of country database
4	Kenyatta National Hospital – KNH	Project implementers, Medical records
5	Moi Teaching & Referral Hospital	Project implementers, Medical records
6	National Institute for Medical Research - NIMR	Lead implementers, research and national data archiving
7	Ministry of Health and Social Welfare (Tanzania)	Tanzania country coordinator & custodian of country database
8	MUCHS	Project implementers
9	Ministry of Health and Social Welfare (Zanzibar)	Implementers (overall country coordinator – Zanzibar isles)
10	Kilimanjaro Christian Medical Centre – KCMC	Project implementers (northern region of Tanganyika)
11	Muhimbili National Hospital	Project implementers: Medical records (node)
12	Ministry of Health (Uganda)	Uganda country coordinator & custodian of national database
13	Institute of Public Health, Makerere University	Lead implementers – referral and teaching hospital
14	Virus Research Institute (Uganda)	Project implementers (research database)
15	Ministry of Health (Burundi)	Lead implementers (overall country coordinators) & custodian of country database
16	Ministry of Health (Burundi)	Lead implementers (overall country coordinators) & custodian of country database
17	World Health Organization (WHO)	Advisors (Health Mapper & ArcGIS) software
18	East African Community Secretariat (Arusha)	Administration and custodian of the database
19	African Medical & Research Foundation (AMREF)	i). Programming issues of community aspects of the database. ii). Monitoring and evaluation on utilization efforts.



Detailed description of roles

Overall coordinators	<ul style="list-style-type: none">- Updating of integrated database- Development of various communication strategies.- Management of the integrated database (day-to-today running).- Making of various backups- Coordinate training needs
Project implementers	<ul style="list-style-type: none">- Carry out mapping of each health facilities from village to national level.- Ensuring protocols are followed- Data is kept in safe custody and making of regular backups.- Transmission of data to central servers
Lead implementers	<ul style="list-style-type: none">- Key coordination of participating institutions in each country- Transmission of data to and from periphery sites & participating countries

2.2 Procedures

2.2.1 Establishment of a surveillance database

A multi-layered approach will be used where health connectivity requires that there is need to recognize existence of different geographic regions and health provider entities that have different access, service and security needs. This is partly due to the level of current electronic network maturity, and to differing needs, innovation and specialization [Michael G; 2007]. Fifteen diseases, which were purposively selected by EAC health stakeholders, will form the initial parameters that will be used in the EAC eHealth web portal development. In addition, AMREF, which has been over the past years testing a proto-type community data capture database in Makueini, Kenya, will be developed further to included human-animal disease surveillance system. A GIS consultant will be hired to assist in the linking of Health Mapper and ArcView software into the web portal.

It is envisaged that a pro-type web-portal will be tested in 3 purposively selected pilot sites in each country. This gives a total of 17 sites including those of Rwanda and Burundi. Table 2 shows the list of selected facilities.



Table 2: List of pilot sites

Country	Specific sites/facilities
Uganda	<ol style="list-style-type: none"> 1. Mulango Teaching & Referral Hospital 2. Mbarara Teaching & Referral Hospital 3. Ministry of Health
Tanzania	<p>Mainland</p> <ol style="list-style-type: none"> 1. Muhimbili Teaching & Referral Hospital 2. National Institute of Medical Research (NIMR) 3. Ministry of Health & Social Welfare <p>Zanzibar</p> <ol style="list-style-type: none"> 1. Mnazi Moja Hospital 2. Ministry of Health & Social Welfare
Kenya	<ol style="list-style-type: none"> 1. Kenyatta National Hospital 2. Moi Teaching & referral Hospital 3. Ministry of Health 4. Kenya Medical Research Institute (KEMRI)
Rwanda	<ol style="list-style-type: none"> 1. National Medical School 2. Central University & Referral Hospital 3. Ministry of Health
Burundi	<ol style="list-style-type: none"> 1. Jabe Hospital 2. Ministry of Health

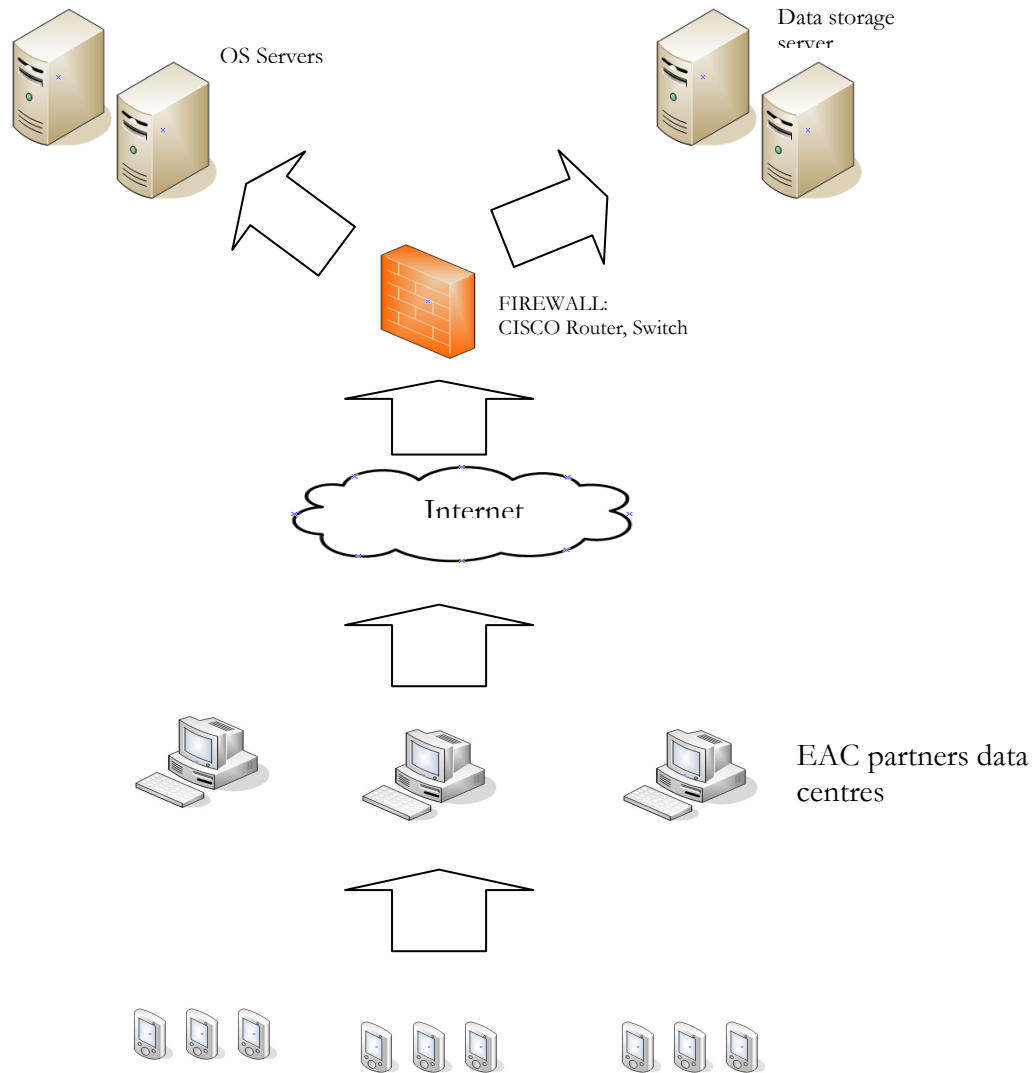
A second phase will follow later where particular the private sector will be incorporated. The following are critical requirements when designing the data center infrastructure to meet service level expectations:-

- High Availability—Avoiding a single point of failure and achieving fast and predictable convergence times
- Scalability—Allowing changes and additions without major changes to the infrastructure, easily adding new services, and providing support for hundreds dual-homed servers
- Simplicity—Providing predictable traffic paths in steady and fail over states, with explicitly defined primary and backup traffic paths
- Security—Prevent flooding, avoid exchanging protocol information with rogue devices, and prevent unauthorized access to network devices

The data center infrastructure will be scalable and highly available, it still be simple to operate, troubleshoot and easily accommodate new demands. To achieve harmony in reporting tools and proper system integration between all the proposed sites, data collection tools and databases will be synchronized and sequent standardized into a common database.



Figure 2: Main node architecture for the pilot phase



The system architecture will integrate and link homogenous data sources allowing a central master application site to be developed. This will facilitate ensure consistency of data since data management activities, though minimally decentralized, are carried out at the main node. The master site provides an aggregate interface to the collection of data sources as a single logical view.



2.3 Staff Training

Staff from each of the participating countries will be trained in the use of ArcView GIS and Health Mapper in health mapping at the RCMRD training centre. It is expected that the initial group to be trained will be the lead personnel from participating institutions. This group will become the trainers within their institutions and regions.

2.4 Data Management

- a) A GIS mapping team (producing digital maps of health facilities) will plot the position of each health facility and associated spatial data using hand held GPS systems and satellite. This activity will be set up at RCMRD. Setting up the integrated database Net will require and involve the following: A server RDBMS (e.g. SQL Server 2000 or 2003); Integration between specific country database formats and the server RDBMS to facilitate for the access of the central data by both Health Mapper and ArcView or ARCGIS software; the database will be accessed both through a local GUI and web based portal with restricted access; and a Web server software to host the website. In addition to setting up the system, EAC will host and manage the system (and database) on a day-to-day basis.
- b) Research database: The research database, managed at the central node will be updated with key health facility and regional research data and results from key research institutions, processed and made available to peers and policy makers. Feedback mechanism to guide, improve or implement the research will be put in place.
- c) Collected data, from PDA's and digitized epidemiological forms are accumulated at national level as well as from private health care service providers and teaching hospitals. If inconsistent data or unverified data is detected, the data and error codes (or explanation) will be sent back to the concerned institution.
- d) For proper system and database security, VPN systems will be incorporated to ensure IP control and transmission of encrypted data and communication signals from district to the main node and to the participating nodes. In addition, installation of a firewall in front of all the participating nodes and the main DB, installation of virus software and periodic audit checks will be put in place.



2.5 Beneficiaries.

The project will be ultimately implemented in the EAC Partner States namely Kenya, Tanzania and Uganda with provision made for Burundi and Rwanda who will join the Federation in the course of the year. The main regional hub will be at EAC headquarters in Arusha, Tanzania as well as linkages with other regional and international ICT systems of similar nature.

2.6 Ethical Issues & Confidentiality of data

- i) This integrated database project is only data collection based on interviews of head of facilities. Data collection using invasive methods.
- ii) The project will generate vital information and will detect disease patterns, birth/death situations. This supports health care management and public health polices at local level.
- iii) Prior to start interview at community-level health care facilities, an informed consent from head of these facilities will be taken. Written consent of co-operation will be obtained from the various head of facilities.
- iv) For protection of data collected during the project, finger print log-in system for handy-data-entry system (PDA) is applied. On the station PC and the main server, access to the data is limited by log-in using user name and password. Furthermore, firewall is set on the server to protect the data by injustice accesses from inside and outside of the EAC data center.

2.7 Expected outputs

The expected outputs of the project are:

- A harmonized digital and standardized Surveillance Report Form with an easy to use inter-phase (for all the project countries)
- An integrates database GIS system that runs on both Arcview and Health Mapper Software
- GIS databases and/or maps for both baseline data and health related layers (Health facilities, Telemedicine ICT, Communicable and non-communicable diseases, etc)
- Functional GIS units in Kenya, Tanzania, Uganda, Zanzibar, Burundi, Rwanda and Arusha (Head office)
- An integrated GIS Database developed, hosted and continuously updated in member countries
- Trained staff in Arcview and Health Mapper from the project countries
- GIS, metadata and other databases installed in country offices
- Project reports



3.0 Future Considerations on EAC Regional eHealth MIS/IDSR/ArcGIS Database System for e-health and telemedicine practice in East Africa

This system is expected to grow in usage, especially considering that the database will be accessed through the Internet. Because of this likely development, it is advisable that a budget be set aside in the second year of operation to facilitate the migration of the database to a more stable system such as Oracle so as to manage the large number of e-health and telemedicine practice users accessing it.

Project implementation summary:

3.1 The project shall be implemented in two phases as detailed below covering a period of one and half years

3.1.1 Phase 1: One year

Undertake a baseline situational analysis study and ICT capacity assessment and feasibility, costing and SWOT analysis of creating a regional centralized data repository and data center to house electronic medical records (EMR), centralized physician order form entry systems (CPOE), and picture archival communication systems (PACS.)

Training of Ten staff for one month at RCMRD-Nairobi in ArcView GIS and Health Mapper from the project countries

Training of two high level spatial database management staff for 12 months split in two halves. The staff will be responsible in e-health spatial data management, update, and transfer and analysis for report printing in form of maps at EAC and major centres. Later these personnel will play role as internal trainers provide backstop in the same skills.

3.1.2 Phase 2: Six months

Procurement and Distribution and Install an Integrated ICT System for both Medical and other health services supplies

Supply connectivity and management services. Design and implement wireless LANs and WANs for hospitals/ health facilities; it is anticipated that, each hospital will be equipped with a LAN which will be a mixture of both wired and wireless technologies. For example, inter-hospital/health facilities with wireless WAN connection will be provided in order to support sharing of data and resources among themselves and improve patient healthcare. For redundancy purposes, the health facilities will be



connected in a point to- multipoint manner. With wireless networking it will be possible to cover long distances with repeaters, deploy the network quickly and easily maintain. The provision of high bandwidth which is essential for the transmission of video and graphical data that cost effective compare to ISDN and proven technology, e.g Wi-Fi system.

3.2 Network and Internet connections

It is assumed that there are existing network and internet connections in each of the installations i.e. hospital, ministry headquarters and EAC.

If there is none, then a site survey has to be done in order to ascertain the correct amount of establishing networks in each of the network locations. Therefore establish the cost of internet (VPN) connections from each location to EAC Health secretariat Arusha.



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Annex 1: BUDGET

Proposed First Year Budget by country

Outline	Item Description	Estimated Unit cost, US \$	Kenya (4 sites)	Uganda (3 sites)	Tanzania (mainland) 3 sites	Zanzibar (2 sites)	Burundi (2 sites)	Rwanda (3 sites)	EAC (Arusha)
Equipments	Rank Xerox Scanner (heavy duty)	2,200	8,800	6,600	6,600	4,400	4,400	6,600	2,200
	Laserjet printer (network)	1,500	6,000	4,500	4,500	3,000	3,000	4,500	1,500
	CISCO switch 6500 series	55,000	55,000	0	0	0	0	0	55,000
	UPS - 220 KvA smart	650	2,600	1,950	1,950	1,300	1,300	1,950	650
	Server (Xeon processor)	4,500	18,000	13,500	13,500	9,000	9,000	13,500	4,500
	Printers	1500	6,000	4,500	4,500	3,000	3,000	4,500	1,500
	PC workstation	1,500	6,000	4,500	4,500	3,000	3,000	4,500	1,500
	CISCO Routers	2,000	8,000	6,000	6,000	4,000	4,000	6,000	2,000
Sub-total			110,400	41,550	41,550	27,700	27,700	41,550	68,850
Software	GIS ArcView	6,389	0	0	0	0	0	0	6,389
	CISCO software	10,000	0	0	0	0	0	0	10,000
	Win 2003 NT edition	1,800	1,800	0	0	0	0	0	1,800
	Sub-total		1,800	0	0	0	0	0	18,189
Internet Access	Monthly Internet charges (125 KBps up/down link) US\$ 1,250 x 12 months	15,000	60,000	45,000	45,000	30,000	30,000	45,000	0
	Sub-total		60,000	45,000	45,000	30,000	30,000	45,000	
Workshops & conference	Training seminars for local teams per country. Assume each country will carry one workshop per year	8,250	8,250	8,250	8,250	8,250	8,250	8,250	
	Regional seminars for steering teams in ArcView & Health Mapper - 2 meetings	14,000	14,000					14,000	
	Sub-total		22,250	8,250	8,250	8,250	8,250	22,250	



EAC Regional integrated e-HMIS & Geomatics Initiative Proposal.

		Estimated Unit cost,			Tanzania				
Stationary & consumable	Stationary & associated consumables	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450
	Computer storage media (<i>flash disks, CDs & zip drives</i>)	700	700	700	700	700	700	700	700
	Sub-total		2,150	2,150	2,150	2,150	2,150	2,150	2,150
Motor Vehicle	Toyota Land Cruiser	45,000	45,000	45,000	45,000		45,000	45,000	
	Toyota Omni-bus (25 seater)	88,000	88,000	88,000	88,000		88,000	88,000	
	Sub-total		133,000	133,000	133,000		133,000	133,000	
Refurbishment of offices	Upgrading of office furniture	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
	Air conditioning of server room & computer laboratory	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500
	Sub-total		10,000	10,000	10,000	10,000	10,000	10,000	10,000
Development of GIS database & hosting web site	Project design & implementation strategy (days) at RCMRD	200	600						
	Conversion of surveillance report forms and development of user inter-phase at RCMRD	60	6,000						
	Training seminars at RCMRD (baseline and follow-up activities)	1,250	1,250						
	Sub-total		7,850						
Grand Total – US\$			347,450	239,950	239,950	78,100	211,100	253,950	99,189
Overall Total – US\$			1,469,689						



EAC Regional integrated e-HMIS & Geomatics Initiative Proposal.

Time frame

	Description	Time Frame (Months)											
		2007								2008			
		May	June	July	August	September	October	November	December	January	February	March	April
Stage 1: Pilot phase, model development & web databases	Consultative meetings / proposal development (No. 1)												
	Digitization of report forms and user inter-phase												
	Regional training of central teams on project implementation process												
	Project clearance by authorities in each country (<i>where applicable</i>)												
	Development of GIS maps, databases, web database												
	Purchase of ICT equipments												
	Hosting and installation of database GIS database in country offices												
	Refurbishment of central offices / furnish server rooms												
	Field visits by managers on selected districts per country												
	Pre-test studies using PDAs & GPS by country												
	Data collection of selected districts / country												
	Consultative regional stakeholders meeting												
	Data storage, processing & packaging												
	Documentations of findings												
Monitoring and Evaluation													



Annex 2: Summary description of ICT requirement for the initial phase.

Item	Make/model	Description/ specifications	Estimated Unit Prices, \$
1. Switch	CISCO Catalyst 6500	<ul style="list-style-type: none"> • Content Service Module (CSM) • Firewall service module (FWSM) • Intrusion Detection Service Module (IDSM) • Network Analysis Module (NAM) • SSL Service Module (SSLSM) • 3 slots 3-RUS 	12,000
2. CISCO software	CISO software	<ul style="list-style-type: none"> • 	3,500
3. Router	CISCO Router	<ul style="list-style-type: none"> • CISCO 2610XM series • 10/100 Ethernet • IOS IP software 	1,600
4. Server	IBM xSeries 460	<ul style="list-style-type: none"> • Intel Xeon Processor • Speed 3.33GHz (dual-core) • 64GB DDR II RAM • 440 GB SCSI hard disk (Raid 5) 	3,000
5. UPS	APC smart UPS	<ul style="list-style-type: none"> • 2.20KvA smart load • Spike protection 	650
6. Desktops	Dell/IBM desktops	<ul style="list-style-type: none"> • Intel Processor - Core 2 Duo • 2 GB Memory • 4 GB Hard disk • Speed 4.0GHz 	1,800
7. Printers	HP/Dell/Epson printers	<ul style="list-style-type: none"> • Color resolution • Network ready (10/1000MBps) 	1,500
8. Scanner	Rank Xerox	<ul style="list-style-type: none"> • 20 pages per minute or higher • Series 520 or higher • USB capability 	1,620
9. GIS software	ArcView GIS (full module)	<ul style="list-style-type: none"> • Full modules • Single key – user but allows multiple installation 	15,000
10. PDA	HP iPAQ pocket PC	<ul style="list-style-type: none"> • 312-400 MHz speed • 256 MB DRAM 	315



Annex 3: Situation Analysis Review Activity

PREAMBLE

This study seeks to assess the infrastructure and use of Information and Communication Technology (ICT), such as telephony, scanners, overhead projects, fax, computers, and the Internet, in selected EAC member states. It also identifies their needs to improve information flow and management.

The specific objectives of the study are:-

1. To assess the availability of local, locally adapted, and relevant information (available electronically or in hardcopy) necessary for the development of improved health service delivery, research capacity, efficiency, and appropriateness within EAC member states;
2. To describe the strengths, potentials, and constraints of the present information and communication capacities (including human resources, knowledge and infrastructures and relevant communication relationships) and policies and strategies in health care service delivery, research and research knowledge transfer (content development, training/education, feedback with society); and
3. To compile an inventory of existing and preferred communication tools, channels, and actors.

Expected Benefits.

Identify critical needs for improved infrastructure and use of ICTs in disease surveillance, health care service delivery, extension, and education, and develop projects to address these needs.

Information Management.

All data and information gathered for this study will be summarized for analysis and contribute to the preparation of an EAC report focusing on the stated goal and objectives of this exercise. Both the summarized information and the final report will be submitted to EAC Health coordinator.



Questionnaire

Box 1. Organization data

Name and title of respondent
Name of organization Address Telephone Fax E-mail
Type of organization (<i>mark those types that best describe your organization</i>): 1. Research Institute 2. University (Medical school) & Referral Hospital 3. Government Health Facility/ Health Centre/ Dispensary 4. Non-Government Organization Hospital 5. Private Health Facility 6. Other (specify) _____
Function of organization (<i>mark those functions that best describe your organization</i>): 1. Health care service delivery 2. Teaching 3. Research 4. Information & client advisory centre 5. Laboratory services 6. Other (specify) _____
Total Number of staff members (employees) _____



Box 2. Within the organization setup, assessment of the current ICT situation

Areas	Issues	Response
Policy	1. Do you have an ICT policy framework?	Yes / No
	2. Do you have any arrangements of after sales service with any ICT vendor?	Yes / No
	3. Do you have a document/guidelines that outlines the standardization of ICT equipment?	Yes / No
Management	4. Who makes the final decision concerning ICT issues particular procurements, expansion ventures/exercise?	
	5. Are there rules regarding PC use & information sharing?	Yes / No
	6. In the last one-year, how many times did you service your ICT equipment?	1. Once 2. Twice 3. Thrice 4. More than thrice
Resources	7. In your estimation, how many people in the organization are computer literate?	1. Over 75% of staff 2. 50-74% 3. 25-49% 4. <25%
	8. Does the organization committee any funds (budget) towards preventive maintenance of ICT equipment	Yes / No
	9. About what percentage (%) does the ICT maintenance expenditure account for in relation to annual expenditure	1. Over 75% of total expenditure 2. 50-74% 3. 25-49% 4. 25% 5. Nil
Hardware	10. In total, how many standard PCs do you have in the organization?	0. Nil 1. < 5 PCs 2. 5-20 PCs 3. >20 PCs
	11. How many of these PCs have an access to the internet?	0. None 1. <25% of all PCs 2. 25-50% 3. 50-75% 4. >75%
	12. Does the organization have a functional computer network? (LAN/WAN)?	Yes / No
	13. About how many PCs are networked	0. None 1. <25% of all PCs 2. 25-50% 3. 50-75% 4. >75%



Areas	Issues	Response
	14. When last did you perform data backup	0. Cannot remember 1. Yesterday/day before 2. Last week 3. Last month 4. Last year
Software	15. When last did you purchase a new version of anti-virus? Specify the type of anti-virus currently installed in your system	
	16. Do you have user manuals (printed form) for the following selected software:- i. MS Office Suite (any version) ii. Your current anti-virus iii. Your current OS iv. Your network OS	Yes / No Yes / No Yes / No Yes / No

Box 3: The ICT situation in each partner organization

ICT Parameters	Response
1. Total number of functional PCs (desktops)	
2. Total number of functional laptops	
3. Total number of functional printers (all makes/ categories)	
4. Total number of servers in the organization	
5. Total number of LCD projectors	
6. Does your organization have an web site	Yes / No

In your own estimation, what percentage of the routine operations are already computerized:-	Tick the appropriate response
i. Human resource operations	None <25% 25-50% 51-75% > 75%
ii. Logistics and procurement department	None <25% 25-50% 51-75% > 75%
iii. Financial / accounting/ audit department	None <25% 25-50% 51-75% > 75%
iv. Records management department	None <25% 25-50% 51-75% > 75%
v. Hospital routine functions (care provision)	None <25% 25-50% 51-75% > 75%
vi. Research activities (where applicable)	None <25% 25-50% 51-75% > 75%



Table 1 Questions to consider in development of a business case for telemedicine¹

Population and Services	
<i>What applications are being considered?</i>	<ul style="list-style-type: none"> • By specialty • By administrative task
<i>What are the current delivery arrangements for each specialty?</i>	<ul style="list-style-type: none"> • Approximate level of demand • Local and remote health care providers. • Referral arrangements.
Personnel and Consumers	
<i>Who is to operate/use the telemedicine application(s)?</i>	<ul style="list-style-type: none"> • Local health care providers – will there be changes in and responsibilities? • Remote health care providers – have changes in relationships to remote providers been identified?
<i>Has there been consultation with all health care staff involved? Is there acceptance?</i>	<ul style="list-style-type: none"> • Consider views of all staff.
<i>Should there be wider publicity and consultation regarding the telemedicine services?</i>	<ul style="list-style-type: none"> • Consider: • contact with patient groups, general public. • Level of community acceptance.
<i>What training programs need to be put in place?</i>	<ul style="list-style-type: none"> • Consider qualifications and training needs for all staff who will be involved with the telemedicine application.
Delivery Arrangements	
<i>How many sites will be using telemedicine?</i>	<ul style="list-style-type: none"> • Specify the applications at each site. • Consider sequence/timing of introduction of telemedicine at each time. There may be advantages in phased introduction.
<i>Has scheduling been addressed, at least at a preliminary stage?</i>	<ul style="list-style-type: none"> • Consider scheduling of tele-consultation session within region/service. • Check/negotiate availability of remote providers.
<i>Is real-time telemedicine essential for local needs, or might store and forward options be adequate?</i>	<ul style="list-style-type: none"> • Consider if immediate availability of information is important for clinical and administrative needs. • Consider factors which would ensure consistent real

¹ Ohinmaa et al. 1999, Hailey et al. 1999



	time services.
<i>What are the storage requirements for data from use of telemedicine applications?</i>	<ul style="list-style-type: none"> • Cost and flexibility of storage requirements.
<i>What back-up arrangements will apply should the telemedicine system fail? Have data security and privacy issues been considered?</i>	<ul style="list-style-type: none"> • Needs to develop contingency plans.

Specifications and Costs	
<i>What are the specifications and projected costs for purchasing and maintaining telemedicine equipment? Will they apply fully to the goods that are to be purchased?</i>	<ul style="list-style-type: none"> • Consider how specifications will relate to the application in question and the needs of those using it. • Ensure availability of desired equipment. • Bear in mind that equipment will need replacement, perhaps after three years. • Clarify cost and details of maintenance arrangements.
<i>What are the mode and costs of communication?</i>	<ul style="list-style-type: none"> • How do these relate to expected levels of use of the system?
<i>Who is going to invest in telecommunication joint infrastructure?</i>	<ul style="list-style-type: none"> • Is this to be a responsibility of government or of operators?
<i>Will the telemedicine application cover all use of the services in question?</i>	<ul style="list-style-type: none"> • If current arrangements are to stay in place for some cases, consider resource and organizational needs, costs.
<i>How will changing delivery arrangements affect costs?</i>	<ul style="list-style-type: none"> • Changes to personnel and to supplies will have consequences for costs.
<i>Are there other, less expensive telemedicine options?</i>	<ul style="list-style-type: none"> • Consider potential for Web use, for example, in telemedicine-education applications. • Other telemedicine approaches, (e.g. telephone, secure fax, e-mail) may be good options for some applications.
<i>Have issues on funding/reimbursement for use of telemedicine applications been resolved?</i>	<ul style="list-style-type: none"> • These may involve wider policy matters. • Managers and users will require assurance on reimbursement issues. • Consider that the benefits (e.g. saved travelling costs) may not come to the payer of telemedicine service.



5.2. Evaluating telemedicine project proposals

A check-list for evaluating a telemedicine project proposal is suggested at:
<http://www.show.scot.nhs.uk/telemedicine/Programme/appendd.htm>

6.0. References

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