AED-SATELLIFE Center for Health Information and Technology

The AED-SATELLIFE Center for Health and Information Technology has an eighteen-year history of facilitating knowledge building and knowledge sharing throughout the developing world. Having created a global information and communication network called HealthNet, AED-SATELLIFE serves an estimated 130,000 health professionals around the globe by providing access to current, reliable, and relevant sources of information on strategic health issues using affordable and appropriate technologies.

AED-SATELLIFE's distinction lies in its commitment to addressing the challenge of bringing information and communication technology to bear on the real, urgent needs of health professionals on multiple fronts: connectivity, capacity building, content, and community. We have built affordable information access systems, given people the skills to use and support them, distributed vast quantities of information through them, and created an international community of health professionals who share and build knowledge together. To address the linked challenges of information poverty and the digital divide and to achieve its mission to lead a global partnership of healthcare institutions and practitioners fostering communication and information sharing, AED-SATELLIFE pursues three streams of activities:

Health Publications: AED-SATELLIFE produces four electronic publications with relevant content culled from 60 of the world's leading medical journals and available **free of charge to residents of developing nations**.

HealthNet News (HNN)	Up-to-date, peer-reviewed, clinical and research information
HealthNet News AIDS	HIV/AIDS-focused clinical and public health information
HNN Community	Current, thematic public health information
HealthNet News Nursing	Reliable content on nursing practices, management, and care

Global Forums: AED-SATELLIFE's expertly moderated discussion groups cover topics such as HIV/AIDS, essential drugs, African health research and development, and cardiovascular health. Participation in these forums is available to *all* **free of charge**.

AFRO-NETS	African Networks for Health Research and Development
E-DRUG	Essential Drugs in the Developing World *(English version)*
E-FARMACOS	Essential Drugs in the Developing World *(Spanish version)*
E-MED	Essential Drugs in the Developing World *(French version)*
E-LEK	Essential Drugs in the Developing World *(Russian version)*
INDICES	International Network on Drug Information Centers
INDIA-DRUG	Essential Drugs in India
KEN-PED-HIV	Pediatric HIV/AIDS Training and Care in Kenya
Nursing-Chat	Nursing practices, management, and care
ProCAARE	Program for the Collaboration Against AIDS & Related Epidemics
ProNut-HIV	Nutrition and HIV/AIDS
ProCOR	Cardiovascular Health in the Developing World
PDA4HEALTH	Handheld computers for health in developing countries

Special Technology-based Projects: AED-SATELLIFE works with in-country local partners to build their capacity to use cost-effective technology to meet their urgent information and communication needs and to expand this capacity throughout the local health community. We have implemented technology projects for organizations including the American Red Cross, the International Development Research Centre, and the World Health Organization. AED-SATELLIFE's technology projects improve the capacity of healthcare systems to collect and analyze vital data, to disseminate urgent, lifesaving medical information, to educate and inform healthcare workers in remote rural areas, and to participate in the global exchange of knowledge. The **Uganda Health Information Network** is an example of such a technology project, which we will detail as out Featured Program.

Section II – Featured Program: Uganda Health Information Network

The Uganda Health Information Network (UHIN) is the largest and most ambitious information and communication technology (ICT) for health project that AED-SATELLIFE has undertaken to date. Four years into this project, remote facilities that have no landline telephone service or Internet access and, in some cases, not even electricity, are able to send and receive regular transmissions of desperately needed information and accurate, actionable data. AED-SATELLIFE and its partners have successfully demonstrated that communication, information access, and data collection and analysis can be significantly improved among health workers at the facility and district level in Uganda through the use of a two-way communication network.

UHIN commenced as a pilot study to test the viability of using handheld computers (PDAs), wireless access points (WAPs), and the GSM/GPRS wireless telecommunications network for establishing a robust and easily adaptable information communications system. For Uganda, which has one of the highest burdens of disease in the world but also some of the best cellular telephone coverage in Africa, the marriage of handheld technology and cellular telephony represents a watershed moment in the battle against information poverty. As we enter UHIN Phase IV, a total of 500 handheld computers provided by the project are now in use by frontline health workers in 174 health centers in Rakai, Lyantonde, Mbale, Manafwa, and Bududa districts, serving more than 1 million people.

The inability to access medical and health information hobbles healthcare providers in resource-poor countries around the globe. Due to poor communications infrastructure and prohibitively high cost, doctors, nurses, and public health workers in Africa, Asia, and Latin America do not have recourse to the fundamental health information required for good practice and sound decision-making. Similarly, policy and decision making is undermined by incomplete and inaccurate public health data. Data collected using traditional paper-and-pencil methods is prone to transcription errors, loss, and damage and takes time to enter into databases, another process prone to human error. Furthermore, due both to the labor-intensive nature of the process and the geographic and technological barriers to data movement within the system, data rarely reaches policymakers in time for informed decision making on the basis of accurate epidemiological analysis. Useful feedback on the data moves in the other direction – back to the field – with even less success and frequency.

With these information and communications issues in mind, the overall goal of the UHIN project is to support the Ministry of Health (MOH) of Uganda and contribute to the reduction of morbidity and mortality of the population from major causes of ill health by establishing an effective two-way electronic communication system for the delivery of timely, accurate, and relevant information, and developing data collection and transmission tools that contribute to the improvement of national healthcare standards.

In UHIN, AED-SATELLIFE and its partners have built a communication system which simultaneously addresses these challenges. From its inception, the two-way network has been used for both medical information dissemination and for public health data collection and reporting. By converting HMIS and non-HMIS paper forms to PDA format for electronic data capture using handheld computers and by training rural health workers to use UHIN to transmit the data from remotely located health centers over the cellular network to District Health Service (DHS) offices, accurate and timely information reaches public health policy makers. By selecting and disseminating relevant, actionable medical information to health workers at the point of care, frontline caregivers are kept professionally connected and up to date. Over UHIN, information and data flow equally smoothly both in directions. Health and medical information is broadcast from the UHIN server and stored in each WAPs' memory cache. When a health worker next uploads collected data from his PDA to the caching device, he or she automatically receives the latest news, clinical articles, continuing medical education materials, or virtually any other type of content that can be exchanged digitally. The collected public health data which has just been uploaded to the WAP is automatically transmitted to a UHIN server which distributes it to the proper recipient.

AED-SATELLIFE and its partners identify, format, and transmit relevant health information to practitioners in response to user needs. UHIN regularly broadcasts health content relevant to doctors, senior nurses, and senior clinical officers ("tier-1"), and to community health workers ("tier-2"). Intensive and focused content is delivered on a set schedule via PDA to both tiers of health workers addressing diarrheal disease on Mondays, pneumonia on Wednesdays, and malaria on Fridays. In addition, users receive health information from AED-SATELLIFE's information services; continuing medical education and health updates on malaria, HIV/AIDS, and tuberculosis; treatment updates; and news from Uganda's mainstream media.

UHIN Delivers Significant Results

Multiple studies and evaluations have been undertaken since the project began in 2003, indicating the significant impact UHIN has had on healthcare services in the participating districts. Findings include:

- A cost-effectiveness analysis showed that the network delivered a 24% savings per unit of spending over the traditional manual data collection and transmission approaches, a figure likely to increase as additional paper forms are converted;
- District Health Services reported obtaining close to a 100% compliance rate on weekly disease surveillance reporting using the network, compared to the national average of 63%;
- The districts reported benefits including improved data quality at point of collection, more timely access to data for analysis and decision-making, and more rapid response to emerging situations;
- Health workers at remote sites, even those with no fixed telephone lines or regular supply of electricity, routinely accessed critical information, including continuing medical education materials, which had previously been unavailable to them. They no longer had to travel long distances to the district headquarters to deliver data or to receive feedback, conserving time and resources for the health system;
- In-country project partners not only acquired new staff and new technical and training capabilities, but also developed realistic strategic and business plans that forecast sustainability based on their ability to deliver connectivity, training, and content on a fee-for-service basis to other NGOs, government agencies, and institutions.

An impact assessment indicated that consistent access to continuing professional development materials resulted in improved quality of health service to the local population.

- Health workers were providing improved clinical care to patients with malaria and diarrhea as a result of receiving health information broadcast through the network;
- Health workers were referring to the literature available in their handhelds, including national treatment guidelines, for their daily practices;
- Over 50% of health workers surveyed rated handheld-accessed information useful at all stages of patient care, including diagnosis, treatment, and advising patients on home-care;
- Increased health worker and client satisfaction with services provided at health facilities.

UHIN project partners have developed a proposal to expand the network to an additional 250 healthcare workers over a two-year period, make additional HMIS forms available for use on PDAs, and enhance the usefulness of the network through its application to the collection and reporting of data related to Integrated Disease Surveillance and Response (IDRS) efforts. Building the capacity of both DHS and MOH personnel to take over responsibility for on-going training, maintenance, technical and user support, and future expansion and integration of the network will continue to be a major focus of project partner activity. As a result of the successful implementation of UHIN, the Ministry of Health of the Republic of Uganda is ready for a nationwide scale up of handheld computers for health workers to support data collection and transmission for the national HMIS. Building on the experiences of UHIN, the MOH is developing plans for a rollout to 20 more districts. The ministry is currently seeking donor support for this network expansion.

Section III – Evaluation: Uganda Health Information Network

AED-SATELLIFE continually monitors and evaluates the quality, depth, and relevancy of its projects to address developing world healthcare needs. A variety of mechanisms are employed for gathering information including collecting user information and demographics; tracking usage; tracking user comments and feedback; conducting stakeholder surveys; conducting user surveys; convening focus groups with participants; and convening stakeholder meetings.

Throughout the history of the UHIN project, AED-SATELLIFE has used Outcome Mapping (OM) as a monitoring and evaluation tool to understand the way the health management information system (HMIS) and continuing provider development (CPD) delivery operates and the interactions between various institutions or stakeholders in Uganda. We have used the results of the OM process to improve the design of UHIN. (See "Outcome Mapping: A Monitoring and Evaluation Tool for the Uganda Health Information Network Project".)

Outcome Mapping is an integrated system of planning, monitoring, and evaluation developed by IDRC. It is based on the principles of participation and inclusion of those implementing the intervention in the design and data collection so as to encourage ownership and use of findings. In applying the OM methodology to the planning and evaluation processes of UHIN, we have focused on assessing the extent to which the "boundary partners"[1] of UHIN use the network for HMIS data collection and transmission and accessing health content, and to what extent their previously established behavior of using paper data collection forms and printed reading material has changed as a result of introducing UHIN.

Our evaluation approach has focused on the behavior changes of the boundary partners under the premise that the consolidation and expansion of UHIN alone may not improve HMIS and CPD in Uganda and that a supportive institutional environment, enhanced personnel skills, etc. are each seen as an integral component of success. The project's outcomes have therefore been evaluated in terms of whether those responsible for HMIS data collection, transmission, and analysis, and for CPD delivery and accreditation, not only know *how* to use UHIN, *but also use it on a regular basis*. We have applied the tools of OM to assess changes in the behaviors, relationships, and actions of the individuals, groups, and institutions with whom UHIN works.

AED-SATELLIFE has used these findings to write project evaluation reports for UHIN funders and has periodically published reports on the best practices and lessons learned. In addition, we have engaged the services of outside experts to evaluate the impact and cost-effectiveness of UHIN (please see attachments).

Bridges.org Study - February 2003 – "SATELLIFE has demonstrated that ICT can improve healthcare in a real way through the use of handheld computers."

Cost-Effectiveness Study - September 2004 – "…cost effective to the magnitude of 0.242… value could get much higher with time since the period of analysis included learning costs that are bound to decline with time… likely to generate economies of scale that would further raise the benefits and cut down costs."

UHIN Technical Report - December 2004 - "…successfully demonstrated that communication, information access, and data collection and analysis can be significantly improved among health workers … (technology) proven to be robust and easily adoptable… and has yielded measurable cost savings and improvements in data quality and availability."

UHIN Impact Study - April 2006 - Use of PDAs to provide targeted health information has had positive impact on health care delivery.

UHIN Technical Report - May 2006 - "The impact assessment conducted at the close of Phase II indicates that as a result of improved access to health content and improved HMIS data exchange, UHIN is improving the quality of health service provided to the population."

UHIN Overview - 2003 to Present – "In addition to having developed the capacity of health workers… the implementation of UHIN over the past three years has built the capacity of the project partners to design, develop, deploy, and support advanced information and communications technology projects."

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[1] Boundary partners are "those individuals, groups, and organizations with whom the program interacts directly and with whom the program anticipates opportunities for influence." (Earl, et al, 2001)

Section IV: Suggested Reading

"While one-fifth on the world's population enjoys an average life expectancy approaching eighty and a life comparatively free of disability, two-thirds of the world's population, living in the least well-off countries of Africa, Asia and Latin America, suffer overwhelmingly from the world's burden of illness and premature death. Each year, an estimated 15 million children die from infection and malnutrition – 40,000 children per day. The toll in illness and lifelong disability is a critical impediment to economic and social stability."

WHO World Report on Knowledge for Better Health, 2004
http://www.who.int/rpc/meetings/pub1/en/index.html

"Providing access to reliable health information for health workers in developing countries is potentially the single most cost effective and achievable strategy for sustainable improvement in health care. Cost effective because the amounts of money required are negligible compared with those invested in health services. Achievable because providers of health information have the will and commitment to make it happen, and because information technology presents exciting new opportunities to complement conventional methods of dissemination. And sustainable because information access is the sine qua non of the professional development of all health workers–the most vital asset of any healthcare system."

Neil Pakenham-Walsh, et al.
Meeting the information needs of health workers in developing countries. *BMJ* 1997;314: 90.
http://www.bmj.com/cgi/content/full/314/7074/90?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=paken ham-walsh&searchid

"It is one thing to ferry books and journals from Europe to Africa and another to make relevant information available to the right person at the right time at an affordable cost."

R Kale
Health information for the developing world. *BMJ* 1994;309:939-942
http://www.bmj.com/cgi/content/full/309/6959/939?ijkey=d4a72869b23173d79517a140329c6f1dd284d77e&keytype2=tf_ipsec sha

"Healthcare is one of the leading issues affecting African development today. HIV/AIDS is devastating the continent, and that is only one aspect of the healthcare crisis. For example, malaria is by far the most lethal tropical parasitic disease, killing more people than any other communicable disease except tuberculosis (TB), and it is estimated to have cost Africa USD $100 billion over the last 30 years. Yet malaria, TB, and other diseases can be managed if promptly diagnosed and adequately treated, and in many cases prevention methods are relatively cheap and simple. But lack of information on treatments and disease management is often an underlying issue that hinders effective patient care and prevention. Information and communications technology (ICT) can play an important role in combating disease and improving healthcare. ICT can be used as a tool for collecting community health information to support decision-making; improving doctors' access to current medical information; linking healthcare professionals so they can share information and knowledge; and enhancing health administration, remote diagnostics, and distribution of medical supplies."

bridges.org evaluation of SATELLIFE PDA project, 2002

"Universal access to information for health professionals is a prerequisite for meeting the Millennium Development Goals and achieving Health for All."

Fiona Godlee, et al.
Can we achieve health information for all by 2015?
Published online July 9, 2004 at www.thelancet.com
http://image.thelancet.com/extras/04art6112web.pdf