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Ronald Sanford

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HEALTHNET:

SATELLITE COMMUNICATIONS RESEARCH FOR DEVELOPMENT

(91-1043)

Evaluation Report

Still waiting
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to IDRC

Submitted by:
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Date:
29 March, 1994

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GLOSSARY OF ACRONYMS AND TERMS

CD-ROM

Compact Disc-Read Only Memory. A disc similar in form to a music compact disc, which stores large amounts of data. Once a CD-ROM disc is produced the data cannot be changed in any way, nor can new data be written onto the disc.

BBS

*not
correct*

Bulletin Board System, uses terminal emulation software to log on to a host computer, after which it can browse through files and select files to download to the operators computer. Use of a BBS is usually inappropriate for those who must use international phone lines for such a link.

Binary File

A file containing non-text characters (such as a Wordperfect, Lotus or graphic file).

Database



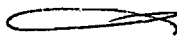
Hardware

The "hardware" that makes up the most basic computer system includes a monitor, a keyboard, and a system unit. The hardware for the ground station of ...

Modem

Equipment essential to electronic mailing which allows the computer to send signals over the telephone system.

Network Coordinator



Node



Point



RAM



Software

The term given to programs and procedures that direct a computer to perform different kinds of tasks. Examples of software include operating systems (such as MS-DOS), and programs (such as Word-Perfect or Lotus 1-2-3).

Systems Operator



I. BACKGROUND

The "information poverty" in the developing world is often cited as a cause of poor planning and decision-making, inferior quality of health services, substandard medical education, and irrelevant or redundant research. Medical libraries in Africa generally have between 30 and 300 periodical subscriptions, while the average American medical school has approximately 3000 journals in its collection. Available textbooks in African medical libraries are often those discarded from libraries and personal collections in the industrialized world, because they reflect antiquated standards of clinical care and outdated research methodologies. The high cost and lack of reliability of telephone and telefax communications precludes clinicians and researchers making direct contact with their colleagues in other countries to obtain updated information. Deteriorating economies in these African countries suggest that access to information and communications is likely to continue to worsen rather than improve. It was in response to this and other inequities in access to information that the Healthnet project was conceived and developed.

A. History of the Development of the Project

The Information Systems and Sciences Division (ISSD) of the International Development Research Centre (IDRC) initiated its Telematics Program in 1981, after an ISSD-sponsored workshop on Computer Conferencing recommended pursuit of applications of low-orbit satellite technologies for development communications. In 1988, a representative of the Nobel Prize-winning International Physicians for the Prevention of Nuclear War (IPPNW) approached IDRC's Telematics program for discussions of communications technologies for development. IPPNW had recognized the need, in 1987 during its 8th World Congress in Moscow, for global collaboration to address the disparity in access to health information.

Discussions included ^{a review of} the experience with ^{the} ~~a~~ Data Communications Experiment (DCE) using a low-earth-orbit electronic messaging satellite (the University of Surrey-built UOSAT-B) which had been launched in 1984. The ~~"packet"~~ communications technology for the DCE had been developed as a collaborative effort of Surrey Satellite Technology (SST) at the University of Surrey, the Amateur Satellite Associations (AMSAT) of the US and the UK, and Volunteers in Technical Assistance (VITA), a ~~not-for-profit~~ ^{NGO} development organization based in Washington, D.C. Soon thereafter, the IPPNW began the work of developing an international not-for-profit organization which would be dedicated to using satellite-based global communications to serve the health needs of countries in the developing world. SatelLife was officially incorporated in 1989 as an affiliate of IPPNW, and is currently headquartered in Cambridge,

Massachusetts.

It also initiated efforts to

Satellife focused its initial energies on raising funds to obtain rights to use the communications capacity of a low-orbit satellite (the UOSAT-F, also built by the University of Surrey), developing appropriate health-related information applications for the satellite, identifying developing country partners, and acquiring the necessary regulatory approval in each participating country. Satellife personnel visited the participating institutions in the IDRC-supported ESANET project (90-0068, which supported networking research activities among five of the largest universities in Eastern and Southern Africa) in mid-1990. Subsequent discussions among the ISSD, IDRC's Health Sciences (HSD) and Communications Divisions (COMM), and representatives of the Essential National Health Research Program supported by IDRC led to development of the Satellife Communications Project (91-0030). Through this project, IDRC provided CAD\$122,112 to acquire 10% of the communications capacity of UOSAT-F in collaboration with Satellife. Satellife subsequently raised adequate funds to acquire 100% of that satellite's communications capacity. The satellite, which is now known as UOSAT-5 or HealthSat, was successfully launched in July 1991.

I would estimate from 5 to 3

Having been involved from the initiation of Satellife and being invested in the satellite itself, IDRC was in an optimal position to further support Satellife for a second phase designed to develop and promote the use of the health applications of satellite communications for developing countries. A Satellife Policy Group within IDRC was constituted in 1991 to inform the project development process for this second phase. The Telematics Program of the ISSD collaborated with HSD, COMM, and ENHR to support Satellife efforts in proposal development. The result of this project development process was the HealthNet project (91-1043), which was funded on January 17, 1992 with an IDRC contribution of CAD\$762,000, *provided* contributed by the Information Systems and Sciences (CAD\$382,000), Health Sciences (CAD\$300,000), and Communications (CAD\$80,000) Divisions of IDRC. The Essential National Health Research Task Force also provided a contribution of US\$50,000 to funding through the HealthNet project. Other funding totalling over US\$1.5 million was provided directly to Satellife from other donors, including NEC/Japan, and the Rockefeller, MacArthur, Lippincott, and Jurzykowski Foundations.

I'm not sure if this ever happened! Charlie?

The "general objectives" for the HealthNet project as outlined in the project summary include:

- 1) To contribute to the capacity of researchers and professionals in health and health-related fields (focusing on Africa) to effect change through the provision

of access to information and communications capabilities;

2) To strengthen the capacity of health-related developing country institutions to provide more effective support for the research process; and,

3) To test, demonstrate and evaluate the use of packet radio and satellite communication technologies in support of health information flows and networking in order to determine the sustainability and appropriateness of this technology.

The following "specific objectives" were established for the HealthNet project in support of its pursuit of the general objectives:

1) To facilitate the establishment of national-level coordinating committees which will be responsible for formulating policies, obtaining licenses, operating the service locally, promoting its use, and participating in the evaluation of the project;

2) To provide and install the necessary ground stations (transceivers, antennae, terminal node controllers, software, microcomputers, CD-ROMS, and power supplies) to those sites where authorization has been obtained to enable this pilot project to proceed;

3) To provide training and to develop ongoing technical support capability in the use of the equipment and software at these sites;

4) To establish and operate electronic mail linkages and information services among participating sites;

5) To develop the necessary capabilities amongst health researchers in Africa and elsewhere to manage the technical information flow and communications aspects of this project and to develop the potentials of this technology in support of the research process;

6) To develop ^a local electronic networks at each site to broaden access, dissemination and impact through greater utilization of existing national and regional information resources;

7) To provide the infrastructure for network coordination, journal article and

newsletter dissemination, offline access to databases, and project monitoring for various health-related networks (ENHR Network, other health-related networks, especially in Africa);

8) To explore software development with respect to messaging enhancements, gateways, accounting, user interfaces, and linkages;

9) To carry out research on the use of this technology and various information access modalities for empowering the health-research sector; and,

10) To develop an intensive and multidimensional evaluation process, monitor and evaluate the experiences, document the results and disseminate these findings.

B. Summary of Strategies and Technologies Applied by the Project

through the previous project
no! switch from UoSAT to 3.
Communications and Information Management Hardware expenditures represent 22% of the budget for the HealthNet project. In addition, CAD\$122,000 was allocated by IDRC ~~to assist SatelLife in its efforts to acquire the rights to the communications capacity of "HealthSat".~~ This microsatellite, launched on behalf of SatelLife in July 1991, became available for use in October 1991 after completion of a period of initial testing. The satellite carries a primary and secondary uplink receiver, a primary and secondary downlink transmitter, and a computer with 16 Mbytes of RAM storage. The satellite uses these "store and forward" technologies to store data which it sends and receives from ground stations using "packet radio". It travels at nearly 17,000 mph, circling earth every 100 minutes and signalling ground stations as it passes overhead.

HealthSAT can support a network of approximately 500 ground stations, passing over every place on earth at least twice each day. Ground stations on the equator have the least access, with a minimum of two optimum passes per day, while sites nearer to the poles may have six to eight passes per day. Ground stations near the equator can send or receive up to 100 pages of electronic mail per day. The access to the satellite for sending and receiving messages lasts up to 18 minutes, however that "window" is shared with all other groundstations in the satellite's 3,000 mile diameter "footprint". Data may be compressed for transmission to and from the satellite so that approximately one page may be sent or received per second.

to acquire capacity and to contribute to SatelLife's

(Specify status of UOSat-5 and 3 - Ask SatelLife). Anticipating expanding need, SatelLife has authorized the manufacture and launch of a second satellite in 1993-94 (happened?).

The ground stations, which cost approximately US\$7500, consist of personal computers (PCs), which are linked by a special modem, called a terminal node controller (TNC), to modified amateur radios. Although local user sites are linked using conventional telephone modems, this use of radio to transmit messages to and from the satellite greatly reduces the high transmission costs through bypassing long-distance telephone communications.

After exchanging "handshake" signals, the ground station computer and satellite computer automatically exchange mail. Messages outbound from the ground station are received and stored in the satellite computer, to be sent as "inbound" mail when the satellite passes over the destination ground station. Users of electronic mail in countries with ground stations may simply enter the message and the appropriate address in the computer, which, using special software will automatically send the message through a modem and telephone lines to the ground station computer for forwarding to the satellite during its next pass. The "gateway" which handles messages to and from the satellite for North America is located at Memorial University in Newfoundland. A similar station for the United Kingdom and Europe is located at Surrey Satellite Technology Ltd. in Surrey, U.K.

The central "host" or "node" machine at the ground station is connected to multiple "points" where end-users can send and receive messages. This "local network" uses telephone lines and modems so the computer at each point can be used to dial the node to collect incoming messages (whether local or from the satellite) and to send outgoing messages to be forwarded to their respective destinations.

With the "terrestrial" or local network and satellite ground station in place, HealthNet can use electronic mail to link health professionals in the developing world with each other and with their colleagues in the industrialized world. Users can also access health data bases, perform off-line bibliographic searches, request reference materials, or obtain expert medical or public health consultation using HealthNet.

Communications and Information Management Software selected for use by the Healthnet project has been (uniformly, mostly?) non-proprietary or "public domain" software which incurs no licensing costs. (Get info/history of all this from SatelLife). FrontDoor was public domain up to version 1.99. More recent (date?) versions are proprietary. So switched (in which countries?), was it smart?

CD-ROM stuff OK.

Fidonet addressing system not used. Fidonet rules (i.e., must not pay sysops, must keep file of addresslist, must forward mail) used by SatelLife to argue why HealthNet should have its own addressing system. (Actually "Dieter wants control", per sysops..., Clarify with CC).

responsible for
Implementation Strategies specified in the project's funding documents outline approaches to management of the project by IDRC, by the implementing agencies, and at the level of participating countries. The project was designed to be "Centre-administered", permitting substantial involvement of IDRC ~~in coordination of project activities~~. SatelLife was to provide technical and legal consultation in securing licenses for groundstations and to be "responsible for coordinating the development of software for gateways, ground stations (nodes), and individual/site users (points) of HealthNet". The project summary indicated that SatelLife would also contract for "modifications of existing public domain software" and/or obtain permission to use such software (or shareware) for the Healthnet system. SatelLife was also expected to coordinate development of specific software for the "accounting, verification, prioritization, and addressing functions for Healthnet mail".

Although the major operational role was to be played by SatelLife, a secondary role was contractually arranged with Memorial University, which was to "act as the communication intermediary between users of the system globally and information resources and participants in North America". In addition, it was to "play a key role in organizing information resources in Canada and in system design considerations". The Pan-African Development Information System (PADIS, 89-0193) of the Economic Commission for Africa (ECA) was expected to coordinate information acquisition activities in Africa, while the University of Zimbabwe Medical School Library was approached to "lead South-South information management activities". It was also foreseen that other related networking projects supported by IDRC, including the East and Southern African Network (ESANET, 90-0141) and the Environment Liason Centre International (ELCI, 90-0141) would collaborate in support of HealthNet, particularly in training and "troubleshooting". IDRC also anticipated that other donors would step in to sustain the networks and to expand HealthNet to other countries.

SatelLife has required that HealthNet partners form a Users Council, which is to include representatives from the university, the medical school, the medical library, non-governmental health agencies, grassroots organizations, and the ministry of health. The Council was intended to determine the site of the ground station, staffing, and policy issues (such as access to the ground station). A member of the

Council is to be selected to serve as the liason with the SatelLife office. The "host" institution for the node is selected to be able to contribute the time of a staff member as the ground station operator to manage and operate the station. The host institution is also expected to provide technical support for both hardware and software for each HealthNet point. Although SatelLife provided training to each groundstation "systems operator" (SysOps), the ground station operator was expected to be technically sophisticated or, at least, "computer literate". SatelLife's promotional material for the Healthnet project specified an expected time commitment for the SysOps of "up to three hours per day" preparing, uploading/downloading and distributing messages.

through project funding
Recurrent costs ~~(and some capital costs, such as for the printer)~~^{are} to be paid by host, while SatelLife provides basic equipment and installation for the ground station and training for the systems operator (any user training paid?). In most HealthNet countries, ^{other} equipment for the points (including computers, modems and printers) was expected to be provided by the user agencies, ^{however,} although in most sites, a few modems were provided through project funding.

* CD-ROM... Get titles, sources, etc. from SatelLife

*in PS?
may move
to findings
(HAK:ge)* { Another strategy to enhance information services available through electronic networking was the "twinning" of each developing country medical library with a library in the industrialized world through the Library Partnership Program. }

At the outset of the HealthNet project, a strong evaluation component was planned. In addition to strengthening project activities, the evaluation component was intended to ensure that HealthNet's approach would be documented as a "demonstration of the cost-effective use and application" of these technologies for development. This "operational research" component was also planned as part of a strategy to ensure the sustainability of these technologies, including by attracting other donors to assist in funding the capital costs of additional satellites and ground stations.

II. EVALUATION METHODS

The evaluation framework specified that the evaluation activities in each country would be conducted in consultation and collaboration with the Users' Council representatives. Development of the evaluation framework was also intended, as outlined in the project summary, to be undertaken in consultation with these Users' Councils. However, due to the status of these Users' Councils in most HealthNet countries, such participation of the Users' Councils proved impossible. The specific

details of the status of the Users' Councils in each country visited during the evaluation are provided in the country profiles (appendix _).

A. Composition of the Evaluation Team

The evaluation was coordinated by the Evaluation Unit of the Department of Community Health at Addis Ababa University. In every country visited during the evaluation, Network Coordinators, Medical Librarians, and ^{users' council members or key users} key users were incorporated into the evaluation team to the greatest extent possible within their schedule constraints.

B. Data Collection

In preliminary meetings in each country visited during the evaluation, team members from the Evaluation Unit ^{worked with Healthnet personnel to} consulted the ~~Network Coordinators, Medical Librarians, and key users~~ to identify a country-specific workplan for evaluation investigations. Critical operational assistance was provided, particularly by the Network Coordinators ^{and medical librarians} in arranging meetings and transportation.

In advance of the visit of the evaluation team in each country, a preliminary questionnaire was sent by E-mail to ^{the principal user of every} active points (i.e., Healthnet points with any activity within the past month) to determine the 1) name, ^{and} 2) ^{postal} address ^{of the} principal user of each point, 3) a daytime telephone number (to facilitate arranging necessary meetings with selected users), 4) the number of staff in the department or organization served by the point who represent "potential users" (i.e., who "might have a need to communicate with colleagues outside the organization"), 5) the number of these "potential users" who are male, and the number who are female, 6) the number of these "potential users" who are ^{users} current (i.e., "send or receive at least one message per month, including those users who ask another operator to send or receive messages on their behalf"), and 7) the number of the "current users" who are male, and the number who are female.

The number of current users for each site responding to the E-mail questionnaire was tallied based on the response to the sixth question. One questionnaire was sent for each of these current users, ^{along with} and a like-numbered "non-users'" questionnaire which was to be given to the "closest coworker who is currently a non-user of Healthnet". The users' and non-users' questionnaires which were sent to each responding HealthNet point are attached as appendix _.

Qualitative investigations were conducted, including key informant interviews (of Network Coordinators, information providers, and selected users) and focus groups with groups of users and of non-users. Discussion guides for those interviews and focus group discussions are attached as appendix __.

Preliminary drafts of evaluation findings, including country profiles, conclusions and recommendations were reviewed with network coordinators in each country prior to departure. (Group discussions in AA in April?)

III. EVALUATION FINDINGS

The concept of "HealthNet" has evolved in the course of the project to date. Although initially in many countries HealthNet meant the use of the satellite for communications and information services, more recently it has come to refer to a network of health users who access these services through either satellite or terrestrial telephone channels.

A. Project Process: Inputs, Activities and Outputs

Financial inputs for the HealthNet project were modest. Although the project summary (PS) for the HealthNet project suggested that "a cursory glance at the budget for this project might cause alarm from the standpoint of cost per site", noting that "a large portion of the project's costs are due to its research and pilot/demonstration nature" and that many users at many sites will gain access to the benefits of the project through the same ground station.

In fact, some expressed "alarm" during review of the project proposal, that financial inputs were likely inadequate to support the ambitious plans for the project. In particular, reviewers expressed some concern that the budget was inadequate to support the development of the "human dimension", including the Users' Councils and training activities.

* "Research expenses" were budgeted at CAD\$700 per site (for what?, Ask CC and/or DB)

* stuff, personnel at the field level inadequate? (Ask David if he planned all the individual country proposals in addition to SatelLife, etc.) In Uganda, the ground station became operational only __ months after it was installed (December 1991) due

to the "lack of funds to employ a qualified systems operator". Did work to make folks desperate!

- * Money (\$100,000) to Memorial U: What did it buy? Brazil (10,000)? PADIS (10,000)? Training materials money (10,000 by SatelLife, including 4300 for "publication")?

Human inputs at the field level have been predominately volunteer services. The technical knowledge and skill of these volunteers has, in many cases, been impressive. Management and leadership skills (not as spectacular?). Productivity and commitment limited by the fact that few (none?) are paid for their work on HealthNet. For many of the SysOps (as well as other support personnel), work on HealthNet is clearly not a part of the "job description" for which they are paid. Controversy regarding pay for SysOps...

As was anticipated at the time of project design, the lack of local technical expertise a problem in some countries.

Network Coordinators (HealthNet Systems Operators) were widely acknowledged to be instrumental in the development and maintenance of the electronic networks. Several users expressed anxiety about the possible devastating impact of a precipitous departure of the network coordinator (~~often using a similar expression, "if he were to be run over by a truck."~~). In several instances, however, it appears that the technical expertise of these network coordinators was not exploited optimally, as they were not routinely consulted on issues such as HealthNet software development. Software sent to the field was even "write-protected" to prevent modification, a move that some network coordinators observed to be somewhat "patronizing". Circulation of appropriate solutions to technical problems among field-based network coordinators was occasionally met with angry responses by SatelLife personnel.

Staffing is generally not adequate in any of the participating countries to permit prompt follow-up of points which have fallen out of operation. Although technical problems are frequently the barrier to continued use of the Healthnet system, the network coordinators do not have adequate time, transport, or personnel resources to visit sites which are not operational, particularly if they are remote from the capital city.

Point operators are generally self-selected, based on their commitment and level of use of the system.

The national coordinating committees or "Users' Councils", which were expected to take a substantial role in organizing and coordinating Healthnet activities in each country have, generally, not materialized. Although early concerns expressed about the lack of operating budget for these committees may have been well-founded, it is likely that several other factors ^{may} ~~should also~~ be implicated as the principal reasons that these Users' Councils did not take a vital role in the implementation of Healthnet.

More honchos than workhorses. Didn't...

Those involved in HealthNet, including personnel from the SatelLife headquarters, systems operators, and users, all suggested that a "national HealthNet coordinator" or other key person should be identified to promote development of the network.

Staff at SatelLife in Boston includes:... Staff at SatelLife are perceived by the network coordinators to be "dedicated", "highly experienced and skilled".

The most important human input for sustaining and expanding local networks has been the committed group of users which has developed in most countries. Users frequently motivate colleagues with whom they would like to be in electronic communication to contact the network coordinator to be "hooked up".

Training inputs to the project have been largely *ad hoc*. Network Coordinators were generally selected for the existing technical expertise and given limited training in the operation of the ground station at the time of installation. Point operators receive formal training in very few sites. In Zambia, for example, the addition of twelve points in a special project in remote health service delivery facilities in that country's Southern Province made a formal group training session practical. However, most points are added to existing networks on an individual basis, so that training has generally been given to individuals or small groups of users at each point at the time of installation.

In several cases, the most highly skilled and motivated users have been able to provide technical support for other users, maintaining the viability of the network, especially at more remote sites.

"At least one" individual was to be identified as a "trainer trainee" (whazzat?) within Africa "to receive intensive training and to participate in regional training circuits". The amateur radio community provided valuable technical support during the installation of ground stations in Canada and Zambia.

Planning and development of training materials was to be a collaborative undertaking by SatelLife and Memorial University (ever happen?), although the preparation of materials related to ground station installation and operations was to be the responsibility of satelLife. At the time of project design, a "Healthnet Station Operators Manual" and a "Field Guide for Trouble-Shooting" were both said to be "in production" (what happened?).

Two training/evaluation meetings with budget of 1000 airfare and 1000 per diem for 15 (total 30,000)

Information and communications technologies comprise a substantial portion of the input provided to HealthNet sites. The "hardware" provided was frequently both low cost and low quality. (statistics...) CD-ROM players, on the other hand, have provided little trouble (entirely reliable?) with regard to need for maintenance, repairs or replacement. Phone lines.. Stuff in Zambia frequently substandard, not robust in field conditions. Of 10 inexpensive computers acquired by SatelLife and sent to Zambia in an initial shipment, only one is currently still functioning. Of 15 reconditioned computers which were subsequently sent to Zambia, "five or six" are still operational. On the other hand, the 15 printers sent to Zambia have had few problems. (Zimbabwe OK)...

The new steerable antennas, although more difficult to install (installation not working in Uganda), has resulted in Zambia in a "1000%" increase in throughput of data during the brief window for communication with the satellite.

Software problems have revolved principally around the interface between FidoNet and the HealthNet ground station. New software for this purpose was installed at most sites (?) by SatelLife personnel (?11/92-2/93), but has not worked smoothly since its installation (check with the boys...) The addressing structure adopted for Healthnet is not easily compatible with FidoNet. Healthnet nodes have been "forced" to use Binkley instead of the better documented FrontDoor software because of concerns regarding fees for use of FrontDoor. Network managers complain that Binkley brings "headaches", with an unreliable "handshake" procedure on poor lines (leading to frequent failed connections) and difficulty in monitoring its function (and, therefore, difficulty in identifying the source of problems). Marimba ... (how does it fit into all of this?). SQUISH/BINKLEY/GOLDED (find out from SatelLife). NetManager (public domain, for re-addressing)

Software... The "user-friendliness" of the software... Fido, Marimba. Addressing specific to Healthnet, instead of Fidonet addresses have reportedly "retarded"

development of the network in some countries. Healthnet is perceived to be "fearful of being swallowed by other, larger, networks", so has used the separate addressing to isolate health users.

Technical support (happened but not planned?)

These information and communications technologies have also contributed to the development of information systems, services and products prepared by HealthNet. SatelLife personnel have developed three service programs within the context of the HealthNet project, including 1) the Dialogue for Health Program (explain), 2) the Interactive Communications Program, and 3) the Library partnership Program. Additional services provided through HealthNet include the four newsletters which are currently being published: HealthNet News, the AIDS Bulletin, the WHO Library Digest, and the African Medical Librarians' Bulletin. Other newsletters under development or consideration for publication by HealthNet include periodicals on subjects of pharmaceuticals, maternal and child health, and tropical diseases.

Users report, however, that the AIDS Bulletin has ceased being distributed and that the WHO Library Digest distribution has also apparently been suspended.

Network development has depended largely upon the existing access to the necessary hardware. Only sites with phone lines may obtain access to electronic networking. Computers were generally not provided through the project, although a few special projects were developed to provide hardware in sites where the lack of a computer was an obstacle to participation in development of the network. Those with computers who required only a modem to have an operational point were, in many sites given or "loaned" a modem which had been purchased through HealthNet or other information and communications development projects (including ESANET).

158,000 for capital equipment for 15 ground stations (9040 per ground station). How many did we get and at what cost per? Also CD-ROM discs (5@200 for 15 sites, total 15,000). 1500 per site budgeted for "operational management" to cover extra phone lines, terminals, etc as needed, total 22,500).

A "depot" for replacement equipment, including radio, computer, antennas and TNC, was to be "maintained in Africa and North America". (done?) 12,400 budgeted for "spares" (2 micros, 2 radios, software, shipping, plus 10,000 for 75 modems).

External linkages and networks have had an important effect in defining the patterns of dissemination and use of the information and communication technologies.

MU's role? Networking (technological, institutional, individual) at the global, regional, national and local levels.

NGONet, ESANet, PADIS, CABECA, ELCI, ...

Health Foundation, Library Partnership Program

Promotion and marketing of HealthNet services... No one responsible.
Clientele/beneficiaries limited...

Policy and environmental factors One of the principal "risks" identified in the project summary was that of inhospitable regulatory environments. At the time of project funding, five ground station licenses had already been procured. SatelLife personnel were reportedly very eloquent in the arguments against both the principal concerns of security (e.g., traffic can easily be monitored in HealthNet's open communications system) and loss of revenue (e.g., HealthNet provides services which would not otherwise be affordable in support of humanitarian work, rather than replacing other revenue-generating services). SatelLife personnel and HealthNet users argued in several countries that the benefits to development would far outweigh any potential security concerns or losses in telecommunications revenue.

(licensing, fees, controls). Political commitment. National support capacity (not now a limitation, but limits sustainability). Cultural factors (information-seeking, sharing, fear of technologies, worry about fragility of equipment). Economic climate (funding opportunities).

B. Project Effectiveness

HealthNet has been effective in making substantial progress in achieving the three "general objectives" established at the project's outset (detailed above on page _). Both individual and institutional capacity for health research have been strengthened though improved access to information and communications. Details regarding progress toward achievement of these first two general objectives are provide in section B.1 below. The third general objective, regarding the demonstration and evaluation of packet radio and satellite communications technologies, is also clearly being achieved, with the evaluation process itself being reported herein. The achievements by objective for the ten "specific objectives" established for the project are summarized in the table in appendix _.

In the __ months since the commencement of the project on __, HealthNet can claim

the following key achievements:

__ ground stations have been established in __ countries, including Zambia, Uganda, Tanzania, Kenya, Zimbabwe, Mozambique, Ghana, the Congo,

__ Systems Operations and __ users have been trained to manage or use HealthNet communications technologies and information services.

A network of health sector users of E-mail and information services has been established, with an estimated __ regular users currently active.

__ international messages have been exchanged using the satellite since the project's inception, while __ messages are exchanged daily by HealthNet users of local E-mail networks.

Four newsletters produced by HealthNet are currently distributed electronically to __ readers in Africa.

1. Access to Information and Communications Technologies

HealthNet has, without question, provided increased access to communications technologies for African health workers. The __ HealthNet points which are currently active provide __ staff members (potential users) of those organizations with what is usually their only access to electronic mail communications. In the __ countries where users (and their colleagues who are nonusers) were surveyed, __% of respondents indicated that they used only mail, telephone, or in-person communications. Few had access to facsimile (fax) facilities. Only __% reported that HealthNet communications had ever replaced fax communications.

Among users of the system, only __% indicated that limitations in accessing the system represented a constraint on use of HealthNet. Reasons for non-use among the colleagues of users rarely included lack of access to the hardware (__%).

Some users described being discouraged in using the system by the observed delays at the national node, where international messages have been noted to wait for up to a week before being uploaded to the satellite.

Individual to individual recruiting. People recruited by colleagues because of an existing need to communicate. Therefore empowers the empowered...

The evaluation also assessed the equity in distribution of access to Healthnet services. Although no systematic assessment of social or economic status was made among users and non-users, it appears that in most countries, access to the system through distribution of equipment and training was offered primarily to those of higher status in target institutions. Users in health service delivery facilities, for example, were more often doctors than nurses, or administrators rather than laboratory assistants. A useful indicator of the equity of distribution of access is obtained by comparing the gender composition of users to that of the staff of the participating institutions. While ___ of the staff of participating institutions were female, only ___% of the users were female. Those users who were female were frequently clerical staff, rather than the professional staff who are the actual end-users of the information obtained using the system.

Many users have frankly pointed out the fact that access to e-mail in their institutions has been effectively limited to senior staff and administrators, rather than junior and technical staff who might better profit from access to Healthnet communications and information services.

Also racial issue...

The most common constraint to access to the system was that actively imposed in several countries by limiting the number of operators. Systems operators and coordinating committees often justified this limitation in the number of operators, saying it had been imposed in order to prolong the life of the system hardware. (Check to see if any data regarding the life of equipment being dependent on the number of operators).

Lack of reliability in access to the system was most often due to breakdowns in telephone communications or system hardware. Among users surveyed, ___% that telephone line failure was a limit to their use of the system, while ___% reported that breakdowns in the computer or modem had been a constraint to increased use. Systems operators reported that... 1) ground stations, 2) lines, 3) point hardware.

Zimbabwe, for example, reported that technical failures (including a loss of the gateway to the Internet for a period three weeks and a loss of the telephone line to the local network's host machine for over two weeks) had "a serious effect on user morale". The failure of the telephone line to the host was felt to highlight the "dangerous lack of redundancy" in the operation of a single host system in Zimbabwe.

Few sites had reserves of equipment to replace or exchange for defective computers

or modems. Remote sites difficult to reach for technicians...no plan for servicing hardware. Routine maintenance?

Get system-busy minutes per day as an indicator of access and/or capacity of the system to support additional users (see Jensen). Perceived busyness relates to call patterns (i.e., beginning and end of day busyness).

"Mismanaged upgrading of system software" was also cited as a cause of setbacks in development of HealthNet. System documentation for the non-proprietary software (which replaced a package which required payment of license fees) was noted to be "inadequate to support unassisted installation and operation by non-technical users". Although the problem was solved for the urban users by providing a one-day training workshop, those operators from more remote sites were unable to attend. Several remote users actually corrupted their previous installations in the process of attempting to upgrade their software, and subsequently ceased their participation in the network.

Systems Operators were almost uniformly dissatisfied with Binkley Term software in use for __. Inadequate transparency of the software processes interferes with troubleshooting, and Binkley's intolerance of poor line quality leads to frequent failure to successfully complete the "handshake" and connection procedures.

Dissemination of information. Guy in Kafue Gorge thinks staff aren't interested. The quality and appropriateness of the information services available on HealthNet was frequently questioned. The AIDS Daily Bulletin, for example, averages __ KB per day. Subscribers to this conference must "wade through immense amounts of text" only to find that little of it is useful or appropriate to the African context. Items were often found to be "purely American" in relevance, often reporting on recent developments in American gay communities. Many users suggested that such information resources might be better screened at source to save the time of African users. It was suggested that information services might best be designed to give priority to "the top ten causes of morbidity and mortality" in the Healthnet countries.

WHO Bulletin and AIDS Daily Bulletin have "stopped".

User-"friendliness" of software (? constraint to access)

Technical training of systems operators ...

Lack of promotion of broader access through training, technical support, marketing (information materials, documentation, outreach)

Access to limited network. Eskinder working on InterNet gateway for Healthnet (check on status of this).

Access to information has also provided access to opportunities for users which might otherwise have been missed. In Zambia, for example, a message received by electronic mail brought an opportunity for members of the Department of Pediatrics of the University of Zambia to attend an international meeting on health services research.

2. Use of Information and Communications Technologies

Not as fully used as expected by the ENHR crowd. Why? Why is there not an ENHR conference?

Some important uses of HealthNet information and communications technologies include:

Rapid access to medical literature (Department of pediatrics in Zambia got quick access to information on the diagnosis and management of rabies and spina bifida to address clinical emergencies.

Surveillance data

maintaining collaborative relationships after departure of consultants (e.g., Rational use of Drugs Project in Zimbabwe, or Connie Osborne's collaboration in a malaria study with a PI in the US).

Logistics management - facilitation of direct admissions for Zambia. Patients go directly to referral wards, often saving two or three days of admission formalities and preliminary clinical assessment. Follow-up and discharge planning (including arrangements for transport of the patient and post-discharge instructions for care) are also handled by electronic mail. (Hasn't worked reliably yet...). Ordering spare parts and laboratory reagents for the Department of Pediatrics in Zambia ("saves weeks").

Clinical Consultations- details of surgeons and burns from Uganda and Mozambique.

Contacting donors. The Department of Pediatrics at the University of Zambia has contacted the German development assistance agency (GTZ) to

successfully obtain funding for a clinical research project.

Supervision of students during field training (CDC/MPH Zimbabwe)

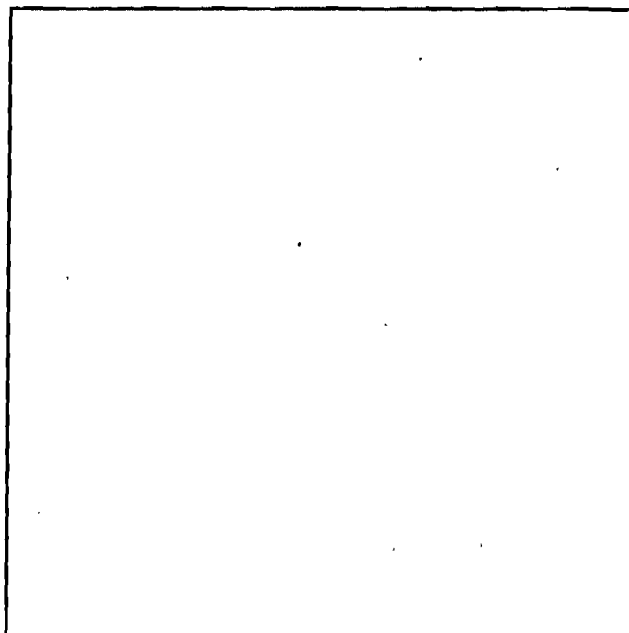
Activity at local network points is conveniently monitored using the MessageTrack software (available to all Network Coordinators?). In the following graph, the growth in use of HealthNet is shown by the progressive increase (despite the anticipated seasonal variation) in number of active points (i.e., those with any activity) by month:

C:\hg\zimpoint.cht

Use as indicator of effectiveness. Calculate use per user, but also use per capita in target institutions. Qualitative indicators of the importance of HealthNet communication and information services. Satisfaction measures.

Wide variation in regularity of use (some users logging in every day, some only weekly or less).

Increasing use actually limits access as the system node reaches its capacity for handling incoming calls, especially at peak hours of the day.



Most users admit they are only vaguely aware of many of the potential applications of the information and communications technologies. Many recognized the need to request additional training to learn such uses as international e-mailing, attaching documents, requesting literature searches.

Information materials prepared and distributed. Documentation. Marketing. Market penetration. Awareness among non-users. Promotion of increased use by providing monthly reports of use patterns to users at each point. Equipment's capacity to support growth of the number of users. Limitations of training and technical support resources to support expansion of the number of users.

Use of the satellite for is limited. First, the proportion of message traffic which is international is quite small in most HealthNet countries (specify range). Second, concerns about privacy and speed of delivery have spurred many to use Internet addressing, since international messages sent through HealthNet must be downloaded manually at SatelLife in Boston, given an Internet address, and re-sent to their destination. For Uganda, for example, it is cheaper to receive (send?) by satellite. Mozambique and Cameroon...

No method or system for exchanging points lists. Would be better to be part of Fido (per Bennett/Robinson).

Socio-cultural factors limiting use. Lack of an "information-seeking" culture. Regina notes, "Africans don't read by nature." "People in Africa don't have a tradition of talking to each other" (Mark). "Not one of the strong points of African culture to share" (Charles). "Sharing is not something, you may remember, that Kenyan intellectuals are likely to win any prizes for". (Firoze). "When users, especially the researchers, receive information here they treat it as their own; they've got an attitude of not sharing, of keeping it to themselves" (Silas Maganga)

"Information from outside Africa is more highly valued than that from within" as a barrier to S-S exchange. "If a secretary can use it then why should I..."

C. Relative Cost-Effectiveness of Communications Technologies

The 110-pound UoSAT-5 cost approximately \$1 million to manufacture and \$200,000 to launch. The use of frequencies just outside the amateur satellite service frequency, permitting use of cheaper amateur equipment to be modified for use by HealthNet. As a result, the total cost of the groundstation, including software, is estimated at \$7,500.

Reduced expenses for postage and travel.

Direct costs, indirect costs, recurring and capital costs, pricing, worth, savings

Selection of measures of effectiveness. The information and communications technologies likely provide benefits which may be political, economic, social, and cultural. Most of these benefits are of a qualitative nature, and naturally difficult to quantify.

Yet... Can look at the relative performance of HealthNet communications technologies

when compared to other communications channels, such as fax or telephone. Also compare to other means of electronic networking, such as used in RIO (X.25) and others such as NGOnet, ESANET (public switched telephone networks).

Reported impact on productivity, efficiency. Reported cost savings, reduced need to travel.

Information received through the HealthNet project is likely to increase the quality of health research and health services at a lower cost than obtaining the same information using the previously available communications technologies. The evaluation will obtain cost and effectiveness data and provide comparative data for other similar networks in the region. Key questions to be addressed include:

"With HealthNet serving the hospitals in the Southern Province, the Provincial Medical Officer is now making decisions much more quickly. People now say 'no way!' when you mention withdrawing the service. When the system is down so that documents have to be delivered by hand, an additional expense of 80,000 Kwacha (over US\$120) is incurred for each trip which must be made by vehicle to Livingstone". -- Regina Shakakata, Medical Librarian, University of Zambia

Get cost of international traffic (total number of seconds spent online internationally divided by the number of KB transferred, multiplied by the rate per second for international calls).

Satellite vs terrestrial CEA in Uganda

fax vs E-mail

D. Development Impact

The project summary reflects the mission of IDRC ("Empowerment through Knowledge") in pursuing the goals of individual and institutional "capacity-building" and "empowerment". These goals were to be achieved through increasing access to and use of information and communications technologies. Although difficult to quantitate, capacity-building and empowerment have clearly been achieved through HealthNet interventions. Documented and reported changes in some "indicators", however imperfect, of capacity-building and empowerment suggest that some progress can be attributed to HealthNet project activities.

1. Capacity-Building

Individual vs institutional capacity-building. Individual and organizational capacity to define needs, adopt objectives and strategies, and improve performance.

Credibility, competence, leadership, power. Capacity to learn (new contacts, new activities, changes in organizational structure), performance (quality of care/services, quality of research, percent increase in research funding, percent increase in revenue, application of research findings).

Time saved by the information, by the service (questionnaires), Improved decision-making, research, planning, analysis, cooperation, quality, timeliness.

A recognition of the impact of HealthNet on capacity-building is reflected in the recent recommendation that HealthNet be expanded to include all hospitals in Zambia. The recent National Health Reforms document, although initially neglecting issues of information and communications, has been revised to recommend a national electronic mail network be developed as part of the program to optimize utilization of health care facilities -- Connie Osborne, Director, Department of Pediatrics, University of Zambia

2. Empowerment

The impact of the project in empowering researchers, managers, and clinicians is difficult to quantify. Stats from Q-aires...

Show change in ratio of sent to received over time.

Equity indicators

Through increased access to and use of information and communications technologies, the project proposes to achieve both individual and institutional capacity-building. "Empowerment", which is clearly related to capacity-building, is stated as the goal of the project, although it is not further operationally defined. The evaluation

We are quite happy, very pleased, with the effect of HealthNet on our ability to support medical research and clinical care. You can imagine seeing the change, from a situation where nothing is happening, almost everything is dead, to a time where we can get a reply to our queries the following day. It's amazing!" -- Regina Shakakata, Medical Librarian, University of Zambia

will assess the development impact of the Healthnet project in building individual capacity and institutional capacity for health research and other health activities. It will also propose indicators of empowerment which will be used to measure the current levels of project achievement. Both "capacity-building" and "empowerment" are, however, processes which take place over time, so that a repeat assessment of the status of these indicators at the end of the project will be instrumental in assessing the project's development impact. Key questions to be addressed include:

E. Sustainability Assessment

Expansion of local networks is achieved largely through the recruitment of motivated individuals within institutions with health activities. In a few cases, those committed individuals have been successful in motivating the managers in that institution to commit the organization as a whole to electronic networking. In most cases, however, the use of HealthNet is still viewed as the province of "hackers" rather than an essential requirement for successful functioning within an organization. As evidence of the marginalization of electronic networking, many users usually log on to check messages from laptop computers at home, arguing that participation in Healthnet is not viewed as relevant or essential in their jobs.

Due to the limited personnel resources available for network coordination, most countries lack a comprehensive strategy for local network development. The CMAZ (spell out...) in Lusaka, for example, is an agency which would be a natural target to assure a more institutionalized approach to HealthNet development. The organization supports 86 health service delivery institutions, providing services such as facilitating relations with the Government of Zambia and with donor agencies, technical

HealthNet is sustainable only by the committed. A system like this needs a critical mass of enthusiasts to make it work. The sustainability will ultimately depend on the MOH decision to rely upon electronic mail for referral and epidemiologic information. -- John Jellis, Chairman of the HealthNet Planning Committee, Lusaka, Zambia

assistance, logistical support, training and recruitment of staff. Only five of the 86 members have HealthNet points, although over 10 have existing telephone lines. Many have computers. Radio communications are available to relay messages from those facilities with phone lines to those without. Current expenditures for fax and photocopying of messages for distribution are "considerable". Recent concerns about these growing costs have raised increased interest in electronic mail, however, because of the broad (if not limitless) responsibilities of the Zambia network managers, there

is little assistance available to CMAZ to facilitate increased use of Healthnet by CMAZ's.

Institutionalizing electronic networking will depend, in part, on a local commitment to invest in technical support. In several countries, users have clearly recognized the need to commit resources for technical support, although these resources are uniformly inadequate to date. Promising signs are seen in Zambia, where managers of remote hospitals indicate a willingness to commit a portion of the budgets to cover salary expenses for technical support. In Zimbabwe, the MOH has established a position for technical support to electronic networking, although the salary for that position is currently paid by the Danish aid agency (DANIDA).

Indigenization of the networks has been a problem in some countries, notably Zambia and Zimbabwe. Expats running and using.

Intended to be an "interim" solution to communications infrastructure problems. Anticipated at the time of project design, though not directed, that individual countries would experiment with cost recovery.

Technical support and issue of paying systems operators (not in Zambia, ...) undermines sustainability.

Costs of local, national and international links

User group involvement, willingness to pay, cost recovery

Support from MOH policymakers

Indigenization, institutionalization.

Local inputs, local capacity

System capacity to support additional users, telephone capacity,

The project description also emphasizes the importance of the sustainability of these systems for the exchange of information. The evaluation will include a sustainability assessment, which will examine several key questions regarding sustainability:

- ✧ Has there been involvement of national PTT (or other regulatory agency concerned with communications) in local management as a strategy to enhance

sustainability?

- ⊗ Has there been provision of feedback to national or regional policymakers assuring that the health impacts of HealthNet justify the removal of regulatory barriers to free flow of information?
- ⊗ Are there appropriate strategies to ensure the sustainability of systems for training and maintenance of equipment?

IV. LESSONS LEARNED

A. Network Development

- The HealthNet project has been instrumental in catalyzing the development of a communications network linking health professionals in _ African countries.
- ⊗ SatelLife's vision and commitment have provided the momentum for the successful implementation of the HealthNet project. ... while their technical expertise...
- ⊗ The lack of personnel dedicated to HealthNet in each country site has been a constraint to expansion of the network.

Users' Councils and National Coordinating Committees frequently collapsed due to problems including: 1) poor definition of the mandate of these bodies, 2) the inclusion of members whose main interests were policy issues with those whose primary concerns are technical, 3) the inclusion of many members whose positions of power may have made them more influential, but whose busy schedules made them chronically unavailable for meetings, and 4) the dependence on these unwieldy bodies (which are difficult to convene in emergencies) for routine management decision-making.

Although international message traffic may be one of the most powerful potential applications of Healthnet, international use has been largely limited to the expatriate community due to their previous connections with individuals and institutions outside their countries.

HealthNet has been instrumental in promoting increased use of electronic mail within the health sector.

Health (and other sector) users of local (national) networks which were developed using HealthNet inputs are now linking internationally through Internet, rather than using the satellite.

Limitations of access imposed by limitations of the number of operators represents a constraint to the growth and equity of access to communications and information.

B. Information and Communications Technologies

Reliable computer equipment is a prerequisite for sustaining use of communications networks. Use of inferior computers and peripherals clearly hampers expanding use of the E-mail network.

Reliable telephone links are also required to encourage increasing reliance on electronic mail. The most frequent constraint to fuller use of E-mail from remote sites was the breakdown of telephone contact. Party lines do not support computer communications.

Although it may be argued that promotion of the growth of the network of HealthNet users should await increased system reliability, increased reliability may itself depend on the development of demand among users for reliable telephone connections and appropriate technical support.

A chief limitation of E-mail when compared to fax is the lack of feedback regarding the fate of messages. Fax users find the "transmission OK" signal reassuring (even if the actual transmission is garbled or unreadable) while E-mail often fails to reach its destination without providing any feedback to the user.

One constraint to fuller use of HealthNet lies in the lack of a mechanism for systematic distribution or electronic filing of address lists. Few users knew the names and organizations which could be reached using the local network, and fewer still had any notion of potential individual or organizational message destinations outside the country.

Limitations of the use of the HealthNet satellite for international communications include: 1) the limitation in number of satellite "passes" per day, 2) the limited "window" for upload and download of information, which introduces constraints on the length of messages and documents which may be transmitted by satellite, 3) the competition for the satellite's time by

adjacent countries further limits the "window" of opportunity for communication, 4) the relay of messages sent by satellite through the gateway and through SatelLife headquarters (where they must be downloaded and relayed into an Internet system manually) introduces further delays in the receipt of international messages, and 5) the manual downloading and relay of messages at SatelLife headquarters introduces additional concerns regarding privacy and confidentiality of messages.

The selection of software for HealthNet has provided a constraint to tracking of messages (no log function?), development of computer conferencing (can be done with Fido),

The use of a unique system for HealthNet addressing (rather than Fido addresses) has clearly retarded the development of networks. Systems operators and core users have interpreted SatelLife's decision to use a separate system for addressing as an effort to prevent HealthNet from being "swallowed" by other, larger networks.

Many larger organizations, including ministries of health, donor agencies and multilaterals, are reticent to encourage use of electronic mail due to managers' fears of loss of "control" of communications with other agencies.

The current comparative advantage of HealthNet lies in communication to and from countries to which phone links are poor (e.g., Cameroon and perhaps Mozambique and Uganda).

C. Information Services

Users generally report that Healthnet information services have been frequently useful, exposing them to a "broader range" of new information.

- ✱ The initial phase of HealthNet network development has focussed largely upon development of reliable communications services. There is an opportunity now to enter a second phase with increased emphasis on development of appropriate targeted information services which capitalize on the project's achievements to date.

Broadcast of information services which contain large proportions of information which is not locally relevant has inhibited use of the Healthnet system. Users delay logging on to check for messages because they anticipate

having to "wade through" large volumes of material which is not targeted for their needs.

African Medical Librarian's Bulletin was frequently cited as the most useful of all the HealthNet information services, due in large part to its solicitation of input from African countries. Little other effort has been made to date to promote contributions of information from Southern users in order to facilitate South-South information exchange.

Ask SatelLife about survey of users regarding information needs/requests.

D. Technical Support

Although casual "conferencing" and exchange of "lessons learned" has occurred to some extent among the network coordinators, much effort is spent "re-inventing wheels" to solve operational problems in operation of local networks and ground stations.

Decisions regarding technical issues (such as selection of hardware and software) have frequently been made unilaterally by SatelLife, without adequate consultation of the network coordinators at the field level.

E. Training

Selection of target personnel for training in the operation of system points has introduced a second constraint to both growth and equity of access to HealthNet communications and information.

F. Sustainability

A chief constraint to sustainability lies in the strategy of recruiting highly motivated individuals, rather than institutions, as users. Although perhaps the most feasible strategy for initial development of local networks, the investment in such committed individuals, who are often expatriates, is lost when they move on to other jobs, most often in other countries. Without fuller integration of E-mail communications into the daily functioning of organizations, E-mail is likely to remain the province of "hackers" rather than a part of organizational culture.

G. Research

Little has been done to promote even the most basic operational research... (incl analysis of messageTrack logs, etc).

V. RECOMMENDATIONS

A. Network Development

Systematically link ENHR task force members and researchers in Zimbabwe, Mozambique, Kenya, Uganda, Tanzania, Ghana, Zambia, and Ethiopia, as well as ENHR countries outside Africa with access to HealthNet.

Develop mechanisms to systematically foster the development of international message traffic, such as through provision of address lists by area of professional expertise, linking health researchers to international interest groups, ...

Develop address lists (including InterNet addresses for specific departments and individuals in partner institutions by their area of professional interest) which can be searched to offer health professionals in participating countries the names and E-mail coordinates for potential colleagues and consultants.

Strengthen "marketing" of Healthnet services, including through preparation of promotional materials for distribution to potential users which may be adapted for use in participating countries.

Shift the focus for recruitment of users from individuals to institutions, encouraging entire networks or agencies (such as ministries or NGOs) active in the health sector to use electronic mail for both internal and external communications.

Collaborate with IDRC's Health Sciences Division to develop a mechanism to ensure appropriate use of Healthnet for networking among related health projects in participating countries, for example by encouraging exchange of bibliographies and literature searches or sharing of protocols for review, possible replication or collaboration.

Select a full-time Healthnet coordinator for each local (national) network. The

coordinator can undertake detection of problems at each point, promote fuller use of existing services by users, and "market" the system to non-users.

Conduct a study of the feasibility of cost recovery for expansion of HealthNet services through leased lines to the Internet in selected countries, including Zambia and Zimbabwe.

Encourage the development of separate nodes for HealthNet in Zambia, Zimbabwe, Uganda...

B. Information and Communications Technologies

Ensure that each ground station is equipped with a separate computer which may be used as a "point" to serve users who do not have access to their own computer and modem.

Explore revising HealthNet software to provide an option to request an automated certification of receipt for critical messages. (GOLDED does?) If frequent use of such messages would have too great an adverse effect on system carrying capacity, guidelines limiting the use of this option may be appropriate.

Watch the "iridium" project (70 low orbit satellites establishing a worldwide network for hand-held phones! Est. \$4/min, less later. Motorola?

C. Information Services

Develop mechanisms to solicit more contributions to HealthNet information services from African users, such as through conferencing and bulletin boards.

Intensify efforts to ensure that information services provided in response to individual requests (such as literature searches or consultations) are disseminated to others, both nationally and regionally, who may have an interest.

Target information services to address expressed user needs (such as based on surveys or special requests) and to cover health problems of greatest concern and public health importance in the region.

Make fuller use of existing information services which are provided for developing countries by seeking permission from organizations such as WHO, AHRTAG, and AUPHA (check, expand list) to disseminate these well-established newsletters and bulletins.

Strengthen conferencing capabilities, developing interest groups for systematic dissemination of information targeted to the specific interests of users groups. Such development of "sub-networks" of users would also facilitate development of research collaboration and professional exchange.

Develop a mechanism to screen information provided through the AIDS Daily Bulletin, limiting relayed news to that clearly relevant to developing countries. Highly specialized information, such as regarding molecular biological advances or legislative and regulatory issues, may be reserved for a limited subgroup of subscribers who request such information.

Include a brief synopsis at the introduction of larger broadcast messages and conferences to allow users to quickly identify and select messages they would like to read in greater detail.

D. Technical Support

Use the HealthNet network coordinators more fully as a resource in decision-making regarding technical issues. Establish an electronic conference among systems operators to solicit their input regarding technical problems and identification of possible solutions

Explore mechanisms to improve systems for maintenance, repair, or replacement (such as through equipment exchange depots) of defective computer equipment.

E. Training

Strengthen systems for hands-on training of users, including follow-up sessions at the site of work to assure that each trainee is made aware of specific applications of potential interest. Experienced users might be paired with new users with similar interests (either electronically or in face-to-face sessions) so new initiates will have a "target" for initial communications. CABECA...

Develop system documentation for use by systems operators (for both nodes

and points) and end-users. Documentation for end-users should include a highly simplified single page (or card) with reminders of key commands and facts needed for use of the e-mail system.

Assist users by developing sample administrative guidelines for management of E-mail messages by users or their secretaries and administrative assistants (for example, for frequency of checking for messages, guidelines for notifying senders of the absence of the recipient, threshold of size of messages which should be compressed and/or sent and received at off-peak hours).

F. Sustainability

Explore mechanisms to enhance sustainability, including through cost recovery, strengthening of systems for maintenance and repair of equipment, ...

G. Research

PROJECT ACHIEVEMENTS BY OBJECTIVE

SPECIFIC OBJECTIVE	ACHIEVEMENT TO DATE
Establishment of National Coordinating Committees	
Provision and Installation of Ground Stations	
Provision of Training and Development of Technical Support Capability	
Establishment and Operation of E-mail Linkages and Information Services	
Development of Capacity to Manage Information and Communications	
Development of Local Electronic Networks	
Provision of Infrastructure	
Exploration of Software Development	
Research on Access to and Use Information and Communications	

Development of an Evaluation Process	
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COUNTRY PROFILESZAMBIA

The ground station for Zambia is located in the University of Zambia's (UNZA) Computer Center. Licensing was easy, took only 5-6 months, no security of economic concerns by the PTC. The host is rarely down.

Decentralizing decision/purchasing. Technical support and communications to be provided centrally. The need for electronic networking among the 84 hospitals in the country has recently been recognized.

1) National Network Development:

HealthNet users have been given access to a local E-mail network through the University of Zambia's network (UNZANET). The Foundation for Research and Development covers the cost of a terrestrial link to the INTERNET in South Africa. As a result, Zambia makes minimal use of the satellite for international message traffic.

The extension of Healthnet into the Southern province has brought electronic mail communications to 12 remote health care facilities. Previously, communication by letter to two or more weeks (mail delivery is only once a week or less to these facilities). At present, these workers expect responses to messages as early as the same day, and generally within three days of sending a message. As part of the evaluation of this pilot project, these users in the Southern province are now keeping a log to document use patterns and dates of responses to messages.

HealthNet coordinators in Zambia have developed several mechanisms to "market" HealthNet. A circular entitled "Electronic Mail in Zambia" was developed and distributed to promote development of the multisectoral UNZANET. A 12-page, illustrated publication entitled "HealthNet in Zambia" was also produced to provide an introductory explanation of HealthNet services and coverage within Zambia. Ceremonial "openings" of key new points are held, with the local press invited to cover the event. Most promotion of HealthNet, however, occurs in the setting of workshops for users and personal contacts with potential users. It was emphasized that disincentives to promotion of HealthNet services include the additional burden for the system operators who must provide technical support to new users. Despite the lack of a systematic program to market HealthNet, however, use is steadily increasing.

Monthly feedback on the use to all users motivates increased use?

2) National Coordinating Committee:

HealthNet users in Zambia have organized a "Planning Committee", which coordinates the activities of the HealthNet expansion project in the Southern province. There is, however, no HealthNet "Users' Council" which governs policy and planning for HealthNet operations. Members of the Planning Committee were noted to be "too busy" to assist in promotion or marketing of Healthnet services. The Planning Committee, which consists of a member of the department of Surgery (Chairman), the two System Operators, the Medical Librarian, two representatives of the MOH, two representatives of an NGO consortium, and members from WHO and UNICEF.

3) Technical Support:

The two network coordinators in Zambia report they spend a combined period averaging 50 hours per week on Healthnet activities.

Users in Zambia complain of "anxieties" related to HealthNet, most of which are due to problems in the reliability of the system. Initial shipments of computer and modem equipment to Zambia included some poor quality units which suffered from frequent breakdowns. Lack of computer literacy and inadequate training resources are also cited as factors which translate to inflated needs for technical support.

Visits to points (include graph of activity by month, correlated with technical support visits). Down-time for the HealthNet system has been a problem, with the node at the computer centre down for about two weeks per year due to telephone line failure, the Monzi hospital point down for two weeks after the computer was struck by lightning, and the medical library point out for two weeks due to water damage. The Medical Library point had been down twice within the week of the evaluation visit due to accidental severage of telephone lines during efforts by the PTC to upgrade the system to digital. Lack of reliability is often even more problematic at more remote sites, with Kafue Gorge hospital reporting that telephone lines are down approximately 20 to 30 days per year due to rains.

4) Training:

5) Medical Library

CD-ROM is available and well-used at the University of Zambia. The Health Foundation has supported the development and maintenance of CD-ROM literature

search capability. Turn-around time for CD-ROM literature searches is often 30 minutes, with an "upper limit" of 5 hours. Hard copy of full-text articles generally requires approximately two weeks to arrive, usually by diplomatic pouch through the UN mission from the partner library at the University of Florida. In addition, the library receives additional support from the centre for Documentation in Mozambique.

The Medical Library archives all Healthnet conference so that they can be made available for non-users of HealthNet upon request. It also maintains a bulletin board at the entrance where bulletins and newsletters are regularly displayed. Relevant information is also sent to heads of departments within the medical school, and newsletters are frequently posted on the Dean's notice board. Most electronic forwarding of information is done at the network node at the UZ Computer Centre. Such dissemination is, however, frequently limited by the lack of resources for photocopying, since there is no budget for paper or toner (one toner cartridge costs approximately US\$227 locally).

The Medical Library also provides access to many occasional users of Healthnet who would not otherwise have access to a Healthnet point. It is estimated that 25 regular (at least once a month) and 10 to 15 occasional users gain access to E-mail services through the Library. Approximately seven of the regular users frequently send and receive messages internationally.

6) Special Activities:

Zambia HealthNet coordinators have taken additional initiative in developing a network of rural health facility users in the country's Southern Province. A (20K) IDRC-funded project... Despite initial setbacks (the MOH failed to provide the promised vehicle and the two key personnel had to be fired), the project has had some impressive successes. Ten of the twelve Southern province points were operating at the time of the evaluation visit to Zambia (2/94). Users of an eleventh point had made a trip to Lusaka to consult with technical support personnel at the University of Zambia Computer Center in an effort to remedy equipment problems and to make the point functional. Users of the rural points were unequivocal in assuring that they would place E-mail communications (including salaries for technical support) as a high priority in allocation of funds in their newly decentralized budgets. (An upcoming final evaluation of the Southern Province project, which comes to an end (date?) (see if Regina has the findings...)).

In light of the results of the evaluation report (due in April/94) of the Southern Province project, Zambia will decide whether and/or how to proceed in the

development of a national network serving the 84 hospitals around the country. Initial discussions have been undertaken with Philips Electrical Zambia, Ltd. to seek solutions to some of the remaining technical problems in establishing telephone or radio contact with the more remote facilities.

Conferencing is also on the increase in the HealthNet system in Zambia. Computer conferences available to HealthNet users include: (insert list). ___ are health-related topics.

ZIMBABWE

Zimbabwe's ground station is located in the University of Zimbabwe's Medical Library. Licensing of the ground station was a barrier to HealthNet operations in Zimbabwe. During the two and one half years that HealthNet coordinators awaited the license, ground station operators could download messages but were not allowed to "broadcast", or upload messages to the satellite. The PTC (PTT?) had no experience or regulation regarding satellite transceiver operation, although it had previously granted a license to an amateur ground station. Both security concerns and concerns about lost revenue were cited by the PTC. The satellite ground station reportedly gets "zero" use currently. Awaiting installation of the steerable antenna.

1) National Network Development:

A principal constraint to national network development in Zimbabwe has been the difficulty in obtaining phone lines. There is currently a waiting period of four to five years and a backlog of 170,000 requests for installation of new lines in Harare alone. Even for the host machine, difficulty in obtaining a telephone line was a barrier to development of HealthNet. The digitalization of the system is progressing slowly, but is expected to improve the reliability for current subscribers and to make more lines available for new subscribers.

The provisional solution to this problem in Zimbabwe has been to connect the ground station and HealthNet users through MANGO, an independent Fido-based electronic mail network which had been already established to support NGO users. MANGO currently has over 200 points, of which ___ are HealthNet points. The lack of an autonomous HealthNet host is felt to be "a serious weakness" for HealthNet, although the Network Coordinator expects to have a separate node for Healthnetb users within six months.

For only Z\$2000 (US\$250) per month, MANGO is able to access the Internet twice a day to upload and download international messages. The recent upgrading of the node computer from a 386 to a 486 has reportedly increased the system capacity to handle incoming calls 15-fold.

Virtually no marketing. System near capacity anyway. Library has produced some flyers and posters to promote its services, including for electronic mail, literature search and interlibrary loans.

2) National Coordinating Committee:

The Users' Council in Zimbabwe was described as "moribund". The multisectoral NGO network, MANGO, which also serves HealthNet users, has a Board of Directors which makes policy decisions in the use of that larger network.

3) Technical Support:

Zimbabwe has also shown leadership to date in diversifying its sources of technical support to network users. The Danish aid agency (DANIDA) has funded an expatriate advisor in a Ministry of Health position to provide technical assistance for the development and maintenance of electronic networking in support of three DANIDA-supported projects within the MOH. The three projects include the MOH Essential Drugs program, development of the National Epidemiologic Surveillance Program, and laboratory assistance to the National Blood transfusion Service. The DANIDA advisor is, therefore, able to provide the needed technical assistance to MOH users, thereby freeing the Network Coordinator to attend to other Healthnet support needs. In addition, a few very committed and technically sophisticated users (including the Midlands Province Epidemiologist and the US Centers for Disease Control's advisor to the Masters in Public Health training program) have themselves been able to provide technical support to many of the more remote users.

Visits to points, down time

4) Training:

Generally done by Rob, though there's been some diffusion of skills for installations and getting users going.

A recent workshop for orientation and training of end-users was organized in Lusaka. Although approximately 15 users were expected, over 60 attended the full-day workshop. Such a response suggests that users would appreciate further opportunities for training in the use of Healthnet.

5) Medical Library

CD-ROM databases available in the University of Zimbabwe's medical library include MedLine, PopLine, AIDS Compact Library, and OncoDisc. UTANO/IMPILO Zimbabwe, a Zimbabwean health literature database compiled at UZML, is also available in the medical library. Not all users of the CD-ROM literature search services are at the medical school, with two to three requests per week, for example, coming from provincial and district level users. Approximately 60% of users are student from the

University of Zimbabwe.

Full text articles are frequently downloaded from CD-ROM and sent as attachments to E-mail messages. Some 15 journals are available in full text through 1991 or 1992 on CD-ROM. The Medical Library is also supported by the Southern African Interlibrary Loans Network, which includes South Africa, Malawi and Botswana.

The reasons for performing searches and topics being searched are documented systematically by the Medical Library by requiring clients to fill out a request form for reference searches. An evaluation questionnaire is also administered to all clients for MedLine searches (Get results from Mrs. Ann Podmore). The evaluation will attempt to assess the proportion of literature searches in which abstracts (rather than full text articles) will suffice in meeting users' needs.

The Medical Library has taken an active role in promoting the services available in the library, including through HealthNet. More than 500 flyers were distributed through the Health professions Council, and the ML actively seeks opportunities to participate in conferences and workshops by contacting organizers and offering bibliographic support.

6) Special Activities:

Electronic mail is used for submission of weekly disease surveillance reports for four diseases of epidemiologic importance. These reports are submitted electronically to the Department of Epidemiology and Disease Control in Harare by the eight provincial medical directors. These reports have alerted public health officials to outbreaks of malaria in previously non-malarious areas and allowed prompt and geographically targeted responses to reports of the spread of cholera during the 1992 to 1993 epidemic.

Although not as well developed as it could be, one important application of E-mail for communicable disease control has been the international exchange of information about outbreaks, such as of meningitis and cholera, with neighboring countries, including Mozambique, Malawi, and Zambia. Zimbabwe has also used E-mail to mobilize resources, such as vaccines and drugs, for control of these epidemics.

Prior to the initiation of HealthNet, these reports were generally prepared locally using spreadsheet software, and printed reports were forwarded to Harare by fax. Data were then re-keyed (introducing the potential for transcription errors) into consolidated spreadsheets and analysed, printed, and faxed back to the provincial medical offices. With the advent of HealthNet, weekly disease reports are submitted electronically in

spreadsheet format using attached files. Data are then compiled without the need for re-keying each figure. Transmission costs have been cut dramatically and the opportunity for transcription errors greatly reduced.

Midlands Province is moving toward using electronic mail for its portion of the national surveillance system's routine epidemiologic reporting. All health facilities providing outpatient care will report the frequency of outpatient visits for of 61 diseases and health conditions (by age group). In addition, health officials will report the number of vaccine doses administered (by vaccine and by age), children whose growth is monitored (by age), and women seen for deliveries, neonatal or postnatal care, and family planning consultations.

MANGOnet, and therefore HealthNet, have from their inception, been founded on a policy of cost recovery. A fee of Z\$25 (US\$3.13) is charged for installation (including initial user training and technical support). An additional subscription fee of Z\$10 (US\$1.27) per month provides some incentive to "use or lose" access to the system. After initial installation and monthly subscription fees, the network has historically charged only for non-local messages sent. However, a recent change has introduced charges for received messages (Z\$0.10 or US\$0.125 per kilobyte) as well as sent messages (Z\$0.15 or less than US\$0.02 per kilobyte). Such a policy introduces appropriate disincentives to use of the system to download very large files which tie up the system for long periods, preventing access by other users. During the transition period, one user who downloaded a six megabyte file at a cost of Z\$600 (US\$75) was asked to pay for the service. Although conference mail remains free of charge currently due to problems in accounting, users fees for these services will also be introduced as soon as software for monitoring conference traffic is in place.

CDC/FETP/MPH program.

computer conference list (get from Rob)

UGANDA

Uganda's ground station is located in Makerere University's Medical Library. A "cage" enclosure had to be built (at a cost, covered by IDRC funds through SatelLife, of US\$4000) to ensure the security of the groundstation equipment. The construction of that cage delayed the use of the ground station from soon after its "launch" in November 1991 until the completion of the project in July 1992. Licensing of the ground station and customs clearance for the importation of equipment was expedited with the help of a sympathetic Minister of Transport and Communications Dr. Ruhakana-Rugunda (check spelling), who is also on the Board of Directors of SatelLife.

1) National Network Development:

Development of the HealthNet user network has taken place in Uganda by enlarging the existing Eastern and Southern African Network (ESANET) to include 50 (?) health users. The ESANET system, like the MANGO and UNZANET parent networks in Zimbabwe and Zambia, is nearing its capacity with approximately 200 users. Although a decision to separate HealthNet from ESANET and develop a separate Healthnet node was made at the October 1993 meeting of the Users' Council, that separation has not yet taken place.

Although Uganda uses the satellite for international messages with greater frequency than either Zambia or Zimbabwe, most international traffic is carried via terrestrial telephone connections to the GreenNet gateway in London. Because telephone rates from the UK are cheaper, Greennet polls the ESANET node in Kampala three times per day (at 0300, 1100, and 1700 hours). It is estimated that an arrangement wherein Uganda phones the UK would be at least five times as costly as the present arrangement (which incurs a cost of approximately US\$50 per month).

There is limited active marketing of the Healthnet services in Uganda. The Network Coordinator uses strategies of interpersonal contacts and announcements at seminars and workshops to make potential users aware of Healthnet. In addition, posters in each of the 18 University departments outline the services available for electronic networking. System near capacity anyway (?). Key potential "markets" for E-mail and information services in Uganda include the district hospitals (see details below of proposal), the Medical Research Council (which has remote research facilities and sites in other African countries with which it must communicate), and the Makerere University Institute of Public Health's field training program (which requires communication capabilities to maintain field supervision of the M.Med.P.H. students).

during field attachments).

Phone lines OK.

2) National Coordinating Committee:

The Users' Council in Uganda was described as "defunct" and "useless". Its last meeting was in October of 1993, before which time it met twice per year. membership included representatives from Makerere University (including the chairman of the Users' Council, the Dean of the medical School, and, later, the Medical Librarian) the local chapter of IPPNW, the PTT, and a systems operator. Although the Users' Council effectively addressed several of the larger policy issues confronting HealthNet in Uganda, it was felt that a smaller, more responsive mechanism was needed to address the more frequent needs for management decision-making. Some expressed the sense that the Users' Council seemed not to understand its expected function and that it proved to more interested in "bureaucratic control" than development of the network. However selected highly motivated users have formed a small "Steering Committee" which provides considerable support in network promotion and development of proposals for obtaining supplementary funding.

3) Technical Support:

Charles Musisi, the network coordinator, receives one-half time salary from the HealthNet project. In addition to the Network Coordinator, support staff at the University's Computer Center provide some assistance with installations. The Network Coordinator reports he spends approximately 70% of his time completing installations for new users. But due to the lack of personnel resources and lack of travel funds, Healthnet personnel admit they do little "outreach". Operators agree, however, that they feel increased "ownership" of the HealthNet network due to the lack of donor support for technical support and equipment acquisitions.

Visits to points,

Ground station equipment has been relatively reliable, although the TNC had to be replaced on one occasion, causing a two week lapse in satellite communications. The Network Coordinator performs routine maintenance for the ground station equipment, including regular cleaning.

4) Training:

The Network Coordinator and his assistant provide basic user training at the time of installation of each user's point.

5) Medical Library

The library's collections have progressively deteriorated over the past 20 years. University funds were used to maintain subscriptions to approximately 1000 periodicals in the 1970's, while only with donor assistance was it possible to maintain about 300 titles during the late 1980's. Now the library carries only around 20 periodical subscriptions.

The only CD-ROM database available in the Makerere University Medical Library is MedLine. McMaster University has offered to provide updated discs, although they have not arrived to date. The CD-ROM disc drive was "borrowed" from the main library of Makerere University, so there is some concern that they may choose to repossess it at some time in the future. The computer used for the searches was obtained through SatelLife. Library staff make a special effort to teach interested users how to perform the literature searches themselves using the CD-ROM. Clients pay US\$100 (US\$0.10) per page for printouts of the abstracts from their literature search.

Full text articles are obtained through requests to the partner library at the University of Leicester (check). Requests are limited to five articles, although users are free to request another allotment of articles when the pending request has been filled.

Although the Makerere Medical Library has a partnership with Leicester, staff report they would like to develop a closer relationship with McMaster University in Canada, which has already provided some support to the ML.

The reasons for performing searches and topics being searched are documented systematically by the Medical Library by requiring clients to fill out a request form for reference searches. Preliminary analysis of __ questionnaires indicates that __% request searches in support of patient care, __% for research applications, __% for teaching, __% for preparation of publications, and __% indicate "other" uses for the information. (Get data from Sara).

SatelLife News is posted in the ML.

Library staff estimate that five to seven users per day bring diskettes with messages they would like to have sent by E-mail.

6) Special Activities:

Proposal to USAID and UNDP (see copy in C:/sally/nelson). Donors (USAID, Pugh/Carnegie) are interested, and MOH committed. A national (not medical school) project. Use of WB money to reach hospitals. Check with Kadama at MOH.

Institute of Public Health's MPH program to be linked. All students to have PCs (through Carnegie, Rockefeller, and Uganda's WB-funded health project). 75% field-based training, will require mechanisms to sustain supervision by faculty based at MU.

Cost recovery. Pays Charles half time. Collects money to cover costs of paper, etc. Will have a separate bank account (now with CEU money).

Conferences on general topics which are available to Healthnet users through ESANET include: 1) KCI-Net (a technical conference from the Kenya Computer Institute), 2) APC.ICPD (a conference on population studies provided by the Association for Progressive Communications), 3) Africana-L (an Internet discussion on development in Africa), 4) Early Bird (a local ESANET users' conference), 5) African Link (A Fido conference on African development issues), 6) EXPZONE5 (a conference on Fidonet expansion), 7) GNG.Africa (on greenhouse gases), 8) AFRICA.HORN (news from the countries of Africa's Horn), 9) Healthnet news, 10) The AIDS Bulletin, 11) WHO Digest, and 12) African medical Librarians Bulletin. All four of the health-topic conferences are distributed regularly to all Healthnet users. The Network Coordinator admits he hears frequent complaints regarding the universal distribution of such unsolicited "junk" mail.

TANZANIA

The ground station for Tanzania is located in the medical library. However, limitations in access to the ground station (for both operators and users) due to the hours of operation of the library (which is closed Saturday afternoons and Sundays, for example) may dictate a transfer of the equipment to another facility on the University campus. The terminal node controller (TNC) was missing when the ground station equipment arrived after being shipped through London, incurring an additional delay while a replacement was shipped from Zambia, so the ground station only became operational in March, 1992.

The ground station was licensed in December 1992, only two months following the submission of the request. Licensing was facilitated by a Users' Council member who was with the PTT. There was a three-year wait to obtain a private line for use for the ground station, although the usual waiting period is reportedly closer to five years for installation of new lines.

1) National Network Development:

The HealthNet network is currently limited to four active points in Tanzania. Two previously installed HealthNet points have become inactive due to difficulties with non-private telephone lines, so that these users are now "walk-ins" who use the ground station to send and receive their messages. The limited hours of the library (closed half a day on Saturday and all day on Sunday) have been a constraint to use of the ground station as a point for users without computer access. The "single tasking" software now in use can only function on private lines, so that no institutional internal lines can be used for e-mail linkages.

The local network in Tanzania was historically linked through Tanzania's Commission for Science and Technology (COSTEC). The COSTEC node has, however, been non-functional for over a year. Two points which are located in health institutions (the National Institute of Medical Research and the Food and Nutrition Institute) have, in fact, not yet been "switched" to call the HealthNet node.

National network development is largely constrained by the lack of access to computers. Lack of reliable telephone lines is also a constraint to both initiating and sustaining use, with two of the six points which have been installed being non-functional due to inadequate or nonfunctional telephone connections. The Users' Council is currently engaged, through regional representatives of IPPNW in Tanzania, in an effort to identify potential users by identifying health institutions and agencies

with access to microcomputers and telephone lines. The Network Coordinator also observed that existing computers are often "dedicated" to use for specific projects, so that project managers do not feel free to "divert" the resource for multipurpose communications. Although currently limited, HealthNet is soon to be expanded to include Population Services International (PSI), UNFPA, the MOH Planning Division, and the National AIDS Control Program as users.

Little use of information resources. All users agreed that their use of the system for electronic mail would increase dramatically once the system is perceived to be reliable.

"Marketing" of HealthNet has been largely through person-to-person contacts and identification of health institutions or individuals with access to computers. The Users' Council plans, however, to use its regional offices to assist in identification of potential users. There is apparently no money available to finance the printing of flyers, although copies of HealthNet News are posted to help to publicize the available services. Council members expressed a desire to strengthen the existing system and improve reliability before promoting the enlargement of the network.

2) National Coordinating Committee:

The Users' Council in Tanzania is one of the most successful in all the countries included in the evaluation. The Council has eleven members (including two students and five faculty from the University, representatives from the PTT, Commission for Science and Technology, and MOH). A task force, comprised of a small and flexible subset of the Users' Council, was also constituted to facilitate daily management decision-making. Most (seven) of the members of the Users' Council are also members of IPPNW, and meetings are coordinated to facilitate attendance at both IPPNW and Users' Council meetings. Users' Council members felt that the sense of philosophical commitment and "personal responsibility" which comes with IPPNW membership has ensured the sustainability of the Tanzania Users' Council where other countries' Users' Councils have collapsed.

3) Technical Support:

Power outages lead to loss of function of the ground station approximately once per week. Although usually only of two to three hours duration, these outages lead to additional problems if they occur at night. For users, too, telephone and power outages are a frequent barrier to HealthNet use.

4) Training:

5) Medical Library

Silas Maganga, the Medical Librarian who is principally responsible for CD-ROM literature searches, is also an assistant systems operator. His principal use of electronic mail is to procure literature on behalf of library users. The library is constrained in its service provision due to the fact that the most recent abstracts available on CD-ROM are from October 1990. SatelLife has facilitated an agreement with AAAS to provide CD-ROM updates for Med-Line searches, although these have not yet begun to arrive. The library also has CD-ROM full text versions of several prominent journals, although many of these are complete only through 1991 or 1992. Meanwhile, the Medical Library's partner institution, Memorial University in Newfoundland, has kindly provided searches of the more recent literature as well as selected full-text articles for users. The library keeps a log of requests for literature searches which indicates that requests have been approximately stable over the past two years (139 searches completed 3/92-2/93 and 133 for 3/93-2/94).

The library prints and binds copies of HealthNet News for display in the library. Other information bulletins are available for review upon request. Efforts are being made, however, to bind the issues of the other information bulletins so they may be displayed and made available for more general use. The library staff is planning a seminar to inform potential users of the communications and information services available through HealthNet. Both faculty and student will be invited to this information session in the near future. It is estimated that approximately ten regular (at least once per month) users obtain access to HealthNet communication services through the point in the Muhambili Medical Center Library.

6) Special Activities:

The Muhambili Medical Center Library Committee has begun discussion of a system for cost recovery. Receipts have already been prepared and charges will be instituted for printing (for abstracts from literature searches, full text articles, and copies of messages) and by bytes for sending and receiving e-mail messages. Non-HealthNet users are already paying approximately US\$0.30 for each KB of mail or a "flat rate" of US\$200 per month for high volume users. No charge is currently made for installations.

Conferences which are currently available to HealthNet users include "Habari" (a local news conference), GNG.Africa (on greenhouse gases), HealthNet News (now sent only to AMREF and UNICEF), and the AIDS Daily Bulletin (sent currently to AMREF

and to be sent to UNICEF as soon as it resumes circulation).

HealthNet contribution of H/Net Eval
to development of Evaluation Unit

KENYA

The ground station was licensed in November 1992 after waiting approximately one year for licensure. The principal concerns cited by the government as a barrier to licensure was national security. The first message was sent from the ground station in June of 1992. After what is now described as a "false start" in 1992, HealthNet has begun to function again only in February of 1994. Initial efforts to establish HealthNet through ELCI failed due to unauthorized commercial uses of the HealthNet license by ELCI network managers. (Send message to Doug Rigby to get his side of the story...).

1) National Network Development:

Kenya currently has 15 HealthNet points, of which 13 are active (check logs on diskettes). Most points are used by only a single person, although efforts are currently being made to encourage sharing of access to existing points.

One of the largest potential "markets" for HealthNet is thought to be the University of Nairobi's Medical School. Over 300 staff members there will be able to use HealthNet services. However, university and library staff are reluctant to promote broader use until there is improved reliability of the system, some provision for technical support, an additional computer for CD-ROM literature searches, and improved access to available points.

2) Users' Council/National Coordinating Committee:

Kenya has organized a Users' Council, open to all users, which establishes priorities for the national efforts in the development of HealthNet. In addition, a National Coordinating Committee, which is comprised of a smaller subset of the members of the Users' Council, provides a more flexible mechanism for timely management decision-making when the need arises. The National Coordinating Committee provide technical and operational advice to the Users' Council to facilitate decision-making. Each of these groups has had only one or two meetings since being reconstituted in February 1994. However, there is a committed and enthusiastic group of core users who seem likely to contribute greatly to the development and sustainability of the network.

3) Technical Support:

There is currently no systematic provision for technical support to users. University

staff who are attached to the Institute of Computer Science are able to provide some limited technical support in the operation of the ground station and to users. Ground station operation is currently managed primarily through the volunteer assistance of a recent medical graduate (who will soon begin postgraduate training outside the country) and the medical librarian. HealthNet is fortunate that the medical librarian has elected to spend her upcoming sabbatical (if approved) on the further development of HealthNet in Kenya. The National Coordinating Committee has, however, discussed the development of proposals to obtain donor funding for technical support to HealthNet until network users are able to find a sustainable source. Preliminary discussions with UNICEF have been undertaken to obtain support for training a technical support team for every region. A manual was developed to assist systems operators, however it was protected by copyright by its author, so has not been released for general use.

4) Training:

5) Medical Library

The medical libraries at the University of Nairobi and the Kenya Medical Research Institute (KEMRI) are both fully involved in the use of HealthNet. KEMRI has a partner in the Royal Postgraduate Medical School in London, while the University of Nairobi has not been assigned a partner. The librarian at the University of Nairobi has a relationship with Case Western Reserve Medical School and the Cleveland Health Sciences Libraries which she may be able to use to obtain access to documents and periodicals which are unavailable in Nairobi.

The University of Nairobi Medical Library has a CD-ROM disc drive (contributed by HealthNet), however has received no updates of discs since 1990 and has no computer from which to conduct the searches. KEMRI has no CD-ROM equipment. Medical periodicals are limited in Nairobi, although KEMRI has approximately 30 titles and the University of Nairobi approximately 12. The African Journal of Health Science abstracts are circulated electronically from the ground station in the medical library.

KEMRI has adequate paper supplies and duplication facilities to circulate several copies of the AIDS Daily Bulletin and HealthNet news. In the University's Medical library one copy of each of the four of the regular information bulletins is filed for use by interested users.

6) Special Activities:

Conferences which are currently available to HealthNet users include ...

PRINCIPAL CONTACTS

ZAMBIA

<u>Name</u>	<u>Title</u>	<u>Institutional Affiliation</u>
H.K. Agrawal	Postgraduate Student	Department of Pediatrics, UZ
Rachel Baggaley	Project Director	AIDS Counseling Project
(first name?) Banda	(title?)	Churches Medical Assoc of Zambia
Mark Bennett	Director	Univ of Zambia Computer Center
W. Boayue	Country Representative	World Health Organization
James Chipeto	Postgraduate Student	Department of Pediatrics, UZ
John Jellis	Professor and Chairman	Dept of Orthopedic Surgery, UZ
Abigail		
Vivian		
Sally Lake	Health Economist	UNICEF, Lusaka
Munthali Lamios	Postgraduate Student	Department of Pediatrics, UZ
Christine Maonde	Management Team	Siavonga District Hospital
Chikuta Mbewe	Administrator	Siavonga District Hospital
C. Mukuka	Postgraduate Student	Department of Pediatrics, UZ
Tendai J. M'Soka	Postgraduate Student	Department of Pediatrics, UZ
Connie M. Osborne	Acting Head	Department of Pediatrics, UZ
Rashid (last name?)	Adm?	UNICEF, Lusaka
Kees K. Richie	Director, Technical Div.	Philips Electrical Zambia, Ltd.
Neil Robinson	Tech Support Manager	Univ of Zambia Computer Center
Regina Shakakata	Medical Librarian	University of Zambia, Lusaka
Catherine Shawa	(title?)	Churches Medical Assoc of Zambia
Tredwell Sinyangwe	Project Officer	UNICEF, Lusaka
Peter Songolo	Medical Director	Kafue Gorge Hospital

ZIMBABWE

<u>Name</u>	<u>Title</u>	<u>Institutional Affiliation</u>
Rob Borland	Network Coordinator	Dept of Computer Science, UZ
Glyn Chapman	Dept of Community Med	University of Zambia
Davies Dhlakama	Provincial Med Director	Midlands Provincial Medical Office
Henri vandenHombergh	Prov Epidemiologist	Midlands Prov Medical Office
Peter ten Ham	Epidemiologist	Dept Epi and Disease Control
Joshua Madzudzu	Information officer	Shurugwi District Hospital

Canisius Makombe	Health Info Officer	Midlands Provincial Medical Office
Helga Patrikios	Medical Librarian	Univ of Zambia Medical Library
Dan Peterson	MPH Program Supvsor	Centers for Disease Control/MOH
Ann Podmore	Reference Librarian	Univ of Zambia Medical Library
Leif Stabell	Technical Consultant	Ministry of Health, Harare
Mufuta Tshimanga	District Med Officer	Shurugwi District Hospital

UGANDA

<u>Name</u>	<u>Title</u>	<u>Institutional Affiliation</u>
Gilbert Bukenya	Dir, Inst Public Health	Makerere University
John Cutler	AIDS Project Director	USAID, Entebbe
Med Librarian		
David Kiwana	System Operator	Makerere Univarsity
Sam Luboga	Head, Dept of Anatomy	Makerere University
Charles Musisi	Network Coordinator	Makerere Inst of Computer Sci
Sara Mbagi	Asst Medical Librarian	Makerere University
Andrew J. Nunn	Senior Staff	Med Research Council, Entebbe
Prof Mugerwa	Dean, Sch of Medicine	Makerere University
Helen Pickering	Scientist	Med Research Council, Misaka
Nelson Sewankambo	Chair, Users Council	Department of Pediatrics, MU

TANZANIA

<u>Name</u>	<u>Title</u>	<u>Institutional Affiliation</u>
Gertrude Kitabarazi		UNICEF, Dar es Salaam
Ulrich Laukamm	AIDS Project Director	AMREF, Dar es Salaam
Silas Maganga	Medical Librarian	Muhambili Medical Center
Agatha Mfuko	AIDS Project Secretary	AMREF, Dar es Salaam
R.I. Mhina	Orthopedic Surgeon	Muhambili Medical Center
M. Mponda	Administrator	National Inst of Medical Research
William Sangiwa	Network Coordinator	University of Dar es Salaam
Sylvia Shayo	Program Officer	Tanzania Food and Nutrition Ctr
Myin Taung	UN Volunteer	UNICEF, Dar es Salaam

KENYA

<u>Name</u>	<u>Title</u>	<u>Institutional Affiliation</u>
(Get lists from Rosemary Kiathe)		
Nancy Kamal (sp?)		
Paulette Karmali	Clinic Administrator	Nairobi Hospital
Rosemary Kiathe		
James Matunga		
Bill Okelo-Odongo		
Paul Saoke		

SUMMARY OF KEY INDICATORS OF LOCAL NETWORK DEVELOPMENT BY COUNTRY

INDICATOR	ZAMBIA	ZIMBABWE	UGANDA	TANZANIA	KENYA
Date the ground station became functional	4(5?)/91		11/91 (7/92)	3/92	3/92
Number of active HealthNet points at the time of evaluation (E-mail points in all sectors)	45 (200)	42 (200)	(200)	4 (6)	
Number (percent) of active HealthNet points at a university					
Number (percent) of active HealthNet points at other research institutions					
Number (percent) of active HealthNet points in NGOs or project sites					
Number (percent) of active HealthNet points in non-academic health care facilities					
Number (percent) of active HealthNet points in the Ministry of Health					
Number (percent) of active HealthNet points in multilateral or donor agencies					

SUMMARY OF INDICATORS OF DISTRIBUTION OF USE WITHIN PARTICIPATING INSTITUTIONS
(based on survey data)

INDICATOR	ZAMBIA	ZIMBABWE	UGANDA	TANZANIA	KENYA
Number of active health users at surveyed points (number of points responding)					
Mean number of users per point					
Rural/urban ratio for HealthNet users (rural/urban ratio for HealthNet points)	(10/35)				

SUMMARY OF KEY INDICATORS OF USE OF ELECTRONIC MAIL BY COUNTRY

INDICATOR	ZAMBIA	ZIMBABWE	UGANDA	TANZANIA	KENYA
Average percent of days in past month each active point called in	33%	23%			
Mean number of regular (> once/mo) users per HealthNet point					
Mean bytes per month sent from each point	33,906	14,457			
Mean bytes per month received by each point	158,352	31,847			
Mean ratio of bytes sent to bytes received at points	0.214	0.454			
Mean number of messages (sent or received) per month per user					
Percent of HealthNet traffic (in number of bytes) which is international (compared to percent for all users)	7.7% (35.8%)				
Percent of HealthNet traffic (in number of messages) which is international (compared to all users)	14.7% (57.8%)				
Percent of international traffic which is south to south					

Percent of international traffic relayed by satellite (estimated or based on log data)				50% (est)	
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SUMMARY OF TRAINING ACTIVITIES BY COUNTRY

INDICATOR	ZAMBIA	ZIMBABWE	UGANDA	TANZANIA	KENYA
Number of active HealthNet points	45	42			
Number of ground station operators trained					
Number of HealthNet point operators trained					
Number of HealthNet users trained					
Promotion materials prepared	YES	NO			
User training and documentation materials prepared	YES	NO			
Percent of users indicating that their training was adequate					

SUMMARY OF USERS' INFORMATION DISSEMINATION ACTIVITIES BY COUNTRY

INDICATOR	ZAMBIA	ZIMBABWE	UGANDA	TANZANIA	KENYA
Percent of users who usually (> 50% of time) relay messages					
Percent of users who never or rarely (< 5% of time) relay messages					
Percent whose sharing is principally within the user's institution					
Percent who report they post messages					
Percent who report they distribute copies					
Percent who report they relay by E-mail					
Percent who report they relay verbally					
Number of computer conferences available on network	28				
Number of health-related conferences	10			4	
Number of health-related conferences which are "read-only"	6				

Number of Med-Line searches conducted in past year using CD-ROM (other searches)	334 (768)	(340/MO IN 1993!)(?)		133	
Percent who feel that colleagues occasionally "hoard" information					

SUMMARY OF HEALTHNET PROJECT INPUTS BY COUNTRY

INDICATOR	ZAMBIA	ZIMBABWE	UGANDA	TANZANIA	KENYA
HealthNet budget					
Other project inputs					
Computers (in addition to ground station) (Percent still functioning)					
Modems (percent still functioning)					
Printers (percent still functioning)					
Visits by SatelLife personnel					
Date of acquisition of CD-ROM (donor)		1990 (Carnegie)		? (SAREC)	