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**Making Connections:
An Assessment of the Information
and Communication Technology
Needs of CREDESA for Health Care Work
in the Ouidah District of Benin**

FINAL REPORT

IDRC Study/Acacia Initiative
Prepared for IDRC by
IntraDelta Management
Consultants International Inc.

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in consultation with

CREDESA
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April, 1997

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Executive Summary

In January, 1997 IntraDelta was contracted by IDRC to investigate the feasibility of using ICTs in Primary Health Care work in Developing countries. More specifically, the contract asked IntraDelta to look at the possibilities of CREDESA using ICTs in their Primary Health Care project in Benin. A field trip to Benin was scheduled for February for a two person team. Prior to the field trip, IntraDelta researchers identified a series of health care information and communication technologies used in Canada and abroad. For this project an emphasis was placed on technologies which were developed and produced by Canadian organizations and had the potential to support the health care activities of Ouidah district of Benin and which could be used in the broader Development process. These were documented and submitted in an initial report which is attached herein as Annex B.

During their 18 days in an Benin, the Field Team was able to identify several patterns of health care and development activities at the Village, Commune, Zone and CREDESA levels each with their own specific needs. The Team used these identified needs to design an integrated system of ICTs which responds to the complete set of needs. In an other words, the proposed combination of ICTs have the potential to respond to almost all of the of needs identified on the ground. As a result of using the proposed combination of ICTs, development work in an the Ouidah District and, more particularly, the development work in an health care being carried by CREDESA and the Government of Benin will be more effective and efficient.

Based on the Team member's previous experience in an a wide variety of development environments, it was felt that the basic pattern of needs identified in an Benin could be generalized to many development situations though the foci might range from agricultural development to animal husbandry or micro credit. The key conditions are:

- 1. Knowledge needed but not readily available at the grassroots (i.e. the village level);
- 2. Knowledge being available within an organization in an the larger environment (i.e. at the provincial or national levels);

- 3. Capacity for those at the grassroots to absorb and apply the knowledge if received (i.e. a lack of technological or economic barriers to the grassroots implementation of the information after receiving it.

Given these conditions, the integrated use of ICTs suggested herein could be applied to any of these foci or a collection of them.

Introduction and background

1. The International Development Research Centre (IDRC) wants to determine the appropriate application of Information and Communication Technologies (ICTs) to a primary health care setting in rural areas of the South of Benin.
2. Le Centre régional pour le développement et le santé (CREDESA) is a long-term partner with IDRC in health related research aimed at improving capacity in the primary health care area in Benin.
3. CREDESA's primary contribution is that they have established a continuously improving model of a regional primary health care system. That system involves:

Health care services;

1. treatment,
2. prevention,
3. promotion,
4. Community engagement in health development processes, i.e. in transforming health conditions. This work also includes the provision of technical support and services to people at the village level in a variety of areas such as agriculture, income generation, literacy, fish culture, etc.

Training and education:

1. of the population at the village level,
2. of health care workers at the village and commune level (CCS: Complex Communal de Sante),
3. at the level of zone hospital & staff especially related to organizational development,
4. at the level of CREDESA's own professional development; and
5. for allied agencies within Benin.

□ **Research;** all research is related to improving health services, understanding health conditions, managing health challenges and problems, and designing and testing interventions for improving health or for addressing the (development related) determinants of health.

□ **Diffusion and Networking;** CREDESA is fundamentally a research and demonstration project. It has already had considerable influence on the health system within Benin and is already providing technical assistance and training to health organizations in other countries of Africa. These international connections also provide opportunities to learn about solutions being developed elsewhere that might well be applicable in the Benin context.

□ It is clear that CREDESA has developed a comprehensive integrated, holistic approach to primary health care, and further, that their understanding of the regional determinants of health and what must be done to improve health conditions has led to the organic model they have developed with its four lines of action; service (health and development), research, training and education, diffusion/networking. **There is no rational way of separating the four fundamental lines of action which comprise CREDESA's work without weakening or even destroying the system of primary health care they have developed.** Therefore, the assessment we have undertaken will recommend ICTs for the entire system.

- The primary health care system CREDESA has developed, involves activities at the following levels:
 1. village level;
 2. commune level (radius of about 20 km.) There are 8 CCS health centers serving 10 communes in the Ouidah health zone. (Each CCS serves approximately 6 - 8 villages.);
 3. Zone (Sous-prefecture) level, i.e. Ouidah;
 4. CREDESA - The centre of research and development work;
 5. 6 National Demonstration sites, one in each of the 6 other departments.
- The purpose of this study is to assess the information and communication technology needs of the CREDESA system, with due attention to the issues of cultural appropriateness, cost, and sustainability.
- Our understanding of what that assessment actually entails involves two primary dimensions of investigation: 1) that of bringing technology to the people, and 2) that of bringing people to the technology.

Framework for the Assessment

Start-up

CREDESA staff were expecting our mission to arrive at the end of February. When we arrived on the 10th of February, the Director, Dr. Alihonou, was out of the country and, in fact, did not return until the 17th.

We were delighted and humbled by the competent and professional manner in which we were received, and our needs provided for. Three key CREDESA researchers joined us as part of the Assessment Team. They are: Dr. Guedeme, Alphonse, Dr. Soude, Theodore and Dr. Gandaho, Timothee.

The fact that the Director was not present did not seem, in the least, to effect the enthusiasm and professional competence of the CREDESA staff. CREDESA responded to our arrival with quiet efficiency, setting up meetings and appointments, recalling our designated liaison (Dr. Guedeme) from vacation and, without so much as a hiccup, our study was in full swing with a few hours of arrival.

- Framework making - The working group agreed to construct a framework for the conduct of the assessment that would meet IDRC's needs; and that was appropriate to the realities of CREDESA, the Ouidah health zone, and Benin.
- Assessment Framework - The framework was developed by the working group as follows:
 1. CREDESA's mission is to the promotion of health and development in the Ouidah health zone.
 2. The CREDESA system entails four lines of action, namely:
 1. Service (health & development),
 2. Research,
 3. Training and Education,
 4. Diffusion/Networking.
 3. For each of these four lines of action the following questions will be considered:
 1. What are the goals? What is the work trying to achieve?
 2. Where are the challenges and obstacles, particularly related to communication and information?
 3. Where are the gaps and needs that could be addressed by the introduction of **appropriate ICTs**?
 4. Where are the technical support and human resource development inputs needed to bring the people to the technology?

- Assessment activities - Our findings are based on interviews, observations, estimates of suppliers and meetings. Meetings were held with the following:
 1. commune level health providers in 3 communes of the Ouidah health zone;
 2. the Chief Medical Officer of the Ouidah district;
 3. separate meetings with CREDESA departments related to:
 1. development programs,
 2. health services and research,
 3. information technology services,
 4. epidemiological research and situation management (i.e. disease control),
 5. program administration, as well as
 6. in an-depth discussions with our counterparts. (Drs. Guedeme, Soude and Gandaho).
 4. We have also completed a detailed inventory of ICT equipment and determined;
 1. levels of in-house (CREDESA) technical capacity,
 2. availability of technical backstopping, repair services and replacement components in Benin, and
 3. the actual conditions and usability of existing radio communication systems with a view to building on what is already in place.

Findings

ICT structure and placing in Benin

The systematic introduction of ICT's into the Benin context has been underway for at least the past five years. With the establishment of a Benin branch of the **Agence Franco phone pour l'enseignement superior et la recherche of L'Université internationale de la GET BLUE BOOKLET FOR THE OFFICIAL NAME Franco phone** at the Université Nationale de Benin (Centre Syfed-Refer de Cotonou) in 1995, the Benin academic and research community now has a world class technical support center that is linked to some forty (40) other centres around the Francophone world by E-mail, Inter-net and a global Francophone bibliographic reference network. This service gives ready access to support research publications in an many fields (including health) relevant to CREDESA work, as well as access to library distinct anywhere in an the Anglophone world.

Syfed-Refer Cotonou now has some 700 subscribers to its e-mail and Inter-net access services. We also found (3) private organizations which either now have operating services or are poised to offer E-mail and Internet services to a rapidly expanding informatics market in an Benin. While most of the activity is taking place in an the area of Cotonou, there are e-mail and Inter-net users scattered throughout the country using satellite and radio phones for connectivity. Many of the major development related organizations (UNICEF, WHO, USAID, etc.) as well as many of the larger NGO's are already using E-Mail and to some degree are already accessing the World Wide Web.

Users of the commercial and banking sectors have already been using computers internally for some time, and are just now adding E-mail capacity to their systems.

The political and legal context

It is a matter of historic record that Benin was governed by a Marxist-Lenin regime for 17 yrs prior to 1989. With the election (in an 1991) of the National Assembly and the approval by public referendum of a new constitution, there has been a gradual process of democratization that has affected every sector and every level of Benin society.

In an 1994 the authority to the "Haute Autorité de l'Audio Visual et de la Communication" (HAAC) was established with the mandate of promoting and protecting freedom of the press,

as well as public dialogue and debate on cultural and political issues.

The general climate of openness seems to have been accelerated by the fact that (within politically prescribed limits) open and free discussion between citizens on issues of socio-political importance was actually cultivated during the time of the socialist regime. There seems to be a fairly well developed capacity (at every levels of Benin society and especially at the village level) to work together in groups guided by processes of consultation leading towards consensus. No doubt this capacity also has its roots in the rich cultural foundations of the tribal people of Benin; a foundation which clearly has contributed traditional methodologies, processes and protocols related to leadership, decision making, problem solving and building consensus.

This dynamic is difficult to reconcile with dominant political, administrative and organizational cultures which have their roots in the French colonial system. Nevertheless, the creative tension between these two dynamics is very evident at many levels in Benin society. An interesting example of this creative tension is the formation of a coalition of advocacy groups, one of which has just won a court battle (on constitutional grounds) forcing the government to draft new legislation giving the private sector access to the airways. Much of this fight was conducted in the public view, using government controlled television and newspapers to make their arguments. At this writing, the legislation is in the final stages of approval. When it is finished, a completely private TV station (already build and equipped) will begin broadcasting and there is already a lineup of other companies requesting permits for similar initiatives.

On what is termed (within Benin) the "service sector" of ICTs (computer sales and service, E-mail and Inter-net services production of ICT software etc); the field seems to be completely open to innovation and entrepreneurial activity. Both government representatives (ministry of communication and Benin Ministry of Communications Poste and Telegraph (OPT) as well as NGO and private sectors sources consulted during the study were unanimous in assuming that the general political and policy climate for the introduction for the ICT's within Benin is generally open (and opening still further in the public broadcasting sector) and supportive for further development.

Three citizen groups within Benin have been actively involved in advocating for changes in ICT-related issues. They are USAPOSTE, a postal and telecommunications user group organized to oppose OPT over billing and other abuses related to monopoly control of international telephone access; UJPB (Union de Journalists Presse Privé du Benin), an organization of private journalists who were the main push behind the struggle for legislation; and ALBODE, a smaller advocacy group concerned with free and open commercial access to the airways.

Research and development

The only hint of ICT-related research and development either occurring or planned within Benin that we were able to uncover (other than the CREDESA proposal) was related to the expansion of capacity for producing tailor-made information software products (such as a compact disk reference library). This work is now underway and will continue at the Centre Syfed-Refer at the University of Benin. We were also told by OPT officials that they have been discussing international telecommunication services with several North American multinationals (AT&T and MCI were mentioned) in order to find a way to bring costs down that seem endemic to the (effective but expensive) French telephone system.

ICT Infrastructure

The ICT infrastructure now in place in Benin (relative to this study) consists of an analog and digital telephone system, a national TV station, and a national AM, FM and shortwave radio broadcasting system (18 stations which includes a network of 5 rural radio stations and simplex radio connections such as are now used in the Ouidah health zone) scattered across

the country.

At the village level there is virtually no electronic communication occurring anywhere in the country. The village level (where most of the people live) is extremely cut off from access to the information originating elsewhere in the world. Some communes have telephone services and a few others have simplex radio systems. Many have nothing. At the sub-prefectural and department level many centers have basic telephone services.

At the very top of the pyramid the Cotonou area exchange (now expanding to include Pahou and Ouidah), Porto-Novo and Paratcou (located about the middle of the country) now have digital telephone exchanges (thus making data links at baud rates of 19,000 and up possible).

While some other areas do have analog telephone system the maximum Baud rate for data transmissions using these systems is 4,800 which permits access to E-mail but means that Inter-net access beyond printed matter (for example for audio visual information or graphics) is not practical.

Information policy

The government of Benin has had a master plan for the development of the communication sector in place since 1985. That plan is currently being updated to include the latest developments in information technology. The goals of the master plan include having two telephones available for every hundred people in the country by the year 2005. OPT has a very active rural telephone program with the mandate to bring telephone service to all parts of the country. There seems to be a fairly resolute determination on the part of the government to bring Benin into the electronic age. A recent 1997 policy document (available from the Director General of OPT) entitled "Declaration Sectorial" elaborated the countries goals with specific alternatives to sectoral applications of ICT's, and reiterates the commitment of the government to insuring access to communication and information technology for all parts of Benin. It is, nevertheless, clear that the implementation of this policy will depend on the availability of funds, and Benin is just now beginning to recover from a monetary crisis which led to severe cutbacks across all government departments.

Health and Development Services Needs

Health and development needs vary significantly depending on where the particular sub-group or organization has its centre and the role it plays. We found the following groupings to be useful in conceptualizing and discussing health and development activities in Benin: the village, the commune, zone and CREDESA.

Village level needs

1. Urgent need for appropriate technology for **medical emergency communication**, i.e.. voice communication between villages and the CCS (Commune) level for medical emergencies.
2. Currently there is very poor and sporadic reporting of the incidence of disease at the village level needed by CREDESA and the Ouidah hospital for epidemiological assessment related to **disease control**. In practice, this has meant that an epidemic can be taking place in the countryside, and its presence can be unknown to health officials until it is too late to control its spread.
3. Many **development**-related problems occurring at the village level require **information** that can be provided by a CREDESA specialist located at Pahou without requiring travel. Examples cited by CREDESA development staff include:
 1. appropriate technology for making bricks that will hold together,
 2. saline problems,
 3. animal disease prevention problems, and

4. advise to borrower groups in the rural credit program.

Communal level needs

1. **Emergency response and referral communication** - the CCS (Complex Communal de Sante) staff need to be able to talk to village health providers to advise on medical treatment, evacuation and referrals.
2. **Disease control** - CCS staff must collect (continuous) epidemiological data to be relayed to the Ouidah zone hospital and to CREDESA for analysis related to disease control. For this they need regular communication with the villages and with the zone level. The current reality is that unless the health services at the CCS are accessed by village people, there is no way of knowing what is happening at the primary level in the system. It very often happens that babies are born, people get sick but do not seek services outside the village, or people die without any of it being reported. What is reported is carefully logged in a well-organized record system that is harmonized throughout the country. Reporting is monthly. In practice, this can mean that an incident occurring at the beginning of the month is reported to zone health authorities at the beginning of the next month, and could take several more weeks before the monthly reports are collated and statistically tabulated. Hence six weeks or more can pass before health authorities become aware of critical incidence and emerging patterns of disease. (As was seen with the Ebola outbreak in Zaire, much less than six weeks can mean the difference between an incident and an epidemic.)
3. **Education and information services** - health and development training and promotion of information requires access to information, to learning materials and technical support from CREDESA.

Zone level needs

1. the Chief Medical Officer in the Ouidah health zone needs up to date epidemiological data. Now, the primary level of health concern (the village level, where everything really happens) is cut off from the system. Communication only happens when health services are provided at the CCS level (Commune level). As explained above, response times are therefore far too slow to allow for adequate disease tracking and control.
2. The medical service providers at the zone level need to be able to communicate to the village level to provide advice in emergency cases and, as well, they need easy communication and a steady flow of reports and relevant information between the zone and commune levels.

CREDESA level needs

As CREDESA is the focus of this assessment, the list of "needs" is more extensive and detailed. This should not be interpreted to mean that there are more needs at CREDESA's level than at the other levels. It only means that, as CREDESA was at the focus of our work, we have provided greater detail at this level.

Communication Needs

CREDESA needs to be able to communicate regularly with all levels of the system by voice and with data links in order to facilitate the flow of information related to;

1. disease control,
2. providing development and health information and other services,
3. monitoring and evaluation of on-going services and health development processes,
4. data collection related to ongoing research, and

5. dissemination of data across the Benin health system and beyond.

Research needs

1. In collaboration with the Zone health authorities at Ouidah, the Atlantic Regional Health Department and the National Hospital at Cotonou, a primary research need at the CREDESA level is to be able to access up-to-date research literature and innovative program information. Essentially CREDESA is in the process of developing an innovative approach to *primary health care system development*, and they need access to the latest research literature and health development program information available world-wide (Good Canadian universities have some 3,000 relevant journals. CREDESA has 16.)
2. Currently CREDESA does not have a telephone link (which means no fax, no Internet, etc.), or radio links to the CCS or to the village level. *They are entirely cut off from the primary level of the system they are trying to develop.* (Transportation is often an obstacle as well.)
3. There is a general need for training of CREDESA staff in qualitative research methodology so that they can engage village and CCS level people as co-researchers in the enterprise of health development. The inclusion of village voices in the communication loop is critical to the effective operation of the CREDESA system. Now there is a gap. Largely the information flow is still one way (i.e.. top down), despite notable effects to change the pattern.
4. CREDESA's research work depends utterly on the collection of high quality data, mostly at the village level. Literacy levels in the Ouidah region are at about 25%. Many village health providers do not read well (if at all) and are not oriented to regular and systematic reporting. **A system of reporting using voice communication is desperately needed to allow CREDESA to know what is really happening at the village level**, where health conditions must be addressed. The ability to monitor the pulse of the system at the village level is the most critical of research-related needs, mainly because the pivotal focus of research is improvement of the quality of life at the village level.
5. Current research goals for which ICTs are needed include;
 1. documentation and analysis of health system operations,
 2. improving the epidemiological oversight, response and management capacity,
 3. improving health and development services at all levels, but especially at the primary (village) level,
 4. monitoring and measuring health providers performance,
 5. monitoring the effects of health interventions,
 6. measuring the effects of credit and income generation activities, and
 7. manipulation and transformation of data as well as health and development information into forms that are digestible at the village, CCS, zone and country level, as well as for research dissemination.
6. Additional research content is now possible. The addition of community voices as partners into CREDESA's' research capability opens the door for systematic study in areas that have been difficult to focus on for sheer lack of sustained contact. We list a few that were mentioned during our study, but these are only examples of a wide range of possibilities.
 1. Practical Health-system for Community development challenges. One example that was current during our field study was the problem of availability of medicine at the village level. In the past, village health workers were given medicine free of charge for distribution (i.e. sales) at the village level. This practice was stopped by the chief medical officer because money was not coming back from the villages, and he has no budget to supply free medicine indefinitely.

Many solutions are possible, such as village voluntary insurance schemes, but no system will work that is not developed by the villages themselves. The research problem is to identify the following;

1. the parameters of available solutions (so field workers can say to villages, "You devise the solution but the infrastructure you devise must have these particular features),
2. appropriate processes for village problem-solving where none exist, and
3. how to harmonize the variety of solutions villages devise into a workable regional system.

Solving such problems are central to the continued development, sustainability and replicability of the CREDESA system.

2. Ethno-pharmacology - One of the most serious challenges to modern medicine in Africa is the continuous evolution of disease bacteria and viruses. Prominent among the diseases that have evolved at the edge or beyond the current capacity of drugs now available are certain types of malaria, typhoid and meningitis and a host of complex viruses including HIV-AIDS.

Very little systematic research has been done in Benin related to traditional medicines and traditional treatment, prevention and promotion. The government of Benin has recently declared ethno-medicine a "priority" for research and development, but no scientific work we know of has begun in Benin in this area. In nearby Ghana, by contrast, an entire health zone has shifted to the production of traditional remedies. We heard claims that traditional treatments for malaria, typhoid and even AIDS have proven to be effective.

CREDESA researchers expressed an active interest in carrying out research in this area and acknowledge that it could only be done in partnership with local specialists and communities.

3. Rural Veterinary Health - It is axiomatic in an agrarian society the health of domestic animals is directly related to the health of people. CREDESA does have a veterinarian on its development services staff, but no research has been carried out in this area.

The involvement of local populations in research and development activities related to veterinary health opens up yet another very useful research focus for CREDESA.

CREDESA-level training needs

CREDESA is breaking new ground in health development work. The system being developed is not merely a rural health delivery system, as complex and challenging as that alone would be, it is a human and community development promoting system, a wellness and prosperity promoting system, a system that is striving to address the foundations of human health and well-being.

The catalytic role CREDESA is playing in the core of this system—development process—is one that requires CREDESA itself to be continuously developing its own capacity in order to keep pace with its chosen role of catalyzer of the system's growth and development.

As Mr. Malick Sene, the Benin country director representant of UNICEF so aptly put it in our conversation with him in Cotonou, "CREDESA is not merely a Benin

phenomenon. Especially since the Bamako Summit (1993), CREDESA has become a living, evolving model of what is possible in primary health development in Africa, and indeed in the World."

He went on to explain that CREDESA routinely receives visitors and inquiries from virtually every continent (he mentioned Vietnam the French Caribbean, Pacific and a handful of African countries as examples). He then went on to say that, as impressive CREDESA is now, it still has a great deal of learning and development ahead of it. If we look at what is actually happening (and not yet happening) especially at the village and commune level, we see that roughly a third of the CCS groups are quite strong and a third are very weak, leaving a middle third that are doing alright, but not nearly as well as they could. Mr Sene went on to stress that what we now need to understand far more deeply than we now do, is the following: Why is it that this particular third is doing so well? What is it about them? What are they doing right? Are there socio-environmental factors we should understand? And what about the bottom third; why are they doing so poorly relating to the others? What accounts for differences we see? And, most important of all, what is now needed to help each group move to the next level in their development? What are the next steps for the top third? What is the next step for CREDESA itself?

The representatives questions are (to our way of thinking) exactly on the mark. It is an explicit goal of the capacity-building dimension of our recommendations to problematize the practical work of answering these questions and promoting the process of continuous organizational learning at all levels of the CREDESA system.

We list below a listing by topic area of the learning needs we were able to uncover:

1. Research;
 1. qualitative research methods,
 2. participatory action research,
 3. qualitative documentation & reporting, and
 4. advanced statistics.
2. Community development and Community Health promotion strategies including;
 1. needs assessment,
 2. project design,
 3. project implementation, and
 4. project monitoring / evaluation.
3. Training;
 1. information / communication packaging,
 2. curriculum needs assessment,
 3. curriculum design,
 4. technical writing for Community consumption,
 5. production (layout, use of audio-visuals, voice overs, etc.), and
 6. working with translators.
4. Use of ICTs;
 1. ICT equipment maintenance,
 2. information and communication software development, and
 3. setting up a disk-stored reference system (like a compact-disc encyclopedia).
5. Internet applications;
 1. bibliographic searches,
 2. www searches, and
 3. making and maintaining a WEB page.
6. Training of Trainers development;
 1. facilitation skills,
 2. leadership,

3. team building,
 4. human relations,
 5. conflict resolution, and
 6. adult education and train principle strategies.
7. Development topics and issues training;
 1. rural credit,
 2. literacy-awareness,
 3. conservation,
 4. gender,
 5. rural electrification,
 6. culture in development,
 7. youth development,
 8. community economic development,
 9. political development (i.e. community governance),
 10. water,
 11. animal husbandry,
 12. agriculture, and
 13. fish cultivation.
 8. Health-related training;
 1. village health Agent (AVS) upgrading,
 2. communal Health Workers (CCS) upgrading,
 3. participatory management strategies,
 4. epidemiological data collection for village and CCS levels,
 5. epidemiological data analysis and monitoring for zone and CREDESA operations, and
 6. ethno-pharmacological research and analysis methodology.
 9. Program development;
 1. participatory management strategies,
 2. conflict resolution,
 3. human relations,
 4. inter-sectoral partnering,
 5. fund-raising / grantsmanship, and
 6. financial management of health and field development programming.
 10. CREDESA's current training activities related to health and development across the system should address the following ICT-related needs;
 1. the need to build the research and development capacity of CREDESA,
 2. the need to repackage health and development information for various users across the system,
 3. the need to tailor-make learning programs for health workers and community people that fit their realities, and
 4. the need to develop programs of continuous learning that have a scope and sequence appropriate to the health challenges and village level realities for health workers across the system.
 11. The CREDESA staff development process will be especially critical if the introduction of ICTs are to be effective. Some of the most important needs for staff training are;
 1. technical training for computer maintenance and repair;
 2. advanced computer programming,
 3. transformation and repackaging of health and development information and research findings for village, CCS, zone and country level consumption,
 4. advanced research methods training, especially in qualitative methodology and advanced statistics,
 5. advanced training in community health development intervention strategies, and
 6. advanced descriptive reporting methodology.

CREDESA level diffusion and networking needs

Benin already has Internet access, and the connection of CREDESA to the Internet is critical to the ongoing development of their primary health care system for the following reasons;

1. for access to up-to-date technical and research information,
2. the ability to diffuse (through their own web site) the findings of their research, and
3. for engagement in dialogue with colleagues in Benin and other countries.

Making Connections

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in consultation with

CREDESA
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Recommendations

Overview

To this point we have described the situation and defined the needs. What follows is our recommendations for the introduction of technologies, organizational structures and training to address these needs. It is important to stress again that we are recommending an integrated system which requires the development of human capacity as much as the installation of hardware and software in order to achieve its purpose of developing and strengthening the effectiveness of CREDESA's primary health care systems.

The recommendations are organized by level (Village, CCS, Zone and CREDESA) and

have two sections: (1) the recommended type of equipment (hardware) to be installed and (2) the rationale for the recommendation. Throughout this section, there is reference to the need to train the people in the use of the technology—to bring the people to the technology. It is this process and not the introduction of the technology (i.e. bringing the technology to the people) which is seen as the key component of this project. We understand that it is the strengthening of human capacity to use the technology available which is the key to the development process. Technology, in and of itself does not facilitate development nor does it necessarily improve the human condition. In fact, it may have the opposite effect.

We have identified four basic types of communication equipment which we feel would be appropriate for use in CREDESAs environment in Benin. These are:

1. FM (Simplex) radio links - This radio technology would be used to facilitate communications between villages, CCSs, CREDESA Research & Development and zone hospital;
2. Remote (Duplex) telephone links - Remote wireless telephone will be used to link CREDESA Research & Development to CCSs and Zone Hospital; and
3. Computer-assisted/controlled communication (i.e.. FAX, e-mail, Internet access) - Computer-assisted/controlled communication to allow CCSs, Zone Hospital, CREDESA R& D, University, National and Regional Departments of Health to share both communications (information, messages, notices, etc.) and data.
4. Broadcast communications - FM broadcasting will allow CREDESA and Zone Hospital to reach the larger community very quickly if needed and to undertake a program of general health education. It will also allow villages to communicate with each other.

We have summarized the use of the above technologies to be employed at the various levels in Table 1 below and have included a diagram (Diagram 1) showing how the system components can work together to address the total spectrum of ICT needs identified.

Table 1. Communication linkages by level and technology

	Village Health Workers	Community Health Centres	Ouidah Hospital	CREDESA Research Complex	University Hospital - Cotonou
Communications Radio	X	X	X	X	
Telephone Access		X	X	X	X
E-mail Access		X	X	X	X
Internet Access		X	X	X	X
FM Broadcast	X	X	X	X	X

NB: For radio communication it's possible that villages at extreme opposite positions have difficulty communicating but otherwise communication is possible between all locations equipped with a radio.

Looking at Diagram 1, radio communication will exist throughout the shaded area of the diagram. This will allow simplex radio communication between any combination of points inside the circle.

Telephone communication links will exist between CCSs, CREDESA R & D and Zone Hospital allowing duplex communication with these and national or international agencies.

Computer-assisted communication will exist between CCSs, CREDESA R & D, Zone Hospital, University, national and international agencies to allow data and fax exchanges.

FM Broadcast radio would be available throughout the entire area.

DIAGRAM 1 goes here.

Option One. A Complete ICT system

Option one is the complete ICT system described below. We believe that this is the optimal choice for meeting the development challenges now facing the CREDESA-initiated primary health care system. By optimal we mean culturally adaptable, cost efficient, effective and sustainable.

Primary health care system as a whole

In recommending this system as an organic whole we are addressing what we see as an integrated web of needs related to:

1. health and development services,
2. research,
3. training and Education, and
4. diffusion and Networking.

As we see it, the complete system would consist of the following components to be used for the following purposes. Our recommendations are presented by level.

Village Level ICTs

1. Recommendation

At the village level, we recommend the installation of;

1. a simplex two-way radio system, which will allow voice communication with the communal health centers, the three hospitals, CREDESA, as well another villages.

2. Rationale

1. Sending or receiving medical communications, requests for technical assistance or the passing on of medical treatment advice from the zone or CCS level to village health workers.

A simplex radio system will greatly increase the capacity of zone and communal health providers to issue quality care for emergency as well as chronic cases. Currently, such cases can only be handled if either the patient or the provider travels. As there is a general shortage of vehicles, and because two workers (nurse and midwife) have to be

available to serve 6-8 villages, the ability to work at a distance to screen patients, give advice to village health workers regarding treatment, and evacuation or, if need be, to consult the zone hospital for technical advice will all greatly improve the medical services for village people.

2. Information sharing related to regional activities and project organization

The simple task of calling a meeting of representatives from 8 villages requires that messages be hand delivered to all the villages. This process can take days or even weeks, and confirming participants availability can and often is impossible. The proposed radio system will make it possible for health zone and research and development activities to be greatly accelerated in the sense that a comparatively few people will now be able to do most of the organizational and communications work for any given month in a fraction of the time that it previously took for many people across the system to organize a simple meeting.

3. Two - way flow

Despite concerted and systematic effort to work in a participatory manner, much of the initiative for the ongoing system development process still comes from CREDESA. This is not for lack of ideas, enthusiasm or even capacity at the village level as much as it is because of a lack of the means and mechanisms needed.

One of the principle contributions we believe will be made by the addition of the village radio communication system is that the villages will have a voice in the ongoing dialog driving the primary health care system development process. Village committees and groups will be able to initiate meetings with technical helpers at the CCS, zone or CREDESA levels. They will also be able to initiate and organize collaborative activities with other villages, exchange information and ideas related to health and development challenges, pose questions related to health emergencies and obtain rapid and appropriate advice from whatever source they need to turn to.

In short, the simplex radio system at the village level has the potential to transform the power balance and the role villages have had to live with in the process up until now. To a much greater degree than was ever possible before, villagers will leave behind the role of passive recipient of services, developmental programming and information, and will gradually (as they learn how) be able to much more effectively play the role of partners in the health development process, with real power to direct and control the services they receive.

This shift will not come overnight, and it will not come without considerable investment in training and in developing participatory mechanisms that can sustain the new level of work—and therein lies a major piece of the research work that we believe is fundamental and necessary for the successful introduction of ICT's into the CREDESA / Ouidah primary health care system.

4. Partnership with CREDESA researchers in sustained research activities

Another important change the radio system will make possible from the villages point of view is that it will make collaboration (with CREDESA) in ongoing research activities feasible. There will always be a need for researchers to spend time with people in the village, but once effective working relationships are established, it will

now be possible to engage groups of village people in many villages across the system in collaborative research efforts.

This represents a significant upgrading of CREDESA's research capacity because the entire focus of CREDESA's work is the continuous improvement of health and well-being of the people who live at the grassroots level in Benin society. Until now, there has been no easy way to engage significant members of those people in processes of researching their own lives in the quest for ways of transforming health conditions (except for occasional visits and focus groups meetings). It will now be possible to greatly sharpen the focus of CREDESA researchers on the real needs and challenges of the people CREDESA was created to serve. Looked at from the village point of view this potential will (at the very least) help to focus the technical assistance available on the actual cutting edge of the health development process as it evolves. More optimistically, it has the potential of connecting CREDESA's scientific and social research capacity as well as its access to a global information networks to village problem solving efforts.

Centre Communal de Sante (CCS)

1. Recommendation

At the CCS level we recommend (in addition to the simplex radio system they now have) that the following equipment be installed;

1. a computer (IBM clone) with CD Rom, modem and capacity for voice, and a basic printer, and
2. wireless telephone connection (an extension of the CREDESA/ Zone hospital system which is (soon to be) part of the hard-wired Benin telephone system).

2. Rationale

1. Disease control

CCS staff must collect (continuous) epidemiological data to be relayed to the Ouidah Zone hospital and to CREDESA for analysis related to disease control. For this they need regular communication with the villages and with the zone level. The current reality is that unless the health services at the CCS are accessed by village people, there is no way of knowing what is happening at the primary level in the system. It very often happens that babies are born, people get sick but do not seek services outside the village, or people die without any of it being reported. What is reported is carefully logged in a well-organized record system that is harmonized throughout the country. Reporting is monthly. In practice, this can mean that an incident occurring at the beginning of the month is reported to the zone health authorities at the beginning of the next month, and could take several more weeks before the monthly reports are collated and statistically tabulated. Hence six weeks or more can pass before health authorities became aware of critical incidence and emerging patterns of disease. (As was seen with the Ebola outbreak in Zaire, much less than six weeks can mean the difference between an incident and an epidemic.)

By combining daily village-level radio-based reporting (to CCS) of health incidences together with an improved CCS level integrated record keeping system using a simple data management software program that tabulates as new data is entered, it will be possible to have a much faster, current and accurate picture of the epidemiological shifts occurring. By adding E-mail capacity it will now be possible for weekly or even daily reports to be forwarded electronically to a central

data processing system at CREDESA and automatically tabulated as CCS level data is integrated into a regional analysis.

2. Epidemiological Research

The implications for such a system for epidemiological research are enormous. For the reasons explained above, there are serious gaps in the availability of up-to date, consistent and reliable data, and many of these problems will be solved by the system of connectivity we are proposing.

3. CCS as a Health and Development Learning Centre (HDLC)

Currently the CCS is a health treatment centre that engages in some prevention and promotion activities. It has two staff, a nurse and a midwife. The potential for the CCS to become a catalyst for health promotion and community development has not yet been realized. This fact has been recognized by CREDESA, and they have already begun a process of team-building at the commune level which brings together the other government and NGO workers in the area.

Depending on the locality, this usually involves an agriculturalist, a rural development specialist (with an economic focus), a social worker and an adult educator (usually with a focus on literacy and basic education). CREDESA sees the work of building the capacity of these communal teams to provide technical assistance and training to 6-10 villages in each commune as a necessary next step in the primary health care system development process.

The current pattern is that CREDESA staff is trying to be the provider of training, technical assistance, information and other services. In order to develop a system that is replicable elsewhere in Benin (and in other countries), the capacity to provide technical assistance must be developed within the system itself, and cannot depend on the research and development group (i.e. CREDESA) facilitating the system development process.

One of the primary uses of the computer at the CCS level is to store and to make accessible a wide variety of health and development information in a form that can actually be used by communal level providers and village people.

We propose that a health and development resource bank be developed and stored on disk or compact disc for use at the communal level.

The features of this resource bank could include appropriately packaged information on a wide range of topics including;

1. medical references information for CCS providers,
2. health information for mothers and children designed and packaged for village level consumption), as well as other types of health information, and
3. development information on the areas of work CREDESA is already involved in, including agriculture, fish culture, water management, construction, small businesses and entrepreneurial development, health cooperatives, local credit systems, literacy and basic education.

The material would be developed in the local language (Fon), and

would have pictures and a voice-over presentation, so that those who cannot read can access the information (65-75% are illiterate in the Ouidah health zone and among woman, the level rises over 90%).

The system would be icon driven to allow easy access and mobility within the programs.

It may seem at first that we are proposing something technologically remote from the real world context of rural Benin. Following are our thoughts on why we believe such a system will be cost effective, context-appropriate and sustainable.

CREDESA has already produced and collected a considerable bank of paper-based information resources in the form of books, pamphlets, manuals, etc. As well, they have a fairly comprehensive video library. Please note that we have decided not to recommend the application of video and television at the CCS level because;

1. we anticipate the CCS staff being pressured into offering recreational video services, and
2. we see the CD ROM technology as being more versatile and directly applicable.

All of these resources can be converted and combined with CD ROM or other disc formats. The problem with the current resource bank is that it is physically located at CREDESA's headquarters at Pahou. In general, paper based resources are subject to wear, loss, theft, humidity and many other hazards as well.

What we propose will (after a period of developmental work to get the system up and running), greatly increase CREDESA's capacity to diffuse health and development information and the results of research to the CCS and village levels. Any villager or rural provider will be able to go to the nearest CCS Health and Development Learning Centre (HDLC) and access the complete range of information now only available by making a trip to Pahou (something that is very expensive in terms of time and energy for a village-level person).

Current research underway at CREDESA on the use of health and development services is showing that because of the enormous costs associated with accessing health and other sources requiring travel, the vast majority of people (and especially women) simply opt for a local and usually traditional solution or no solution at all. It is very important to recognize that villagers routinely do their own cost-benefit analysis. When human energy and time are needed for other survival-related activities, and when people have almost no margin of risk or slack in terms of the resources available to them, they will naturally choose to not access services that are "available" to them if the costs of access are too high.

If we believe that information is an important input in the process of improving health and quality of life, then we need to find ways of making information affordable to those who need it as well as appropriate to their needs. In this vein, the ideal would be a situation where the knowledge required at any particular level would be available through one or more of the people living and / or working at that level; that is, one or more individuals with the needed knowledge residing in the village or working at the CCS, CREDESA or the Zone Hospital. Through these informed individuals, the knowledge could

either be shared (as in the case of knowledge which should be general) and thereby made generally known or tapped on an "as needed" basis (as in a case where the knowledge is more specialized and does not need to be generally known). One of the advantages of Health and Development Learning Centres is that it can be organized as the local centre for sharing knowledge. The knowledge required by the community can be stored here, accessed as required by any community member, and used for training, upgrading or refreshing the community members selected as repositories for more specialized knowledge.

In the process of bringing knowledge to the community, it is important to recognize that this knowledge will have to be filtered and translated so that it can be presented in a manner which can be integrated into the understanding of the recipients. This interface role would best be played by the set of HDLCs coordinated by CREDESA to ensure there is no overlap of filtering and translation work.

3. Arguments for and against

1. The computer based CD ROM information service we propose would be costly only in terms of initial development time. Production is labor intensive and does require appropriate technical know how which would have to be purchased and eventually transferred to CREDESA. Reproduction is relatively cheap. Because an entire library can be stored on one or a few disks, storage and systems maintenance are also achievable with a minimum of cost.
1. The capacity to develop the sorts of materials we have described for storage and retrieval on compact disk already exists in Benin at the Université of Benin's Center SYFED-REFER. In discussions with the Center's director, Mr. Jean Tchougbe, it became clear that they have already developed a similar type of reference system for their own Center, and that they would be delighted for the opportunity to work with CREDESA on developing a system for rural use. The center SYFED-REFER is already a working partner with CREDESA, providing training as well as, bibliographic and inter-net services to CREDESA researchers.
2. Eventually it will be possible to develop and store up-to-date local health and development profiles generated by local communities with technical support) that provide outside helpers, researchers and government with relevant and timely analysis to use as a base for program development and further research. This sort of "mapping" is intrinsic to participatory methodologies designed to systematize community generated knowledge and analysis, and is already in use in Benin to a limited degree in the work of some NGO's (Aid et Action and their partners). The recording of a baseline of qualitative and quantitative description of community realities is a fundamental step to improving the quality of research (especially data analysis) and program development. This technology will make it possible to store and update such baseline "community stories" and to diffuse these community generated research outcomes across the CREDESA system and around the world.
3. Information is never neutral and it is virtually useless in development contexts unless it is:
 1. tailored to the capacities and needs of the consumer (i.e. packaged appropriately)
 2. linked to ongoing real-world processes and problems; and
 3. those destined to use the information participate in what information comes to them, how it is organized, and in

controlling the inquiry process through which the information is accessed.

Extensive work with tribal people and ICTs at the University of Alaska Fairbanks (Ray Barnhardt et al.) has shown that more than any other medium (incl. human facilitators), computer assisted information and learning can be extremely effective in supporting systematic learning, even when the content of the information has been generated from within other cultural contexts. This is largely because the information seeker/ learner can control the pace and the logic of the enquiry process.

4. The necessity of a building a "human bridge" with which to bring the people to the technology is of the utmost importance. This is the most costly link in the chain. It involves team building, training, the establishment of participatory mechanisms, systematic research, and time.

Specifically, we recommend that in order to bridge between the two ends of the CREDESA system (top down and bottom up) capacity building is needed in the middle—at the CCS level. The proposed commune level team (involving CCS health staff, as well as commune agriculturalists, adult educators, social workers and local NGO representatives) will need:

1. adult education and animation skills,
2. information, basic research and computer skills,
3. communication and media skills,
4. community development knowledge and skills, and
5. basic health promotion/prevention/primary treatment knowledge and skills.

It is this group who will provide consistent mentoring and animation services to villages in support of village development (a role now being played largely by CREDESA staff, but one that needs to be shifted to the CCS level).

5. The systematic upgrading and training of health and development workers at the commune level can be carried out at a distance from CREDESA and the zone hospital using a combination of e-mail, downloaded lessons, voice mentoring by telephone and simplex radio, and through regular courses offered on the CREDESA FM broadcast radio system (see below). **The access to information of these providers relevant to the technical support and services they are asked to give to the villages is a critical link in the chain**, and constitutes yet another reason why computers with CD Rom capacity and data link capacity are needed at the CCS level.
6. Telephone , fax and E-mail communication - Those of us who had become used to electronic communication can scarcely imagine the hassles and obstacles that go with trying to produce a simple letter, proposal or report using a typewriter and somehow getting our document corrected (i.e. retyped) and transported to its intended receiver. It is clear from conversations we had with workers at the village at CCS level that they often have considerable difficulty in making their ideas and problems understood in short burst (i.e. radio) voice communications, and that writing letters and reports present many obstacles as well. The simple addition of E-mail will greatly increase the two-way flow of written communication between all levels of the system. Questions and answers can be asked and answered without requiring real-time communication, and with relative certainty

that messages sent are actually received. Research, health system management, and development program reports from the village and CCS level can be recorded and passed on instantly. Training programs can send lessons, receive assignments and provide mentoring services. Field workers can receive advice as to problems, answers to administrative questions and clarification on technical issues. In summary, the flow and exchange of information can greatly increase the efficiency and effectiveness of the system.

The capacity of the Chief Medical Officer and zone hospital staff in directing and guiding health services will also be greatly enhanced by the ability to have telephone conversations, to transmit e-mail messages to and from the CCS level, and to receive consistent health reporting that describes what is happening on daily and weekly basis at the village and CCS level. As well, the Chief Medical Officer will have access to international health data banks such as HEALTH-SAT through Internet, and will be able to consult with colleagues in Cotonou, the West African region and around the world. Hence the quality and quantity of technical knowledge and advice available in the system will be many times greater than it is now.

CREDESA / Zone hospital level

1. Recommendation

We recommend that the following ICT equipment be installed at CREDESA in Pahou and at the zone hospital at Ouidah;

1. simplex radio system with a 30 meter tower to ensure coverage of the entire Ouidah health zone,
2. a computer with CD ROM, modem and voice capacity, plus a printer,
3. e-mail and internet connection,
4. a wireless extension telephone system connected to the eight CCS centers, and
5. a 50 watt FM Broadcast radio transmitting station be installed at CREDESA in Pahou (i.e. Rural radio station)

2. Rationale

1. Simplex radio - The installation of a simplex radio equipment at CREDESA in the zone hospital will serve the following functions:

1. For the zone hospital;
 1. the transfer of medical advice,
 2. receipt of emergency medical and evacuation distress calls,
 3. supervisory and monitoring of health staff at the CCS and AVS (local) levels, and
 4. receipt of epidemiological reports that describes real-time health incidences at the village level

2. For CREDESA;

1. ability to monitor and evaluate ongoing health and development services across the system,
2. ability to provide health and development information and advice in response to requests and problems in the system,
3. ability to develop data generation and reporting systems at the village level and to receive real time up dates on health conditions, and
4. ability to receive current epidemiological information for data processing related to disease control and management

2. Computer and data links by telephone to the CCS level and to the

world. This will provide the CCS, zone hospital and CREDESA with:

1. the ability to access international scientific and scholarly bibliographic data banks and to communicate and collaborate with colleagues all over the world through e-mail, Internet and fax;
 2. the ability to relay information and technical advice to health and development workers at the CCS level;
 3. the ability to conduct training programs at a distance that combine broadcast radio courses and printed resource materials and receive assignments and other communication from learners in the field without the cost and disruption of services associated with the travel of workers to central locations;
 4. the ability to collaborate within institutions in Benin such as the Université de Benin medical school, UNICEF, the World Health Organization, etc. (Currently CREDESA is cut off both from the system that it is created to serve and from any outside communication because the center at Pahou has no telephone service.); and
 5. the ability to share information, data, and to coordinate the activities between CREDESA and the chief medical officer and his staff using telephone and e-mail links
3. 50 Watt FM Broadcast (rural radio) station. This feature will provide CREDESA and zone hospital authorities with the capacity to;
1. broadcast health information,
 2. broadcast health education and training programs,
 3. broadcast development information and training,
 4. encourage issue-oriented two-way dialogue with community and CCS level people (using simplex radio for feedback), and
 5. emergency bulletins.

We also envision community generated radio productions involving the villagers. These will allow the villagers to share their development stories, their problems and solutions and also involving the use of the arts and traditional music as a way of strengthening the collective identity of a regional (Ouidah) health and development movement. At this writing we know of five (5) such rural radio stations in Benin funded by Agence Cooperation Cultural et Techniques (ACCT). (ACCT is an international NGO with offices in Montreal and Paris). These stations are all "officially" government radio stations that operate in a specific rural area and which focus exclusively on health and development issues. The government of Benin's Office Radio Diffusion et Television de Benin (ORIB) provides training, technical support and animation services for the startup of stations and licencing is easy to obtain.

In our view the addition of FM broadcast radio capacity to the CREDESA system offers a cost-effectively way to provide a tremendous reinforcement of CREDESA'S ability to diffuse research, health and development information, and to develop training programs of many sorts at a distance.

Summary of Option One

In summary, we have presented as option one the full range of ICT equipment and the reasons for each recommended configuration. Everything recommended is feasible in the Benin context. By "feasible" we mean:

1. that it will serve the fundamental goals of improving health and the quality of life
2. that it will enhance the capacity of the CREDESA primary health care system in all of the four (4) critical dimensions, namely;
 1. service,

2. research,
3. training, and
4. diffusion.
3. that it can be readily adapted to the cultural and other contextual realities of Benin;
4. that the human capacity to make full use of the ICT's for health development either exists now within the CREDESA system or can be developed;
5. that the recommendation is cost-effective in that what is proposed does what it is designed to do with the minimum expenditure necessary while producing significant improvements in system performance.

What we propose as the full system option includes the hardware necessary to install the systems outlined above and the training necessary to build the research and development capacity and process that run throughout the project. Total cost of this project, both the hardware and the training, is approximately \$700,000.

Implementation

We are proposing a two-phase implementation as outlined below.

Phase 1

Phase one would include the addition of the following to the existing systems;

1. a simplex radio system at the village level,
2. research and development work and training, especially focused at the CCS and CREDESA level with the aim of building capacity to bring village people fully into the system,
3. a number of computers, each with a CD-ROM, modem, printer, an internet connection and e-mail capacity. These would be installed at CREDESA and the zone hospital but not at the CCS level.
4. a 50 Watt FM Broadcast radio station located at CREDESA.

This stage would take two years to implement and would cost approximately \$246,480 for equipment, \$72,000 for buildings to house the village radios (provided by CREDESA) and \$179,573 for research and development capacity building for a total cost of approximately \$498,053. This includes an estimated maintenance cost equivalent to 10% of the equipment value. This phase would allow much of what is possible with the full system, but the dimension of data links to the CCS level and the capacity to develop CCS level Health and Development Learning Centres (using the CD-ROM disks for information storage) would not yet be introduced.

The first two year phase would entail developing the basic human resource network, mechanism and systems for information sharing and community participation and research activities, and in capacity building and development related to preparing information resources suitable for CCS and village level consumption for storage and retrieval on disk or compact disk.

By the completion of phase one:

1. Village-level radios would be fully operational;
2. Village systems of information collection and reporting relative to epidemiological oversight and critical incident management would be in place;
3. Mechanisms for village level participation in CREDESA research and program development (related to health and development services) would be well established;

4. CCS-level multi-sector teams consisting of two health workers, an agricultural technician, a social worker, an adult educator and other available resource people will have completed a team building, planning and animation training process and will be working as a team (backstopped by CREDESA staff) with villages in their commune area;
5. A system for computer-based epidemiological record keeping and data analysis will have been developed at CREDESA in consultation with the Chief Medical Officer. This will allow rapid and continuous analysis of health conditions and incidences of disease across the zone. This system will likely include daily (or at least, weekly) reporting by radio from villages to the CCS level and daily (or weekly) reporting by the CCS staff (using radio) to CREDESA. Protocols and forms to systematize the work will be developed that are harmonized with the currently operating system;
6. CREDESA will have developed a prototype information resource database suitable for storage on disk and appropriate (i.e. local language, voice-over, visual images, and appropriate topics, etc.) for communal team and village level access to information;
7. CREDESA will have strengthened its research capacity in two ways;
 1. through internet access to international bibliographic databases and the development of electronically-based, collaborative relationships with other institutions and appropriate mentors, and
 2. through the engagement of village and CCS levels in ongoing development dialogue and research processes.

Phase 2

Phase two would occur in year 3 of the program and would add;

1. computers (each with CD-ROM, modem and printer) at the CCS level (eight centers), and
2. Wireless telephone connection at the CCS level allowing voice and data link communication from the CCS level.

This addition will add the capacity for e-mail, fax, and internet access at the CCS level (though the CCS internet access will be at a relatively slow baud rate (9,800) which will not be practical for downloading graphics).

A primary capacity added to the CCS level by these additions is the introduction of a CD-ROM Health and Development Resource database (developed by CREDESA during Phase 1).

Phase two will cost approximately \$100,965 for equipment and \$89,790 for research and development capacity building for a total of approximately \$190,755. This includes maintenance costs estimated to be 10% of the equipment cost.

When taken as a whole, the cost of this full option will be \$352,150 for equipment, \$67,295 for equipment maintenance and \$269,360 for research and development capacity-building costs. The combined cost for the full program will be approximately \$689,000 for an average cost of \$230,000 per year for three years.

Option Two - The broad-based, narrow-topped, minimal system

We have listed the estimated costs and the proposed functions of all equipment in Annex

C of this report to allow mixing and matching. Some workable options, apart from the two-staged Complete System outlined above in Option 1 are possible though not recommended. The system development process (vis-a-vis ICT's) has basic minimum needs, below which benefits would not justify the costs. We have attempted to describe here a configuration that cuts as close to that basic level as we can see will actually make needed differences within the CREDESA system. By this we mean that the implemented ICT system will;

1. increase research capacity,
 2. increase quality of service,
 3. increase people's participation in the system,
 4. increase access to information at all levels of the system, and
 5. increase replicability and diffusion capacity.
1. Recommendation and rationale

In order to respond to each of these five need categories, we see a need for a simplex radio system at all levels, broadcast radio at CREDESA, and internet /e-mail capacity at the CREDESA and Zone levels. However, it would be possible to make some improvements in all of these five areas by the addition of only simplex radio to all levels of the system and therefore we regard this option as the minimal system. The cost of this option would be approximately \$206,000 in hardware with a research and development cost of \$269,360 (a minimum basic research and development cost of approximately \$175,000 could be option) for a total of \$475,360 (This includes an additional 10% of hardware costs for maintenance.).

It is our belief that, while this type of stripped-down option can be selected, it cannot be justified on any but financial grounds. Further, that the financial "savings" are small relative to the loss of system capacity. This fact tends to make these options unacceptable in general and even more unacceptable in a pilot project or research situation where funds are being spent measuring the project outputs and results.

Option 3 - The narrow, top-to-bottom research/pilot system

1. Recommendation and rationale

This option would see the complete system (village radio, CCS computer and data / telephone link, CREDESA/zone hospital data links, simplex radio, and broadcast radio) at the CREDESA level, but would involve only a few selected communes and village clusters (for example, 2 of 8 villages in a commune). This option could be useful for a pilot study or focussed research on the use of ICTs. As such it could be a first step in implementing the recommended option. What is lost in this option is the larger-scale interaction between grassroots organizations and the people. Consequently, the critical mass required for larger-scale health care and community development may not exist.

The equipment costs would be approximately \$133,258 for this option while research and development costs would be approximately \$269,360 and for a total of \$402,618 including the 10% equipment maintenance cost.

Making Connections

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Making Connections: An Assessment of the Information and Communication Technology Needs of CREDESA for Health Care Work in the Ouidah District of Benin

FINAL REPORT

IDRC Study/Acacia Initiative
Prepared for IDRC by
IntraDelta Management
Consultants International Inc.

Dr. Michael Bopp, Allan Fuller and Richard Neufeld
in consultation with

CREDESA
Dr. Alphonse Guideme,
Dr. Theodore Soude and
Dr. Timothee Gandaho
April, 1997

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Implementation Issues

From Installation to Maintenance

Within the concept of transfer of technology "it is very easy to forget the little things". We want to comment on the requirements of installation and maintenance related to the equipment we have proposed.

We were unable to find any commercial or technical organization within Benin capable of supervising

the installation of the broad range of equipment we are proposing. Some could broker a sale if told what to order. Others could install parts of the system; but we could find no one who really understood the finer points (such as programming to eliminate interference problems) of simplex radio systems, or of diagnosing any but the most obvious computer hardware problems. CREDESA itself has an informatics department with a computer technician who is probably as well trained as most in Benin.

The National government radio service was very generous in offering to help with the installations and capacity building related to the rural radio system we are proposing (they have 6 other such operations), and Syfed-refer (the Francophone scientific and research service at the University of Benin) expressed similar enthusiasm for partnering with CREDESA on the Development of a compact disc health and development reference service for rural people. Both groups are really looking for money to keep themselves going and with very little training, CREDESA itself can be technically equal (if not superior to both of them).

For these reasons we recommend the following related to installation and maintenance:

1. That a master technician be brought in from outside Benin to supervise the installation of the simplex and broadcast radio systems (two jobs that would most cost-effectively be done at the same time).
2. That the master technician be someone who can speak French, has considerable experience in installing and maintaining such systems in similar types of environmental and cultural contexts, and is capable of teaching what he/she knows to a Benin team.
3. That a CREDESA technician team be assembled, with representatives from each of the 8 commune areas and from CREDESA's Informatics Department, and that this team be trained to install and supervise the maintenance of the system. In this way every commune should have someone (and someone not far away to backstop) who can watch over and do simple maintenance on the system.
4. That the installation itself be carried out by the team under the supervision of the Master technician.
5. That the installation and training related to the computer and wireless telephone links be carried out by the same master technician (or someone very similar) in tandem with a computer communication specialist so that the system interfaces can be harmonized.
6. Finally we are aware that costs for installation of such a system can vary a great deal, considering which company is engaged to do the job. We have budgeted for a 15% installation cost, and are quite certain that the job can be done within budget if it is done as we propose.

The CCS and village-level management and control of equipment

When we asked commune and village level health and development workers about whether they felt villages would be able to insure that their radio system would be well-maintained and that its use would benefit the whole village and not just an elite group who got control of its use, the people were most eloquent in explaining how things would work.

We need this system. It will save lives - the lives of people we love. People might think because we are poor that we don't know how to take care of something valuable. But the truth is, we know how to take care of things because we are poor and we know how it is to pay for such things. We already have proved we can take care of radio systems. As you can see, we have radio in our communal health centres, and they are very well taken care of."

As to the question of managing the equipment, there was a fairly unanimous opinion expressed that:

1. The radio should be not only for health services use. It must be for the benefit of the whole community, but confined to things that will help to improve the lives of the people (i.e. development).
2. Approximately 60% of the villages have elected and functioning Development Committees whose job it is to coordinate village health and development activities. The remaining villages have counsels of elders. These collective management mechanisms have their roots in traditional

systems and are well-respected. We heard nearly unanimous support for the idea that the interests of all groups would be equitably represented if the radio's use was governed by one of these groups.

Women and access to ICT's

We specifically asked groups of service providers and groups of village women to comment on whether they felt the system we are proposing would increase or decrease the power women have within the communities, and the ability of women to access and utilize the information and services provided in ways that would improve their lives. We were surprised at the somewhat amused look on the faces of many of the women the first time we asked this question. After a polite period of oblique responses, one woman finally spoke up and said,

It is us women who concern ourselves with the health of our children, our families and communities. We are the ones who think about these things and we are the ones who do most of the work for improving these things. We also do most of the business activities. So, given all these things that we do, do you think we will not have a say about how things go?

Another woman, a birth attendant, said,

Most of the health emergencies that happen in our villages concern women and children, and it is we women who will use the radio far more than the men.

We began to wonder, after several meetings in which similar comments were made, whether we should be asking about how to help the men to learn to make effective use of the radio.

In 30 of the 60 villages in the Ouidah health zone, local credit groups are operating (Grameen Bank style) revolving loan funds. Those groups are 90% (or more) comprised of women. Many communities also have all-women enterprise groups (coconut oil, fish sales, village convenience stores, etc.). The idea that any group working together for development purposes would have access to the radio system was universally agreed by everyone we consulted.

CREDESA has been working in the Ouidah area for ten years. The capacity of many people at the village level to participate in processes of consultation and collective decision-making has clearly been enhanced by the gradual development-learning process CREDESA has facilitated.

We saw women speaking their mind openly and with alacrity at every level of the CREDESA system, and most strongly at the village level. Perhaps the place where the most work is needed in integrating women and women's perceptions into the CREDESA system is with CREDESA's own professional research team at Pahou.

For that reason we are **recommending** that one of the core staff of this (proposed) research and development process be a woman, and that *she be asked to engage other women across the CREDESA system in research and development activities*.

Proposed core of systematic training/capacity-building

We believe that the system development process that we have described must have a systematic process of learning at its core. The process of learning we envision must be formalized; i.e. scoped, planned, organized and implemented in a manner that is directly linked to the practice-centred action and reflection work which is described above in the subsection on monitoring and evaluation.

We also believe that the proposed rhythm of practice-centred seminars and field workshops involving eight and fourteen day sessions spread evenly over the three-year life of the project will reinforce this core activity.

We recommend that this learning dimension of the project be supported by the involvement of a *project mentor* who is specialized in the design and facilitation of practice-centred learning processes oriented to community health development and professional research practices.

Project management for a shift in focus

The research and development process we are proposing will markedly alter the focus of CREDESA activities, particularly in the area of research. This is because the means for engaging the primary population (whose health and well-being CREDESA is working to develop through collaborative research and development activities) will be greatly enhanced.

Though this project village-level people will be able to have a voice in every aspect of the health system and its development or at least such is the goal and the potential of what we are proposing. In practice what this expanded voice of the villager will require of CREDESA is a shift in CREDESA's attention (particularly in research) towards a practice-centred focus, a focus on researching the development of the system itself, and not merely the research of health concerns.

In order to make this shift, we have already stated that CREDESA will need to learn (as an organization) how to effectively employ Participatory Action Research and other qualitative research methodologies. CREDESA will also need to strengthen its capacity for qualitative reporting.

In consulting on this matter, the study team agreed that CREDESA is now working very hard to introduce participatory development processes at many levels within the system. It was also agreed that (in principle) it is difficult to bring to others what you don't have yourself.

For these reasons, the team agreed to recommend that the project be managed through a participatory management system whereby:

1. A core management team made up of the key staff of the project and a few other CREDESA people (such as Prof. Alihounou) and the Chief Medical Officer be formed.
2. At least one man and one woman from both the commune and village levels also be included in the team.
3. That an executive committee of this group consisting of the project work-team and one other person run the project on a day-to-day basis.
4. That the entire team serve as a Board of Governors for the project and be responsible for financial and program oversight.
5. That the team be one of the targets for training in the capacity-building dimension of the project.

The process of engagement

While it is true that most of the villages in the Ouidah health zone will be able to handle the management of a simplex radio system, it is of the utmost importance that the process through which radios come to be installed in villages is carried out according to sound participatory development principles.

These principles dictate that the process of community engagement has to be completed before any equipment goes in. In practice this means the community (and not merely a part of it) has to understand why the radio is being installed and must take ownership and responsibility for the community-level knowledge and development work for which the radio is simply a means to an end.

While it would be a mistake to insist that communities utilize any particular form of regular governance and management such as a development committee or a board of directors. (It was noted that Canada has imposed such systems under the rubric of democratic governance programs elsewhere in West Africa and these have been an overlay and sometimes have been at odds with traditional processes of leadership and governance already working effectively in the region.) However, we do feel that it is important to require that certain issues be addressed (somehow) before the equipment is installed. The following is a

list of the issues or considerations we feel should be addressed.

1. How will the community pay for their contribution to the installation costs? (What is needed is a building to house the radio and while CREDESA has agreed to contribute roof, doors, windows and cement towards the construction of the buildings to house the radio, a contribution estimated to be worth \$1,200.00 per building, the larger issue is how to know that the community values the effects of both the building and the radio sufficiently to warrant their introduction.)
2. How will the use of the radio be managed to make sure that all sectors of the community—women, youth, working groups and, elders, community leaders, etc.—have access for health and development purposes?
3. Who has the community identified as the individuals who will supervise the daily use of the radio on behalf of the community? (This assumes that the AVS workers will have continuous/priority access.)
4. How will the community make sure the radio will be used for health and development purposes only? How will abuse be prevented?
5. How will the community pay for radio system's upkeep and repairs, a cost of about 4,000CFA (\$100CDN) / year? (This would cover new batteries and most of the other expected repairs.)

We recommend that each community receiving a radio be assisted to make a plan that addresses these issues and that the plan be written down and followed up on by CREDESA facilitators.

The research and development dimension

We envision a research and development process that involves:

1. **Action** - By "action" is meant the implementation of an ICT system as outlined above, accompanied by the development and testing of new procedures and processes at each level of the system to improve the overall capacity (of the system) to address the needs of the people at the primary level.
2. **Reflection** - By "reflection" is meant a continuous and systematic process of reviewing what is actually happening, of evaluating the effectiveness of what is occurring in terms of meeting health goals, in terms of cultural and system appropriateness and in terms of adjustments and changes that may be required.
3. **Learning** - By "learning" is meant making the integration of ICTs within the health and development processes and practices to be the center of a continuously-improving curriculum. Doing so will insure that the human capacity needed to make the system work will be developed as the ICTs take root within the organic life of the system and the community.
4. **Program Development** - As the process of integrating ICTs into the health and development system and the communities unfolds (which ultimately means that human capacity is developing at every level of the system) new and more effective ways of carrying out the work of CREDESA will be emerging. More specifically, we anticipate significant improvement in the following domains of activity:
 1. Improvement of health and development services, particularly related to emergency response times, the relaying of medical advice during critical incidences, and the efficiency and effectiveness of referral services;
 2. Improvement of epidemiological oversight capacity and the system of disease management and control;
 3. Improvement of research, monitoring and evaluation, both in terms of the quality of analysis and in terms of the quantity of work that is done;
 4. Improvement of the capacity of CREDESA and allied agencies to repackage research results and other information for purposes of dissemination through educational activities and technical assistance;
 5. Improvement of the capacity of CREDESA to access the international scientific and scholarly community, to carry on dialogue, and to access the full range of scientific research literature;
 6. Improvement of the capacity of CREDESA to diffuse its work to the world outside Benin;
 7. Improvement of the capacity of CREDESA to meaningfully involve local people at the

- village/CCS level in research and development processes;
8. Improvement of the capacity of communities to effectively access information, to share their experiences and knowledge with others and, ultimately, to address the determinants of their own health.

In summary, the research and development process we are proposing is designed to animate and integrate the ICT system in ways that lead to the continual improvement of the primary health care system CREDESA is developing.

Monitoring and evaluation

What we have proposed herein is essentially a research and development process designed to add considerable strength to the CREDESA experiment. *The process of organizational learning and system development is the focus of the research portion of the project.* The research questions circle around the process of what is needed, i.e. what is required, what works, what doesn't work, what the obstacles are, how obstacles can be overcome while remaining true to the process of participatory development and primary health care, etc. These research questions must become the focus of continuous reflection on the actions taken, and continuous dialogue and experimentation related to how to improve the system and solve critical problems as they emerge.

The replicability and sustainability of the CREDESA system must become a paramount concern of the monitoring and evaluation activities. And for this to occur, the project research team must be systematically documenting what is happening and what is being learned. We want to emphasize that this is not an activity that can be done at the end of the project. Rather it is a primary level of activity from the very first day. This reflection-monitoring-evaluation activity will include the following:

1. Recording "the story of the project" from a number of key points of view;
 1. village groups and workers,
 2. CCS level teams,
 3. zone hospital,
 4. CREDESA service providers,
 5. CREDESA researchers, and
 6. CREDESA management.

The "story technique" involves the collection of a richly described anecdotes in the words of the storytellers themselves, followed by a thematic analysis of the primary issues, problems, insights, principles, gleanings, etc. that emerge from a systematic treatment of the stories as data.

2. Distilling of principles and models that describe;
 1. the process of health system development (i.e., how the engagement of people at every level of the system needs to be carried out),
 2. the content of the development process relative to effectively addressing determinants of health and well-being, and
 3. maps and models showing the holistic nature, interactive dimensionality and dynamic movement of the system as it develops.

There are two primary reasons for this work;

1. to systemize ongoing practice-centred reflection within the CREDESA organization that contribute to a process of continuous learning and improvement of practice, and
2. to allow the lessons emerging from the ICT system development project to be abstracted from its particular context in the Ouidah health zone, so that they can inform the development of primary health care systems elsewhere in Benin, and in other countries.

This systematic reflection process should be documented at least quarterly throughout the life of the project with involvement of each of the six groups or levels of the system identified above in each round of documentation.

We note that some training and mentoring may be needed to strengthen CREDESA's capacity to do this work, and we have planned that this training / mentoring should occur within the capacity-building services outlined in this proposal.

Likely Outcomes

We anticipate the following outcomes as likely to occur as a result of implementing the plan described in this study:

1. A reorientation of CREDESA's research output towards a practice-centered focus which is more directly related to the continuous improvement of the primary health care system they are helping to develop.
2. A much more active engagement of community-level people and field-level professionals in research and development dialogue and practice.
3. The generation (or systematization and testing) of a considerable body of new knowledge now embedded in the traditional knowledge and everyday life of the people. We expect that this new knowledge will provide important insights and solutions to health and development challenges facing the region.
4. The gradual entry of villagers into the global communications network which we believe will have profound impact on international development thinking and practices.

Background Issues, Challenges and Opportunities

This section includes a number of points which we felt were peripheral to the focus of the feasibility study and yet provide insights and information which might be important to those who follow-up this work. There is no particular order to the following.

Other sources of funding

From what we have seen, it is very likely that if IDRC were to fund the first two-year stage of the complete project, other partners could be found to help with the year three, and with additional years of Research and Development funding as well. Preliminary discussions with UNICEF and WHO indicated that they both would be very willing to work with CREDESA to see the project go forward. If they cannot assist by funding the project directly (which may be possible) they certainly seem willing to help leverage funds.

Peopleware - bringing the people to the technology

What we mean by "peopleware" is the development of human capacity to make full and appropriate use of ICTs within the Benin context and within the program of research and development CREDESA is carrying out. In this section we propose a comprehensive program of;

1. training,
2. action-research,
3. monitoring, and
4. evaluation.

This program will accompany and compliment the introduction of ICT hardware and will take place over a period of three (3) years. We anticipate a rhythm of quarterly workshops involving expert (Canadian or regional) technical assistance over at least the first two (2) years of the 3 year process. From what we have determined thus far, the **only way** the introduction of ICTs can be properly integrated and adapted so that they **serve and enhance the health and development process now underway, is that the hardware must be accompanied by a process of training, practice-based action research, monitoring and evaluation.** We are convinced that to leave this dimension out is to misunderstand the fundamental inseparability of technology, human beings and the various forms of information so fundamental to the research and development work CREDESA is carrying out.

CREDESA as an emerging College of Primary Health Care

It seems feasible that at least part of the organized series of courses and workshops which will be developed as part of CREDESA's work in the region could evolve into accredited courses of applied studies in the field of primary health care. CREDESA already has developed a preliminary program design for a certificate level program. We are also aware of a potential connection with an American university which could offer accreditation for a field-based course of study at the masters degree level. Therefore, we recommend that CREDESA actively pursue these possibilities.

We see this dimension as an area of potential growth for CREDESA and as a logical next step in the further diffusion of their model (We can easily imagine students coming from all over the world to study and to work within the CREDESA system). This option of becoming a provider of advanced educational training offers CREDESA the possibility of long-term sustainable funding.

The Canadian Connections

We see the potential for CREDESA to provide technical support and training to elements within the Canadian health system. CREDESA's integration of treatment, prevention and promotion activities (within an integrated system of services, research, training and diffusion) has much to offer both the mainstream and aboriginal health systems in Canada who are faced with a general devolution of services to the community level. What is currently perplexing many Canadian health managers is how to effectively integrate health treatment, prevention and promotion activities and this has already been developed and effectively implemented within the CREDESA system. We believe that fruitful partnerships could be organized between related health authorities in Canada and CREDESA and that these partnerships would be of significant benefit to Canadians.

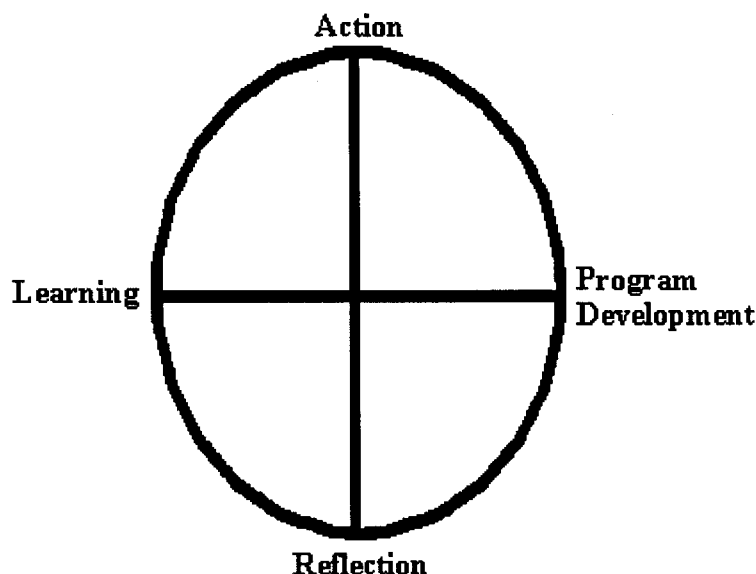
External Training

In addition to bringing systematic non-formal and formal training into the mainstream of CREDESA activities, it may also be necessary to send selected CREDESA staff to colleges and universities outside Benin to obtain required training. We anticipate that this training will most likely be required for the following areas;

1. computer sciences - communication software development,
2. communications training related to media-based public education and information services,
3. qualitative research,
4. development program management,
5. community development,
6. environmental health,
7. environmental management, and
8. language studies (English).

Despite this anticipated need, we have not provided for bursaries or study grants in our proposed budget, simply because it would be far too costly a proposition. We do recommend that CREDESA develop a human resources development plan as a product of the organizational learning activities described in this study and seek out other sources of funding to enable it to acquire training in these areas.

Summary



By adding the systemized learning dimension to what CREDESA is already doing, CREDESA will actually be creating a "virtual college" of primary health care. **The addition of ICTs will greatly enhance the ability of the primary health care system CREDESA is developing to learn, and the intentional systemization of that learning will greatly enhance the effectiveness of the learning process across the system.**

We wish to stress again that, without the research and development dimension, it is probable that the introduction of ICTs into the Benin / CREDESA context will not be as effective in strengthen the capacity of the system which CREDESA is developing to meet the primary health and development goals of the region. What we are proposing is the means of ensuring an organic integration of ICTs into an already functioning system in such a way that the system's capacity will be significantly enhanced.

ANNEX A - Terms of Reference

Under this contract, IntraDelta shall submit:

a) A Work Plan:

- outlining the planned analysis of Information and Communication Technologies (ICT) needs in the Ouidah district of Benin, including a description of the planned process and a list of the planned interviews
- listing in draft form, selected health care information and communication technologies used in Canada with an emphasis on:
 - those developed and produced by Canadian organizations
 - those which hold the potential to support the health care activities of Ouidah district

· outlining in draft form the proposed final report

b) A Final Report:

· providing background to the study

· presenting the Work Plan as a formal document including:

- a list and details of the actual interviews, meetings, and any focus groups
- the methodology used to gather information

- including a bibliography of background articles on health informatics applicable to this study. Copies of articles gathered should be included.
- including recommendations for the integration of ICTs in a culturally and technically appropriate manner to the community level of health care in Benin
- including an approximate cost analysis of the recommendations including recommendations on possible roles for Canadian partnerships in providing the technical and human resource support to implement the recommendations in the previous point
- including recommendations on results-based management indicators for the introduction of various technologies

c) the above draft report will be presented within two working weeks upon the return of IntraDelta from Benin to Ms. Anne Phillips, the Project Officer of the Programs Branch of the Centre and a final report by 27 March 1997.

ANNEX B - Initial Report - ICTs Available for Development

Initial Report

on

Feasibility Study

of

Information/Communication Technology

in the

Health Sector of Benin

Submitted to the

International Development Research Centre

by

IntraDelta Management Consultants International Inc.

February 9, 1997

Introduction

This initial report outlines the activities undertaken to date, initial research findings (as presented to the field Team in briefing format) and work plan for the Team in the field. Initial research findings are attached as *Annex A: Briefing Notes for Feasibility Study of Communication and Information Technology in the Health Sector in Benin* and *Annex B: Initial Overview of Technologies for Feasibility Study of Communication and Information Technology in the Health Sector in Benin*.

Activities undertaken to date

Work has been performed at a hectic pace due to a fixed window for travel and a late signing of the contract.

Initial research was performed through the IDRC Resource Centre. From this we have branched out to the Internet and via telephone to organizations for more specific information. The major requirement here is for a sufficiently dense filter to reduce the flood of less relevant material. ICT is a very hot topic and there is too much information on the topic. Further, the field is very dynamic and what was leading edge yesterday is now old. We encountered several WEB sites, for example, that were "under construction" or "not yet in service." There is no information from a time prior to 1995.

Overview of the findings

The research findings indicates that there is rapidly growing capacity to deliver ICT. The technology is developing quickly in the First World in large part in response to a groundswell of computer users. Over a relatively short period of thirteen years computer use has moved from the esoteric environment of large companies to the desktop in elementary classrooms and virtually every white collar desk. This change has produced ongoing demand for better (faster/easier) technology and applications. Developers are constantly searching for new sources of demand and are responsive to user preferences. The earning potential of a successful application or technology is enormous and therefore suppliers are easily persuaded to invest in technological development.

From our research perspective, this is good news because it provided easy access to information from the suppliers. In one case, for example, a salesman was at our door within 6 hours of contacting the organization.

ICT for development is not a new concept. However, today conjunction of better applications (faster and easier to use), reliable technology, rapid turn-over of both hardware and technologies and stiffer competition between suppliers (and supplying nations), has resulted in the creation of an aggressive supply-driven market.

Unfortunately for the suppliers, there does not seem to be an equally rapidly growing demand and a lower-than-hoped absorptive capacity. One result of low demand is that the technology may be pushed or dumped onto developing nations and peoples without allowing the time required for identifying, fostering or creating genuine demand.

Where demand appears to be "lacking" in developing nations is at the grassroots level. There is little or no demand for ICT from the developing countries' man-in-the-street. In a stable-state society there is little need for either new information (Just do as our forefathers did.) or long distance communications (Who do you know who lives so far away that you would need communications technology and would be willing to pay?) Further, the individual frames of reference (mental maps) have to be built up over time. How would a farmer and his family even begin to think about accessing information technologies?

At this stage of our project, it seems that the key requirement will be enabling grassroots recipients to access the technology. By "enabling" we mean creating a sufficient mental model so that the end user can successfully identify and acquire needed information. With this idea in mind, we have asked that our researchers try to identify projects that bring people to the technology rather than the technology to the people.

Travel to the Field

Travel to the field has been organized with difficulty. The cost of travel increased to approximately \$6,000.00 (We still have not been provided with the full set of figures from TTI Admiral Travel Agencies.) as compared to the budget of \$4,700.00. IDRC's in-house travel agent's quote was significantly higher than our own agent who gave us a firm quote of \$4,400.00.

The work to be performed in the field is not as tightly defined as we would like. In particular, our communication with CREDESA has been too brief and general. We have provided CREDESA with a

list of types of people to be interviewed and activities to be carried out. CREDESA's very proper and positive response was that they would assist us in this matter. We had hoped instead to have a schedule of those to be met with and interviewed.

The dates for the field Team and their Assignment to Benin are as follows:

Arrival in Ottawa

Richard Neufeld Feb. 3

Michael Bopp Feb. 8

Depart Ottawa Feb. 9

Arrive in Benin Feb. 10

Depart Benin Feb. 24

Arrive in Ottawa Feb. 25

Depart Ottawa

Richard Neufeld March 1

Michael Bopp Feb. 28

The Team travel in Benin was to use the CREDESA vehicle and driver. We did not receive confirmation from CREDESA that this would be possible and have arranged to have another vehicle for the Team's use should it be necessary.

We are using our contacts in Benin to line up possible interviewees as a fall back to having CREDESA staff make these arrangements though it should be emphasized that we have no indication that CREDESA has not already made all of the necessary interview and meeting arrangements.

Annex A: Briefing Notes for Feasibility Study of Communication and Information Technology in the Health Sector in Benin

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I. INTRODUCTION:

I.1 Report Overview:

The purpose of this report is to assist in orienting the feasibility study for ICT in Primary Health Care for Benin by providing information about the country, past IDRC projects in the country's primary health care activities, ICT initiatives of IDRC in other parts of Africa, as well as some current information about ICTs in Africa and more specifically in Benin. A section is also included which reviews some of the national and international activities of Canadian health organizations and their ICT services within primary health care.

Also included in this report are several lists, including primary health care and ICT organizations,

institutions and government contacts within Benin, in other parts of Africa and within Canada. Finally, there is a reference bibliography of the articles, project sources and other materials correlated in this report.

I.2 Country Overview of Benin:

The Republic of Benin is a narrow stretch of territory with an Atlantic coastline of about 100 km, flanked by Nigeria on the east, and Togo on the west; its northern borders are with Burkina Faso and Niger. The official capital city is Porto Novo, but the de facto capital is actually Cotonou. French is the official language and there are a number of indigenous languages. The money is called Communauté Financière Africaine (CFA) Franc and the exchange is approximately 500 CFA francs to US \$1.00 (as of December, 1995). The total population of Benin as of 1993 was 5,215,000, in a land mass of 112,622 sq km (43,484 sq. miles).

It should be noted that normal working hours in Benin are from 8:00 a.m. to 12:30 p.m. and from 3:30 p.m. to 7:00 p.m., as well as on Saturdays from 9:00 a.m. to 1:00 p.m.

Climate:

Benin is characterized by unusually dry conditions. This is due to a protected coast and a mountainous area to the west and northwest. Most of the country is tropical, with a dry season from November until April and a rainy season from April until October. The best time to visit the southern coastal region is from December to March and July/August, and for the north, the best time is between December and April.

Economics:

Benin is considered as being a poor country. In 1994, according to estimates by the World Bank, Benin's gross national product (GNP), was equivalent to \$370 per head. During 1985-94, it was estimated that GNP per head declined by an annual average of 0.8% in real terms. Over the same period, the population was estimated to have increased by an annual average of 3.%. Benin's gross domestic product (GDP) increased in real terms by an average of 2.5% annually during 1980 - 1992. GDP increased by 3.2% in 1993, and by an estimated 3.4% in 1994.

Electricity:

Only about one-fifth of Benin's electrical energy requirements are generated locally, and the country is presently reliant on imported energy from Ghana. Plans exist for the construction, in co-operation with Togo, of a second hydroelectric installation on the River Mono, which would substantially increase Benin's domestic generating capacity.

Social Welfare:

In 1983 Benin had 238 Physicians and 1,317 nursing personnel. In mid-1995 the International Development Association approved funding of US \$27.8m. in support of a health and population project—costing \$33.4m.—a principal aim of which was to be the establishment of a nation-wide family planning programme. The health budget for 1992 was projected at 4,688m. francs CFA (2.3% of total expenditure).

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Telephones (>000 in use) as of 1991 27

Daily newspapers, as of 1992 1

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Ouidah City:

Pronounced "whydah", it translates in English to the "Museum City". It is evocative of European penetration with its ancient Portuguese, English, Danish and French trading posts. There can be seen the remains of the ancient port from which slaves were boarded and shipped to the Americas.

Visa Requirements:

- two application forms
- two passport size photos
- international certificate of vaccination (yellow fever and cholera).
- visas are issued for 15 days: entry and transit within three months. Extensions may be obtained at the Immigration Office.
- a \$20 fee for each application is charged
- a letter of guarantee from your employer or copy of round trip ticket or a bank letter of guarantee.
- allow 48 hours for issuance of a visa

(For more detailed information about Benin, please see appendix X).

II. PRIMARY HEALTH CARE IN BENIN:

II.1 Overview of the Centre Régional pour le Développement et la Santé CREDESA) :

Since 1983, the Centre Régional pour le Développement et la Santé has been providing primary health care services and scientific research aimed at improving the food production and nutrition of the villages within the Ouidah (pronounced why-dah) region of Benin. IDRC has been supporting the Centre through a number of primary health care, rural development, agriculture and management projects. Some of these projects included: several institutional capacity building projects (implemented in several phases), which were designed to streamline the primary health care training and operational programs, as well as to implement an information and documentation hospital and services for the researchers and population; research projects designed to analyze the problems associated with the regions agriculture and food production systems; and projects aimed at evaluating and improving the function of the community health committees of the Centre. (See the chart below for project outlines).

The reports of the various projects note that the Centre has played an important role in the community and has improved both the agricultural knowledge and the health of the people of the Ouidah region. In recognition of the research work done by the Centre, the Director General of CREDESA, Professeur EusPbe Alihonou, has been awarded a certificate de satisfaction" signed by the Prime Minister, an award from UNICEF for its collaborative initiative of Bamako, and finally, France awarded Professor Alihonou with the "Chevalier de l'Ordre National du Mérite". The Centre has also produced a number of scientific and health related articles and publications, most notably, it produces its own magazine called "CREDESA-INFO".

However, CREDESA continues to have certain challenges in its organizational, financial and information management. Several diagnostic missions of the Centre were undertaken by IDRC and CIDA during 1995-1996. Following the recommendations of these organizational evaluations, the Centre has undertaken to decentralize its management in a new, experimental model. However, this model has created problems in maintaining the quality of the research of the Centre, and in the morale of researchers. As well, the Centre continues to experience problems in resource and financial management, and information and documentation systems formation and management. In this regard, the "Rapport technique final" of phase 3, dated July, 1996 states the urgent need to construct a new hospital in Ouidah, which would in part, serve as a documentation and reference centre (see appendix X for the complete final report).

II.3 IDRC Projects in Support of the Centre Régional pour le Développement et la Santé (CREDESA), Ouidah Benin (see appendix of project summaries)

Title	Project No.	Overview	Results
BIORP II: The role of health committees	940202, Health Sciences - SED Status: active Completion date: 1997/11/10	The aim of this project is to describe and analyze the functioning of health committees and their effect on the involvement of communities vis-B-vis their health problems. The research will be conducted by the Centre Régional pour le Développement et la Santé(CREDESA)	The research results will help identify improvements that could be brought to bear on the functioning of community health committees, or whether they should be maintained as a community participation structure.
Institutional Research Capacity Building - Phase III	92-0220, HS WARO - Health Systems, Status: Active, Completion date: 1996/06/16	Since 1983, CREDESA has worked with the population of the Ouidah district. A streamlined system of primary health care and training and operational research programs have been gradually established. This third phase will develop a streamlined health serves system at the district level which ensures equity and delivery of the referral/recourse system and it will identify the factors which promote within the communities a commitment towards solving their health and development problems.	
Second Phase of Institutional Research Capacity Building	91-0232, HS- Health Systems Research/ Health and the Community/ Health and the Environment Completed: 1993/03/31, Status: Closed	Primary health care activities started in the Ouidah district of Benin in 1983. This second phase was to develop, implement, and evaluate a streamlined health services system, and an efficient and equitable community financing system at the district	With the cooperation of the community health officers (CHOs), researchers identified priority problems and possible solutions. After interviewing key informants, they set out the

		<p>level. It will identify and enforce the factors promoting the mobilization of the communities to solve their health and development problems. Specifically, the project will study the various components of primary health care in the health system; identify selection, acquisition, and distribution methods for medicinal drugs and materials; develop and test a basic health management system; study the efficiency of health service systems, and the self-financing and cost distribution at the district level; and describe the various ways of community participation.</p>	<p>activities and tasks of a district level management committee. The did an in-depth study of the acceptability, efficiency, and reliability of a national information and management system; evaluated CREDESA's community health officer training program; evaluated sources of health care, and community participation in groups initiated and not initiated by CREDESA. <u>See Rapport technique final du CREDESA, deuxieme phase (avr. 1992- mars 1993) (Final Report), Location: ARCHIV 362.1 (668.2) A6, BIBLIO ISN: 96401</u></p>
<p>Rural Development and Nutrition</p>	<p>91-0144, Funding Unit: Crop Production Systems, Integrated Resource Management, Animal Production Systems, Health and the Community, Centre-Wide Unit. Completion Year: 1994/12/31 Status: Active</p>	<p>This interdisciplinary project builds upon the phase I participatory appraisal, which provided directions for action research to improve nutritional status in poor communities of three distinct agro-ecological zones of Ouidah district. The elements of the project span the agricultural, nutrition, health, marketing, and social sectors, the overall objective being to improve and sustain household food security. Specifically, CREDESA</p>	

		<p>will use and evaluate community processes for selecting interventions in these sectors, particularly in farming and post-harvest systems; stimulate community participation in the adoption of interventions; determine the effects of interventions on household economies, health, nutrition and equity; and reinforce the capabilities of the CREDESA team in conducting action research. The project is an important focal point for the Centre's nutrition-related support in the West African region and will generate knowledge on approaches to community-based studies relevant to development research in general.</p>
<p>Institutional Support for Training (sub-Saharan Africa)</p>	<p>90-0114, Funding Unit: FAD</p>	<p>The inability of Africa to absorb or assimilate the aid received in the last 30 years is largely due to insufficient human resources with the capacity of analysis, generation, management and practical use of research results. To make it possible for African researchers to create, invent and innovate for development, this project will develop the capacity of three research institutions in the region, all of whom benefit from IDRC's help: Ecole supérieure de gestion (CESAG); Centre ivoirien de recherches économiques et sociales (CIRES); and Centre regional pour le développement et la santé (CREDESA)</p>
<p>CREDESA</p>	<p>89-0240, IS- socioeconomic</p>	<p>The CREDESA of Benin</p>

<p>Information and Documentation Centre (Benin) - (ISRI)</p>	<p>Information—Socio-Cultural Information Networks, Completion date: 1994/01/01, Status: Active</p>	<p>coordinates, at the Ouidah community and district level, activities related to primary health care. These are aimed at reinforcing the population's ability to plan, implement, and follow directions in primary health care in a rural environment usually deprived of appropriate health services. After 10 years of activity, CREDESA still does not have a satisfactory information and documentation infrastructure. This project will develop an information and documentation centre to serve the population of Pahou, the rural district of Ouidah. Specifically, it will strengthen the centre's personnel through training; acquire multimedia holdings; develop a bibliographic data base; and produce and disseminate information.</p>
<p>Rural Development and Nutrition (Phase I)</p>	<p>89-0229, Funding Unit: Centre-wide Nutrition Unit Completion Date: 1991/04/30 Status: Active</p>	<p>In the district of Ouidah Benin, widespread malnutrition persists along with poor public health conditions. CREDESA is leading an ongoing community health project in this area, which concentrates on help for needy people. A project aimed at improving the competence of the Centre in this activity is being granted financial support by IDRC. To bring about lasting improvements in the health status and nutrition of the population, it is necessary that the food system's productivity be</p>

		<p>increased and job opportunities be created. This project will demonstrate the interrelationships between factors affecting the population's health and nutrition. Using the Rapid Rural Appraisal methodology, it will study, with the involvement of the local population, the local markets; socioeconomic forces; the state of nutrition and the household level; and existing and potential management resources.</p>	
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Making Connections

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**Making Connections:
An Assessment of the Information
and Communication Technology
Needs of CREDESA for Health Care Work
in the Ouidah District of Benin**

FINAL REPORT

IDRC Study/Acacia Initiative
Prepared for IDRC by
IntraDelta Management
Consultants International Inc.

Dr. Michael Bopp, Allan Fuller and Richard Neufeld
in consultation with

CREDESA
Dr. Alphonse Guideme,
Dr. Theodore Soude and
Dr. Timothee Gandaho
April, 1997

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ANNEX B - Initial Report - ICTs Available for Development

ANNEX B - Initial Report - ICTs Available for Development

Initial Report

on

Feasibility Study

of

Information/Communication Technology

in the

Health Sector of Benin

Submitted to the

International Development Research Centre

by

IntraDelta Management Consultants International Inc.

February 9, 1997

Introduction

This initial report outlines the activities undertaken to date, initial research findings (as presented to the field Team in briefing format) and work plan for the Team in the field. Initial research findings are attached as *Annex A: Briefing Notes for Feasibility Study of Communication and Information Technology in the Health Sector in Benin* and *Annex B: Initial Overview of Technologies for Feasibility Study of Communication and Information Technology in the Health Sector in Benin*.

Activities undertaken to date

Work has been performed at a hectic pace due to a fixed window for travel and a late signing of the contract.

Initial research was performed through the IDRC Resource Centre. From this we have branched out to the Internet and via telephone to organizations for more specific information. The major requirement here is for a sufficiently dense filter to reduce the flood of less relevant material. ICT is a very hot topic and there is too much information on the topic. Further, the field is very dynamic and what was leading edge yesterday is now old. We encountered several WEB sites, for example, that were "under construction" or "not yet in service." There is no information from a time prior to 1995.

Overview of the findings

The research findings indicates that there is rapidly growing capacity to deliver ICT. The technology is developing quickly in the First World in large part in response to a groundswell of computer users. Over a relatively short period of thirteen years computer use has moved from the esoteric environment of large companies to the desktop in elementary classrooms and virtually every white collar desk. This change has produced ongoing demand for better (faster/easier) technology and applications. Developers are constantly searching for new sources of demand and are responsive to user preferences. The earning potential of a successful application or technology is enormous and therefore suppliers are easily persuaded to invest in technological development.

From our research perspective, this is good news because it provided easy access to information from the suppliers. In one case, for example, a salesman was at our door within 6 hours of contacting the organization.

ICT for development is not a new concept. However, today conjunction of better applications (faster and easier to use), reliable technology, rapid turn-over of both hardware and technologies and stiffer competition between suppliers (and supplying nations), has resulted in the creation of an aggressive supply-driven market.

Unfortunately for the suppliers, there does not seem to be an equally rapidly growing demand and a lower-than-hoped absorptive capacity. One result of low demand is that the technology may be pushed or dumped onto developing nations and peoples without allowing the time required for identifying, fostering or creating genuine demand.

Where demand appears to be "lacking" in developing nations is at the grassroots level. There is little or no demand for ICT from the developing countries' man-in-the-street. In a stable-state society there is little need for either new information (Just do as our forefathers did.) or long distance communications (Who do you know who lives so far away that you would need communications technology and would be willing to pay?) Further, the individual frames of reference (mental maps) have to be built up over time. How would a farmer and his family even begin to think about accessing information technologies?

At this stage of our project, it seems that the key requirement will be enabling grassroots recipients to access the technology. By "enabling" we mean creating a sufficient mental model so that the end user can successfully identify and acquire needed information. With this idea in mind, we have asked that our researchers try to identify projects that bring people to the technology rather than the technology to the people.

Travel to the Field

Travel to the field has been organized with difficulty. The cost of travel increased to approximately \$6,000.00 (We still have not been provided with the full set of figures from TTI Admiral Travel Agencies.) as compared to the budget of \$4,700.00. IDRC's in-house travel agent's quote was significantly higher than our own agent who gave us a firm quote of \$4,400.00.

The work to be performed in the field is not as tightly defined as we would like. In particular, our communication with CREDESA has been too brief and general. We have provided CREDESA with a list of types of people to be interviewed and activities to be carried out. CREDESA's very proper and positive response was that they would assist us in this matter. We had hoped instead to have a schedule of those to be met with and interviewed.

The dates for the field Team and their Assignment to Benin are as follows:

Arrival in Ottawa

Richard Neufeld Feb. 3

Michael Bopp Feb. 8

Depart Ottawa Feb. 9

Arrive in Benin Feb. 10

Depart Benin Feb. 24

Arrive in Ottawa Feb. 25

Depart Ottawa

Richard Neufeld March 1

Michael Bopp Feb. 28

The Team travel in Benin was to use the CREDESA vehicle and driver. We did not receive confirmation from CREDESA that this would be possible and have arranged to have another vehicle for the Team's use should it be necessary.

We are using our contacts in Benin to line up possible interviewees as a fall back to having CREDESA staff make these arrangements though it should be emphasized that we have no indication that CREDESA has not already made all of the necessary interview and meeting arrangements.

Annex A: Briefing Notes for Feasibility Study of Communication and Information Technology in the Health Sector in Benin

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I. INTRODUCTION:

I.1 Report Overview:

The purpose of this report is to assist in orienting the feasibility study for ICT in Primary Health Care for Benin by providing information about the country, past IDRC projects in the country's primary health care activities, ICT initiatives of IDRC in other parts of Africa, as well as some current information about ICTs in Africa and more specifically in Benin. A section is also included which reviews some of the national and international activities of Canadian health organizations and their ICT services within primary health care.

Also included in this report are several lists, including primary health care and ICT organizations, institutions and government contacts within Benin, in other parts of Africa and within Canada. Finally, there is a reference bibliography of the articles, project sources and other materials correlated in this report.

I.2 Country Overview of Benin:

The Republic of Benin is a narrow stretch of territory with an Atlantic coastline of about 100 km, flanked by Nigeria on the east, and Togo on the west; its northern borders are with Burkina Faso and Niger. The official capital city is Porto Novo, but the de facto capital is actually Cotonou. French is the official language and there are a number of indigenous languages. The money is called Communauté Financière Africaine (CFA) Franc and the exchange is approximately 500 CFA francs to US \$1.00 (as of December, 1995). The total population of Benin as of 1993 was 5,215,000, in a land mass of 112,622 sq km (43,484 sq. miles).

It should be noted that normal working hours in Benin are from 8:00 a.m. to 12:30 p.m. and from 3:30 p.m. to 7:00 p.m., as well as on Saturdays from 9:00 a.m. to 1:00 p.m.

Climate:

Benin is characterized by unusually dry conditions. This is due to a protected coast and a mountainous area to the west and northwest. Most of the country is tropical, with a dry season from November until April and a rainy season from April until October. The best time to visit the southern coastal region is from December to March and July/August, and for the north, the best time is between December and April.

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Benin is considered as being a poor country. In 1994, according to estimates by the World Bank, Benin's gross national product (GNP), was equivalent to \$370 per head. During 1985-94, it was estimated that GNP per head declined by an annual average of 0.8% in real terms. Over the same period, the population was estimated to have increased by an annual average of 3.%. Benin's gross domestic product (GDP) increased in real terms by an average of 2.5% annually during 1980 - 1992. GDP increased by 3.2% in 1993, and by an estimated 3.4% in 1994.

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- allow 48 hours for issuance of a visa

(For more detailed information about Benin, please see appendix X).

II. PRIMARY HEALTH CARE IN BENIN:**II.1 Overview of the Centre Régional pour le Développement et la Santé CREDESA) :**

Since 1983, the Centre Régional pour le Développement et la Santé has been providing primary health care services and scientific research aimed at improving the food production and nutrition of the villages within the Ouidah (pronounced why-dah) region of Benin. IDRC has been supporting the Centre through a number of primary health care, rural development, agriculture and management projects. Some of these projects included: several institutional capacity building projects (implemented in several phases), which were designed to streamline the primary health care training and operational programs, as well as to implement an information and documentation hospital and services for the researchers and population; research projects designed to analyze the problems associated with the regions agriculture and food production systems; and projects aimed at evaluating and improving the function of the community health committees of the Centre. (See the chart below for project outlines).

The reports of the various projects note that the Centre has played an important role in the community and has improved both the agricultural knowledge and the health of the people of the Ouidah region. In recognition of the research work done by the Centre, the Director General of CREDESA, Professeur

EusPbe Alihonou, has been awarded a certificate de satisfaction" signed by the Prime Minister, an award from UNICEF for its collaborative initiative of Bamako, and finally, France awarded Professor Alihonou with the "Chevalier de l'Ordre National du Mérite". The Centre has also produced a number of scientific and health related articles and publications, most notably, it produces its own magazine called "CREDESA-INFO".

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Title	Project No.	Overview	Results
BIORP II: The role of health committees	940202, Health Sciences - SED Status: active Completion date: 1997/11/10	The aim of this project is to describe and analyze the functioning of health committees and their effect on the involvement of communities vis-B-vis their health problems. The research will be conducted by the Centre Régional pour le Développement et la Santé(CREDESA)	The research results will help identify improvements that could be brought to bear on the functioning of community health committees, or whether they should be maintained as a community participation structure.
Institutional Research Capacity Building - Phase III	92-0220, HS WARO - Health Systems, Status: Active, Completion date: 1996/06/16	Since 1983, CREDESA has worked with the population of the Ouidah district. A streamlined system of primary health care and training and operational research programs have been gradually established. This third phase will develop a streamlined health serves system at the district level which ensures equity and delivery of the referral/recourse system and it will identify the factors which promote	

		within the communities a commitment towards solving their health and development problems.	
Second Phase of Institutional Research Capacity Building	91-0232, HS- Health Systems Research/ Health and the Community/ Health and the Environment Completed: 1993/03/31, Status: Closed	Primary health care activities started in the Ouidah district of Benin in 1983. This second phase was to develop, implement, and evaluate a streamlined health services system, and an efficient and equitable community financing system at the district level. It will identify and enforce the factors promoting the mobilization of the communities to solve their health and development problems. Specifically, the project will study the various components of primary health care in the health system; identify selection, acquisition, and distribution methods for medicinal drugs and materials; develop and test a basic health management system; study the efficiency of health service systems, and the self-financing and cost distribution at the district level; and describe the various ways of community participation.	With the cooperation of the community health officers (CHOs), researchers identified priority problems and possible solutions. After interviewing key informants, they set out the activities and tasks of a district level management committee. The did an in-depth study of the acceptability, efficiency, and reliability of a national information and management system; evaluated CREDESA's community health officer training program; evaluated sources of health care, and community participation in groups initiated and not initiated by CREDESA. <u>See Rapport technique final du CREDESA, deuxieme phase (avr. 1992- mars 1993) (Final Report), Location: ARCHIV 362.1 (668.2) A6, BIBLIO ISN: 96401</u>
Rural Development and Nutrition	91-0144, Funding Unit: Crop Production Systems, Integrated Resource Management, Animal	This interdisciplinary project builds upon the phase I participatory appraisal, which	

	<p>Production Systems, Health and the Community, Centre-Wide Unit. Completion Year: 1994/12/31 Status: Active</p>	<p>provided directions for action research to improve nutritional status in poor communities of three distinct agro-ecological zones of Ouidah district. The elements of the project span the agricultural, nutrition, health, marketing, and social sectors, the overall objective being to improve and sustain household food security. Specifically, CREDESA will use and evaluate community processes for selecting interventions in these sectors, particularly in farming and post-harvest systems; stimulate community participation in the adoption of interventions; determine the effects of interventions on household economies, health, nutrition and equity; and reinforce the capabilities of the CREDESA team in conducting action research. The project is an important focal point for the Centre's nutrition-related support in the West African region and will generate knowledge on approaches to community-based studies relevant to development research in general.</p>
<p>Institutional Support for Training (sub-Saharan Africa)</p>	<p>90-0114, Funding Unit: FAD</p>	<p>The inability of Africa to absorb or assimilate the aid received in the last 30 years is largely due to insufficient human resources with the capacity of analysis, generation, management and practical use of research results. To make</p>

		<p>it possible for African researchers to create, invent and innovate for development, this project will develop the capacity of three research institutions in the region, all of whom benefit from IDRC's help: Ecole supérieure de gestion (CESAG); Centre ivoirien de recherches économiques et sociales (CIREs); and Centre regional pour le développement et la santé (CREDESA)</p>
<p>CREDESA Information and Documentation Centre (Benin) - (ISRI)</p>	<p>89-0240, IS- socioeconomic Information—Socio-Cultural Information Networks, Completion date: 1994/01/01, Status: Active</p>	<p>The CREDESA of Benin coordinates, at the Ouidah community and district level, activities related to primary health care. These are aimed at reinforcing the population's ability to plan, implement, and follow directions in primary health care in a rural environment usually deprived of appropriate health services. After 10 years of activity, CREDESA still does not have a satisfactory information and documentation infrastructure. This project will develop an information and documentation centre to serve the population of Pahou, the rural district of Ouidah. Specifically, it will strengthen the centre's personnel through training; acquire multimedia holdings; develop a bibliographic data base; and produce and disseminate information.</p>
<p>Rural Development and Nutrition (Phase I)</p>	<p>89-0229, Funding Unit: Centre-wide Nutrition Unit Completion Date: 1991/04/30 Status: Active</p>	<p>In the district o Ouiday Benin, widespread malnutrition persists along with poor public health conditions. CREDESA is leading an</p>

		<p>ongoing community health project in this area, which concentrates on help for needy people. A project aimed at improving the competence of the Centre in this activity is being granted financial support by IDRC. To bring about lasting improvements in the health status and nutrition of the population, it is necessary that the food system's productivity be increased and job opportunities be created. This project will demonstrate the interrelationships between factors affecting the population's health and nutrition. Using the Rapid Rural Appraisal methodology, it will study, with the involvement of the local population, the local markets; socioeconomic forces; the state of nutrition and the household level; and existing and potential management resources.</p>	
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III. INFORMATION AND COMMUNICATION TECHNOLOGY IN AFRICA

III.1 Overview (see appendices of Science/Technology Communication Networks: Africa, Framework to Build Africa's Information and Communication Infrastructure, Telematics Symposium: Recommendations)

III.1.1 African Information Society Initiative (AISI)

The African Information Society Initiative (AISI): an Action Framework to Build Africa's Information and Communication Infrastructure was adopted in May 1996 by the Economic Commission for Africa (ECA) Conference of Ministers. AISI is also the principal activity within the United Nations System-Wide Special Initiative on Africa programme on Harnessing Information Technology for Development (HITD/SIA). ECA is the lead agency for both the implementation of AISI and of HITD/SIA.

AISI had its roots in April 1995 with the African Regional Symposium on Telematics for Development organised by ECA, the International Telecommunications Union (ITU), UNESCO, and IDRC. These organizations and others, subsequently collaborated on a series of activities, under the name "African Networking Initiative (ANI)" (see chart below), to engage African stakeholders in an evaluation of a strategy for action AISI.

Framework to Build Africa's Information and Communication Infrastructure:

Written by the Economic Commission for Africa, through the African Information Society Initiative (AISII), this document lays out the vision, challenges and plan of recommended actions to develop Africa's ICT infrastructure. Of special note to this project is the section on "Technological resources infrastructure": Effective information and communication systems require reliable, low-cost and widespread technological resources such as computers, software and all the components of the telecommunications infrastructure for processing data and information. It will be necessary to upgrade and develop the physical and logical ICT infrastructure at all levels. In this section, the recommended actions are as follows:

Infrastructure requirements: In line with the relevant resolutions of the Regional African Telecommunications Development Conference (Harare, 1992) and the Buenos Aires Declaration (WD-94), it is recommended that African countries greatly increase accessibility to telecommunication networks and services and to the global information infrastructure, in particular for people in rural and isolated areas, using affordable telecommunication systems, matched to the low level of financial resources in Africa. This involves, inter alia:

- a) Using new low-cost terrestrial wireless and satellite communication systems to provide access for rural and isolated areas;
- b) Ensuring national, regional and international interconnectivity and interoperability of telecommunication networks;
- c) Building reliable access networks to the global information infrastructure, including the Internet;
- d) Installing cheap, simple and robust technologies using flexible, modular and scalable network designs for coping with increasing users and traffic;
- e) Establishing low-cost access from every major town, or distance independent tariffs for calls to the nearest access point;
- f) Using simple interfaces for the non-literate and those unfamiliar with computers;
- g) Developing broad band services and bandwidth-on-demand facilities for low-cost multimedia applications;
- h) Improving network reliability and flexibility by providing redundant links and duplicate equipment;
- I) Using modern network management systems to optimize and monitor the use of the networks;
- j) Establishing a clear set of standards and criteria by which to evaluate any national information and communication initiative project;
- k) Using hardware, software and applications that take into account training and maintenance requirements for durability and ease of use;
- l) Using voice based systems where possible to provide for the low literacy levels, oral traditions and diversity of languages in Africa;
- m) Using software that supports multiple languages and translation systems to allow on-line dialogue between people using different languages;
- n) Installing access systems in public places (kiosks and community tele-centres) and mobile or easily transportable systems to bring the information infrastructure closer to the general population;

- o) Providing hard-copy output capabilities so that users can take away the results of their information queries or commercial transactions;
- p) Exploiting broadcast data systems to provide low-cost information dissemination in areas with out adequate telecommunication infrastructure;
- q) Improving the reliability of electricity supply to maintain reliable communications networks by using low-cost integrated solar power and battery recharge systems.

As well, among the proposed programmes of this section is, (iv) Programme 4: Integrated rural development: Shared rural public access telecentres, kiosks, mobile computing and telecommunications resources will be established at selected locations with support from international donors.

Science/Technology communication networks: Africa

The advent of computer-based electronic networking has provided an enabling mechanism towards a solution to Africa's knowledge, research and development isolation. The main issues that emerge during the discussion in August of the African scientific community (African Academy of Sciences) were:

1. Leadership and Participation from Planning to Implementation - The issue of setting up national bodies, committees, focal points, or clearinghouses to coordinate electronic communication programs and projects. These committees should have clearly identifiable functions that address issues of policy that are critical to ICT development in Africa.
2. Human Resources Development and Training Issues: Experience has shown that technical expertise is required at every host. The issue of training trainers was also emphasized, and the importance of training on site and then using these people as local resources. Without the a capacity of continued assistance and troubleshooting, it is likely that the network site will fall into disuse. The information to train and maintain competence must also be available on site. To do this, there must be on-the-ground commitment for sustainability and staff as part of the normal operating costs.
3. Network Needs and Uses - There is a tremendous demand for pc-based linkages for universities for administrative, research and other purposes. It was indicated that networking progress can and often should be made using existing infrastructure, rather than waiting for PTTs to improve their facilities or building new networks. There is a significant lag in terms of networking progress in West African universities. Thus there is a demand for a special focus on that sub-region's electronic communications needs. With the exception of the "RIO" network, with links French researchers (in Africa and elsewhere) associated with the ORSTOM organization, communication networks among universities and institutes in West Africa are virtually non-existent, a situation that stands in contrast to the progress that has been made in some East and Southern African institutions. Network needs should determine placement of equipment. For example, using libraries as a network point would be especially appropriate for institutions interested in using there electronic networking to ensure access to scientific information.
4. Hardware and Software - Technology should be used that is appropriate to what else is going on in the country of operation. For example, in the RINAF (Regional Informatics Network for Africa) project, which aims in part to coordinate, integrate and upgrade African networks and their overseas connections, different approaches will be used in different countries, using X.25 lines where they are available, strengthening Fidonet links, or using satellite links where appropriate, and so on. IN the RINAF scheme, each regional node (with an Internet connection) would control at least one country node. Equipment is sometimes under-utilized as the potential is not understood. In addition, too often people believe that high tech is essential where as "lower" technology can sometimes accomplish more.

Fidonet software has proven resilient to the problems associated with poor telecommunications infrastructure in Africa. Nevertheless some users, particularly those in West Africa have experienced difficulties with Fidonet because of poor documentation and lack of on-site or on-line support. Moving from a Fido to a UNIX-based system has to be justified by need and the number of users. Once Fido has reached 200 users, it is feasible to go to UUCP (UNIX to UNIX Copy Program).

III.2 Community Tele-Centres (see appendix entitled A Telecentre Communautaire, Une Solution Pour Le Rural)

Les Télécentres Communautaires se présentent de plus en plus comme solution pour faciliter l'intégration accélérée des zones rurales et permettent ainsi un meilleur développement de plusieurs secteurs tels que l'enseignement, la santé, les petites entreprises, l'agriculture etc.

Définition: Un télécentre Communautaire est un centre local qui offre une partie ou la totalité des services suivants: services d'information, services des télécommunication et des données B tous les membres de la communauté. A cet effet, Télécentre utilise les ressources des télécommunications et de l'informatique, comme facteur de développement socio-culturel, économique et politique.

Un Télécentre est géré par une personne qualifiée et compétente qui maintient les équipements et assure l'assistance aux usagers. Cet agent devait également animer des stages de formation aux membres de la communauté

Les Télécentres peuvent remédier B les contraintes de coûts, de service, de la qualification et des ressources parce qu'ils sont basés sur une utilisation commune des circuits téléphoniques entre le Télécentre et le réseau public des télécommunications en lieu et place des lignes individuelles. Ils réduisent donc la contrainte de réseau. Dans la mesure où les Télécentres offrent aux communautés un accès commun aux équipements de technologie de l'information sur une base nettement moins onéreuse, ils réduisent la contrainte de coûts de l'utilisation des télé-services et des ordinateurs par les petites entreprises. Par ailleurs, puisque les Télécentres offrent également des services qui, en fait, ne sont disponibles que dans les grandes villes, ils réduisent la contrainte de services des zones les plus isolées ou rurales. En définitive, le fait de faire exploiter le Télécentre par un personnel compétent grâce à des séminaires réguliers, le Télécentre réduit la contrainte de qualification.

Conditions de réussite de Télécentre: L'implantation d'un projet de Télécentres exige une discussion poussée avec les représentants de la communauté, les associations industrielles et commerciales. Le rôle de l'Etat est donc essentiel pour la constitution des partenaires.

Comme base initiale d'implantation, on pourrait retenir 5 aspects fondamentaux tels que:

- intégrer dès le début du processus de définition des Télécentres, la municipalité et si possible l'Etat.
- identifier les partenaires potentiels. La municipalité devra fournir les éléments essentiels pour les contacts et la concurrence.
- définir le site physique du Télécentre. Il serait préférable que le bâtiment soit offert par un partenaire pour la location, contrat de bail, etc. Ainsi, il serait possible d'implanter le Télécentre sans investissement lourd initial dans la construction du bâtiment.
- identifier les partenaires qui seront en mesure de fournir des micro-ordinateurs pour les applications à l'enseignement et d'élaborer des projets de modules retenus (télé-enseignement, télé-médecine...) en incluant le planning et l'évaluation des activités.

III.3 Internet in Africa (see appendix of Jensen's article on (Bridging the Communications gap)

Although an rapidly growing area in much of the continent, Sub-Saharan Africa's teledensity has continued to remain at less than one per 200 inhabitants, most the telecommunication network is analogue and many sections are highly unreliable, especially during the rainy season. Also, as the utility of the Internet depends to a great extent on the quality of the underlying telecommunication infrastructure, the poor quality of the network still remains a basic impediment to rapid developments in this area.

Despite the problems, over half the African countries have developed some form of low cost local dial-up store and forward email service with a gateway to the Internet - 33 of the 54 nations. Of these twenty countries have achieved live Internet public access service in the capital cities, including Benin.

To note is that South Africa is among the top 20 countries in the world when ranked by the number of Internet nodes.

However, local access for the rest of the nation is still very rare. Of the countries with full Internet, only South Africa, Mauritius and Senegal have pervasive local dialup facilities outside of the capital city, while Benin and Kenya have services in the secondary city.

Subscription charges for dial up Internet in Africa vary greatly - between \$10 and \$100 a month, which means that in some countries, even if a computer is available, the service is beyond the reach of all but the top elite. Also, because telephone call charges to the service provider are usually the major cost, the absence of a national service effectively cuts off the majority of the population from the Internet. Reflecting the high cost of full Internet based services, and also the overriding importance of electronic mail, the small email-only store and forward systems with dialup connections to the Internet are generally continuing to attract subscribers.

A recent development of note has been the alacrity with which African public telecom operators, PTTs, have started to establish Internet services. PTTs in Benin, Central African Republic, Djibouti, Mauritius, Madagascar, Senegal and South Africa have recently brought full Internet services on stream, and now similar moves are afoot in Angola, Ethiopia, Gambia, Gabon, Guinea, Mali, Sierra Leone, Tanzania and Zimbabwe.

The majority of international connections to the rest of the Internet operate on analogue circuits rated at 9.6Kbps, but often pushed to 14.Kbps and sometimes to 24Kbps. None of the countries outside of South Africa had international circuits larger than 64Kbps until very recently when Tunisia and Egypt upgraded to 128Kbps. Upgrades to 128Kbps are also expected shortly in Senegal and Kenya, although by contrast, South Africa has a half dozen international links, most of which are over 256Kbps and some are up to 2.8Mbps. While some Internet circuits in Africa connect to the United Kingdom and France, (as well as one to Italy), the majority connect to the USA where suppliers include AT&T, Global One UUNET/AlterNet, MCI, NSN, Sprint and BBN. Nevertheless, France Telecom/FCR has more Internet connections into Africa than any other single supplier, largely because of its close ties with Francophone PTTs.

Aside from the marine optical fibre link in South Africa and Djibouti, which has access to the SEA-ME-WEA cable, most of the other international connections are carried via satellite, except for the countries having borders with South Africa.

Because of the high cost and low international bandwidth available in many African countries, increasing attention has recently been drawn to the possibility of using satellites for Internet services using VSAT. It offers reasonably high bandwidth (64-2Mbps) and substantially lower costs than most PTT supplied international leased circuits. However regulatory barriers have stymied most attempts to use this technology so far, except in Ghana, Uganda and Zambia, where the telecoms market has been substantially relaxed. As a result there are two VSAT-based Internet Service Providers in Kampala - InfoMail and Starcom, and one each in Ghana (NCS) and Zambia (ZamNet). There is also a closed user group link to the University of Dar es Salaam in Tanzania. Public international data communication licenses were recently issued to three companies in Tanzania and it is expected that they will also use VSAT for their services.

The recent availability of the higher powered KU-band satellite footprint in southern Africa, and the prospect of other KU bands being directed at Africa shortly, further improves the potential for VSAT because of the sharply decreased equipment costs for the groundstations which only cost \$10,000 for full two-way transmission capabilities. Within the decade, other satellite-based communication systems being planned are expected to radically improve access from the most remote areas of the continent, but the costs are unlikely to be within the reach of the average African citizen.

Most of the new large scale telecommunications infrastructure building projects which have been announced, most notably AT&T Africa One which aims to put an optical fibre necklace around the entire continent, have not yet been finalized. However, RASCOM has advanced its plans to launch its

own satellite in 1997 and the ITU has announced the availability of some funds to assist in improving the most glaring gaps in the PANAFTTEL terrestrial network.

Most countries in Africa have some form of local or internationally hosted web server with varying degrees comprehensiveness but the quantity of information is generally very limited.

The volume of electronic mailing lists and UseNet news discussion groups on Africa has grown substantially, partly due to the number of Africans still on store and forward dialup email-only services. The number of African residents outside of South Africa with email addresses is becoming more and more a matter of guesswork, but those who have estimated usually hit around the 5 - 10,000 mark.

Of particular importance for Internet development in Africa has been the establishment of national cross-sectoral Internet working groups comprising actual or potential Internet access providers, users, telecom operators and government. These groups have been formed in Angola, Ethiopia, Gabon, Gambia, Namibia, Sierra Leone, South Africa and Tanzania. On a related note, in East Africa, the East African Internet Association (EAIA) has formally been registered. It is the first regional grouping of Internet Service Providers, collaborating to improve their service, share resources and ultimately to set up an international hub to share leased line costs.

III.4 Internet in Benin (see appendix article of Jensen, Bridging the communication's gap):

Benin is one of the twenty countries in Africa which has achieved live Internet public access services in the capital city, and also has local dialup facilities in the second major city, although access for the rest of the nation is still very rare. Another recent development is that the African public telecom operators, PTTs, has established full Internet services on stream in Benin.

This country is a typical example of one that has been encouraged to establish an Internet service as quickly as possible, in this case due to the Francophonie Heads of State meeting earlier this year. But because of limited knowledge, urgency and historical ties with the France Telecom, it has obtained its service from France Cable and Radio (FCR) which is one of the most expensive Internet services available.

A private sector company (Secni SARL) has made a good start on developing a web site providing basic information about the country (www.secni.com) and it aims to be an information site for all the countries in the Gulf of Benin (web home page attached).

In a technical rating of the country's Internet, Benin currently has: Full Internet now or very soon (IP), Presence of low cost store and forward electronic mail services (S&F), More than one ISP (>1), Presence of an X.25 packet switched network (X.25), and Presence of a cellular telephone network (CELL - It should be noted that cellular networks may be important in building demand for Internet access among the elite, but it would not be an answer for the majority, because of the high cost of use).

Benin Country Profile (1): URL: www.secni.com

Benin has a workable telephone network, an X.25 service and an Internet service provided by the PTT, as well as an operating RIO network. The PTT, OPT, launched its Internet service shortly after the Cotonou summit of Francophone states in April, calling it BeniNet. Also a joint venture with France Cable and Radio, which provides the 64Kbps link to Paris, Bennet claims over a 100 dialup users and an active community building web sites.

The service is accessible through a local call in Cotonou and Porto-Novo for a charge of about \$7USD an hour. There are a number of leased line users as well, such as SECNI which is building a Web site focusing on the Gulf of Benin and the countries of West Africa.

III.5 IDRC Involvement in Information and Communication Technology in Africa (see appendix of project summaries, and appendices of Acacia)

III.5.1 Bellanet (see Bellanet appendix)

As a response to the increasing global complexity and resources constraints, development assistance agencies created the Bellanet Initiative to work with the development community to use information and communication technologies (ICT) more effectively to broaden collaboration, increase participation and transparency of action and diffuse lessons learned. Bellanet is funded by a consortium of development assistance agencies, governed by an International Steering Committee, and carries out its mandate through a small secretariat based at IDRC.

Bellanet has a number of collaborative initiatives, working with African Information Society, Technology for Development (AISI/HIID), IWOKRAMA, African networking Initiative, Indigenous Knowledge Program, and the Association for the Development of Education in Africa (ADEA), to mention a number. Bellanet also has a number of projects, such as Email-to-Web Gateway, Program Mapping Initiative and Acacia.

III.5.2 Acacia Initiative (see Acacia appendix)

The Acacia Initiative is proposed by IDRC as an effective way through which African communities can use information and communication technologies (ICTs) to counter the information gap which is further marginalizing and hindering economic and social development in sub-Saharan Africa. The Acacia Initiative centres on communities and therefore, it will work with institutional groups in local communities (schools, clinics, NGOs, etc). But it must also join forces with intermediary organizations (provincial and national government, private sector organizations, universities, and research centres). The program itself will be instrumental in identifying prospective partners through stakeholders debates on the four areas of concentration (policy, infrastructure, technology and applications).

Many organizations already support projects related to ICT policies, infrastructure, technology innovations and applications in Africa. What makes Acacia different is its intention to tackle these issues with a community focus and to do so within an integrated conceptual and operational framework that builds into the program a strong element of continuous learning. Acacia can be seen as Canada's contribution to meeting Africa's Information Society Initiative (AISI) goals, a paper presented by the United Nations Economic Commission for Africa (ECA).

Broadly speaking, Acacia will support the introduction of Anew" technologies, defined for this purpose a computer-and telecommunications based technologies. such support can include "older" technologies such as community radio, production and distribution of videos, etc. when these are links in an information and communication chain that introduces or supports "new" technologies.

Over the next six months, IDRC will complete the conceptual design of Acacia and will prepare a detailed five-year program document for consideration by its Board of Governors in March 1997. This process will include studies, initial pilot activities and consultations with partners and stakeholders in Africa, Canada and internationally, and will ensure the involvement of community-level stakeholder groups.

IDRC initiated/funded ICT Projects in Africa (see project summaries)

Project Title	Partners, Year, etc.	Overview	Results
African Networking Initiative: Defining a Plan of Action (see appendix under Acacia	IDRC, Information Policy Research, project no. 950604, 1995 (Under	The situation in Africa regarding telematics and networking is especially urgent, given the generally poorer telecommunication and information infrastructure, and growing development and information gaps. IDRC, the ECA,	Project-related documents in IDRC Library: Cadre d'action pour l'edification d'une infrastructure

<p>Initiative)</p>	<p>Bellanet) Recipient: United nationals Economic Commission for Africa, Addis Ababa, Ethiopia</p>	<p>UNESCO, and the International Telecommunications Union (ITU) have already established an effective working partnership to explore some of these issues. This project will address the needs and provide a mechanism for broader African input into ICT program and project planning in Africa; provide input into the planning processes of partner development assistance agencies; identify gaps and opportunities for collaboration among agencies and other involved in this field; and determine areas requiring further investigation and research. The project will also review the status of electronic communication and access to Internet in Africa.</p>	<p>africaine de l'information et la communication. 1996. 67 p. BIBLIO ISN: 105235.</p>
<p>Computer - based Networking in Africa</p>	<p>IDRC, Project no. 92-1153, ISS - Information and Communication Systems and Networks - Recipient: Pan African Development Information Systems (PADIS), Addis Ababa, Ethiopia</p>	<p>The projects supported in Africa by IDRC's telematics have demonstrated the technical viability of electronic communications and have highlighted several issues: organizational problems can often be greater barriers than technical problems; human resource development for ongoing training, troubleshooting, and handholding is essential; unless sustainable systems are developed, networking capabilities available to the majority of African institutions will be limited to short-term, ad hoc arrangements dependent on external funding; cooperation and collaboration are required nationally and regionally between users, service providers, and donors as African countries cannot afford the luxury of developing separate physical networks for each user group; and the user base in Africa must be expanded dramatically before Internet- style international interconnectivity can be justified.</p> <p>This project will address these issues by demonstrating how a sustainable communications and networking infrastructure can be developed in Africa. The model to be implemented will involve; the establishment and/or strengthening of national nodes serving the networking needs of a wide array of institutions and</p>	<p>Final report location: ARCJIV 002 PADIS P 3 BIBLIO ISN: 96698</p>

		<p>individuals; for every five or six countries, one of the national nodes will be identified as a subregional resource centre for that set of countries to provide training, troubleshooting, software support, network management and research functions; and national nodes will provide national networking services with a self-sustaining fee structure and will provide interconnectivity with other national nodes and systems outside Africa (payment for service in local currency).</p>	
<p>Software Development for Sustainable Computer networking in Africa</p>	<p>IDRC - no. 92-0603, ISS Information and Communication Technologies,</p> <p>Recipient: NIRV Community Resource Centre, Toronto, Ontario</p>	<p>Since 1989 computer-based communications host systems have been established in Zimbabwe, Kenya, South Africa, Tanzania, Zambia, Ghana, Senegal, and Ethiopia. These pilot projects have proven technical viability and have allowed future needs to be identified. This project will develop tools that will improve access to electronic information, particularly information originating in Africa, and the capability of regional and international inter-personal communication within Africa. Specifically, the project will develop new software and modify existing software for both the users and operators of network hosts in Africa; produce documentation for all software packages in appropriate languages; establish reliable and cost-effective gateways between African computer networks and other networks around the world; and develop billing software as a toll for the financial sustainability of African electronic networks.</p>	<p>Final technical report and recommendations: 1994 ARCHIV 681.3.06 (6) N5, BIBLIO ISN: 102526</p>
<p>African Environmental NGO Electronic networking Node Development (ELCI)</p>	<p>IDRC, 90-0141, IS - Information Tools and Methods,</p> <p>Recipient: Environment Liaison Centre, Nairobi, Kenya</p>	<p>This project will allow the Environment Liaison Centre International (ELCI) a global coalition for environment and development in Nairobi, to develop an electronic network to serve NGOs in Africa with similar interests. The project will strengthen the ability of participating NGOs to exchange mail; and discuss issues and share information electronically through microcomputers, modems, and</p>	<p>Final report of African environmental NGO electronic networking node development 1993, ARCJIV 002:061.2(6) S6 BIBLIO ISN: 101422</p>

		common networking software.	
East and Southern African network (ESANET)	<p>IDRC, 90-0068, IS - Information Tools and Methods - Telematics,</p> <p>Recipient: University of Nairobi, Kenya</p>	<p>This project will explore the potential to utilize computer-based data communications within the research community of the region; build a pool of local expertise in network installation and management; develop effective systems with the existing telecommunication facilities; and explore the technical and managerial aspects of networking as an inexpensive, and eventually reliable means of developing information technology within the regional environment. The computer centres of the five largest universities in East and Southern Africa will experiment and evaluate microcomputer-based data communications networking within the region. The network will be known as East and Southern African Network (ESANET).</p>	<p>Final Report location: ARCHIV 002:384(6) R 6 BIBLIO ISN: 13964</p>
Computer-based Networking in Africa	<p>IDRC, 89-0193</p> <p>Funding Unit: Information Tools and Methods/ Socioeconomic Information</p> <p>Recipient: United Nations Economic Commission for Africa (UN-ECA), Addis Ababa, Ethiopia</p> <p>Completion date: 1992/09/30</p> <p>Status: closed</p>	<p>The Pan African Development Information System (PADIS) was established in 1980 as a cooperative development information system to serve African member states of the United Nations Economic Commission for Africa (ECA). This project will allow PADIS to coordinate a pilot African regional, investigative, and experimental computer-based networking activity involving international, interregional and intraregional linkages both to and from PADIS and through it to other networks. It will contribute towards the appropriate utilization of data communications information technology in Africa; an improvement in the flow of information for socioeconomic development in the region; and the timely utilization of existing information systems. Information technology employed in this project will be used both for communications (messaging, conferencing, and bulletin boards) and for on-line searching. The project will also be linked with other projects planned in Latin America and the Caribbean to maximize project investments, and or the sharing of experience and information.</p>	<p>Project related documents in the IDRC library:</p> <p>Final report/ PADIS/IDRC, 1992</p> <p>Location: ARCHIV 002 PADIS P 3, BIBLIO ISN: 96698</p>

<p>SITA: Telematics and Informatics Information System for Africa</p>	<p>IDRC, 89-0011</p> <p>Funding Unit: Information Tools and Methods</p> <p>Date completed: 1992.01/15</p> <p>Status: Active</p> <p>Recipient: Institut Africain d'Informatique (IAI), Libreville, Gabon</p>	<p>Through this project the Institut africain d'informatique (IAI) will build up an information system on telecommunication and computer science technologies known as the AsystPme d'information sur les technologies de l'informatique et de la télématic@ (SITIA) in 11 west and central French-speaking African countries. This will be the first regional information system on these technologies presented in Africa and perhaps in the Third World. Specific objectives of the project are to create a coordinating centre for the system at IAI and identify focal points in member countries; acquire equipment; recruit and train specialized personnel for the coordinating centre; collect information on new technologies and bibliographic research; make data accessible on-line; diffuse information from telecommunication consultations; contribute information on teaching and research activities at IAI; and generate resources through the system with the view to assuring the continuation of these activities through partial self-financing .</p>	<p>Rapport final et financier/ project SITIA 1994. 4p.</p> <p>Location: ARCHIV 002(6) K6</p> <p>BIBLIO: 102517</p>
<p>AFRIMAIL</p>	<p>IDRC, 86-0154</p> <p>Funding Unit: Information Tools and Methods</p> <p>Status: closed</p> <p>Completion date: 19880706</p> <p>Recipient: Centre national de l'informatique (CNI) Tunis,</p>	<p>Information and information systems are plying a greater role in the development of nations. One challenge in North African countries has been the introduction in computer systems of Arab characters alongside Latin ones. This project enables the Centre national de l'informatique (CNI) in Tunisia to develop and test a bilingual messaging system (French /Arabic) based on international standards for the interconnection of messaging systems. The system will be accessible through various telecommunications techniques by the Tunisian research community.</p>	<p>AFRIMAIL rapport technique 1989 7p.</p> <p>ACHIV 002(611) C4</p> <p>BOBLIO ISN: 101670</p>

IV. INFORMATION AND COMMUNICATION TECHNOLOGY IN THE HEALTH SECTOR IN SUB-SAHARAN AFRICA

IV.1 Overview (see appendix of article Use of ICT in the health sector in Sub-Saharan Africa)

Over the past two years the number of countries in sub-Saharan Africa that have established full Internet

access has increased to a dozen. Before that South Africa was the only country in this category. The lack of full Internet access has not however, prevented the use of information communication technologies in the health sector. For many years different electronic technologies have been used to communicate between health workers in Africa and the rest of the world.

There have emerged some innovative initiatives in the health sector that attempt to overcome the problems associated with ICT use and to develop projects that will use ICTs in a way that would allow them to more effectively deliver health care on the continent. Some of these initiative are partnered with organizations outside the continent while others are based, controlled and driven from within (most are funded by foreign foundations and aid agencies, however).

There are significant continent-wide initiatives that seek t use ICTs to address problems that are widespread throughout the continent or to assist with communication and networking throughout Africa.

Recommendations (from article on ITC in the health sector in Africa

Two recommendations for use of ICTs in the health sector for Africa are:

1. Telemedicine:

Telemedicine is well-used in the north. In Africa, however, it has not even begun to realize its potential. We have found scanty information of just a few small attempts at Telemedicine in South Africa. In one initiative there was, for a while, some telepathology exchange between an individual in Transkei and an individual at the University of Witwatersrand Medical School. Slides were electronically transmitted to Wits for diagnosis, etc., and results electronically forwarded back. There has also been limited use of teleradiology in the private sector, but this has been mainly between different rooms of the same specialist rather than between disadvantaged or remote communities and advanced centres. This is an area, then that attention needs to be given to in order to enhance health care delivery in Africa. Telemedicine lends itself well to be used by remote communities to use the resources of hospitals and specialists. With the kind of network that already exists through HealthNet, it would not require too great an infrastructural investment.

2. An interesting project that has been developed but is not yet fully operational is the Health Hub of the Council for Scientific and Industrial Research in Sought Africa. The CSIR's WWW page includes a facility for "on-line consultations". Users can click on an icon requesting a consultation and are presented with a standard consultation form which is designed to elicit information that would be necessary for a doctor to use for a diagnosis. The form is filled in and emailed to a doctor who then diagnosis the patient's condition and suggests to the patient the course of action they could take. There is a great potential for such a method to be used especially by people in remote areas (where there is access to some ICT technology). Even in countries where there is no World Wide Web service, such a method could be redesigned for email use.

IV.2 HealthNet (see appendix on SatelLife and HealthNet info)

Probably the most significant health-related ICT initiative in Africa is HealthNet, a project of the non-profit organization of scientists and medical researchers known as SatelLife. HealthNet has been implemented in 20 countries throughout Africa. Although it has been criticised for being married to low orbit satellite technology, SatelLife is presently examining the possibility of changing in certain countries to an open system using PCs with Linux so that they might be able to utilize both the HealthSat technology as well as UUCP and SMTP protocols, allowing maximum flexibility in connectivity options.

HealthNet Technology Overview:

Healthnet is a system of Low Earth Orbit (LEO) satellites, simple ground stations, and radio and telephone-based computer networks. This seamless system functions reliably and inexpensively even in areas with little or no telecommunications infrastructure. Individual users are linked to the network via

HealthNet "nodes" in each country where HealthNet operates. These nodes are electronic distribution centers - computers that relay messages and other data to and from each point in the network, much as a local post office collects and distributes mail.

Satellite:

Satellife's technology cornerstone is its low earth orbit satellite. Health-Sat-2 is capable of store and forward full-duplex communication at 9600 bits per second. The satellite's unique polar orbit allows ground stations to communicate with it from any point on earth daily. Stations close to equator will acquire the satellite four times a day; each acquisition, or "pass" lasts for about 13 minutes. At any given time, the satellite is visible to ground stations within a diameter of 6000 kilometers. It was designed and constructed as one of 12 micosatellites by Surrey Satellite Technology, Limited (SSTL).

HealthSat-2 has one downlink and two uplink communication channels. There can be several users requesting messages from the satellite. HealthNet groundstations now employ WiSP (Windows Satellite Program). They are currently developing a gateway software package that will operate under Linux OS. The ground equipment needed to contact the satellite consists of a IBM-PC compatible computer a Terminal Node Controller (TNC), a satellite radio and antennas. Satellife is testing a new radio design that merges the satellite radio and the TNC in one single box that can be portable. The new radio has been successfully tested at the North Pole.

For the users, the HealthNet software is similar to any e-mail offline reader/writer software. The system permits messages to be addressed to Internet destinations, or to any other HealthNet user. Binary files can be attached to messages or transferred by separate file request. All routing and delivering is transparent to the user.

Satellife is based on the work of Dr. Max House and the Department of Telemedicine, Memorial University of Newfoundland (see section on Telemedicine and contact list). Dr. House secured a license from the Canadian government to operate our primary ground station and gateway hub.

Telephone:

Fidonet, developed in an experimenter community similar to that of Amateur Radio, provides an economical alternative to a fully-connected Internet. FIDO networks transfer electronic mail by a series of scheduled telephone calls, or polls. Nodes stay connected for only the period of time necessary to transfer the messages.

The evolution of HeathNet has produced a large network of FIDO network nodes, some using Satellife's low earth orbit satellites and other polled directly by telephone from the Boston USA office where they operate a central Internet gateway. The network is still growing rapidly, with much of its growth being in the "points" connected to network nodes rather than the nodes themselves.

This FIDONet-based service is kept affordable for HealthNets in the developing world because the Boston office calls are billed at US rates rather than rates set by PTTs; they are beginning to move these telecommunications expenses and other costs of operation back to the independent HealthNets on a cost-recovery basis.

Internet:

In 1994 Satellife provided a seamless electronic mail interface between HealthNet and the Internet. The allowed HealthNet users to send and receive electronic mail to and from users on the global Internet. Satellife believes that store and forward technology will continue to be a vital tool for low-cost networking. However, direct connection technologies are now appearing in the developing world context, and Satellife is investing these technologies as well.

Satellife is designing a new platform to replace the existing FIDO-based PC which will be capable of interfacing with a variety of networking environments, ranging from telephone based connectivity to a

full Internet connection. Users will be presented with a universal software interface which will remain the same whether they are connected via satellite, telephone, terrestrial radio or Internet. The GetWeb MailBot allows users to download Web documents through a store and forward email connection.

Terrestrial Radio:

Satellife has begun to design local and wide area networks using High Frequency (HF) and Very High Frequency (VHF) radio to establish connectivity for distances up to 1000 kilometers. Terrestrial radio is an inexpensive means of providing connectivity to a region lacking telephone infrastructure, and can play a vital role in complementing a HealthNet hub served by satellite, or a hub located in an urban area that has international telephone connectivity, but little access to rural regions. It is currently working on the design and installation of an HF/VHF Wide Area Network in northern Tanzania beginning in early 1997.

Services

HealthNet serves approximately 4,000 health care workers in more than 30 countries worldwide. The international health community is using HealthNet in a variety of ways. Continent links "africa.html" for Africa linkages. The goal of HealthNet information services is to connect the health worker with a range of information options in a cost-effective manner with the most affordable and appropriate technology. South-South, North-South and South-North information sharing and distribution is supported by Satellife. These services continually evolve in response to the needs and resources of HealthNet users.

HealthNet currently offers Internet resources to users who are not directly connected to the Internet through:

- mailing lists and conferences
- off-line access to File Transfer Protocol (FTP)
- Gopher
- Selected databases

In addition Satellife will soon have a customized Agora (w3mail) server, which will allow HealthNet users with e-mail access alone to fetch documents from the world wide web.

HealthNet users can send electronic mail to their colleagues nationally, regionally and internationally. For example, using his computer, a health care worker in a rural hospital can send a message to a colleague in a neighbouring district, in the region, or to an institution located in another part of the world.

Electronic conferences allow HealthNet users around the world to form discussion groups on issues pertinent to their immediate needs and or their professional interests. Conferences provide an interactive format irrespective of time and place. Some important conferences carried by Satellife include: ProMed: Program for Monitoring Emergency Diseases, and E-Drug: Essential Drugs

African Medical Librarians Bulletin is made possible by contributions by African medical librarians. AMLB contains selected tables of contents as well as abstracts from local and regional medical publications. WHO Library Digest for Africa is edited by the staff of the World Health Organization Geneva Library. This publication includes WHO material of interest to librarians and health workers. WHO/AFRO Infodigest is compiled by the Documentation Centre in Brazzaville, Congo and highlights tropical diseases and other health issues. Practical Pointers on Primary Care focuses on presenting current clinical information and features summaries and commentaries on a variety of articles from the leading primary care journals, etc.

Satellife has secured permission from the National Library of Medicine to make many of its database such as Medline, Toxnet, Cancerlit, and others accessible via e-mail search vehicles such as "bitnis.html". Access to some databases are fee related. Satellife initiated the Library Partnership Program which now facilitates access to medical literature for libraries in the developing world. This

program is largely a volunteer effort and depends on the creation of "partner library" relationships between institutions and medical librarians.

IV.3 Ahila-Net (see appendix of the article on the Use of ICT in the Health sector in Africa)

Ahila-Net, the Association for Health Information and Libraries in Africa Network. Ahila-Net has set up an electronic networking initiative for its various members throughout the continent. This includes an email discussion group. Ahila-Net is run from the WHO office in Geneva.

IV.4 The Sister Library Programme - University of Zambia Medical Library and University of Florida health Science Center Library (see appendix of the article on the Use of ICT in the Health sector in Africa)

This entire project is centred around the use of ICTs. The programme is an innovative one whereby the two university libraries are twinned so that the Zambian Library might be able to extend its access to information. The low-cost access to current and useful information resulted in increased motivation of user groups at the UNZA School of Medicine. The project was initiated in 1991 by SatelLife, and was promoted by the installation of a HealthSat ground station at the UNZA Computer Centre and the subsequent installation of a fidonet point at the UNZA medical library. The project's major problem is the lack of training in ICT's on the Zambian side.

IV.5 HELINA (see appendix of HELINA)

At the First International Working Conference on Health Informatics in Africa, HELINA 93, held in Ile-Ife, Nigeria in April, 1993, it was recommended that an electronic bulletin board should be established for the African health informatics community. The HELINA-L was created in response to this recommendation. Its technical information is as follows:

1. HELINA-L is for news, information and request for information concerning the informatics (computer and communications) support for health care in Africa. It is initially operated by the HELINA 93 Overseas Bureau, in coordination with colleagues from IMIA (International Medical Informatics Association) and WHO (World Health Organization). The HELINA-L is not for general health-related or general computer-related information.

2.. In order to contain the cost for subscribers in Africa with low-capacity facilities, the maximum length of any message will be

about 100 lines. More voluminous contributions will be abstracted and the full text will be available by order by e-mail.

3. HELINA-L is moderated, i.e. the bulletins distributed through the list will be selected by the list administrators, who reserve

the right to select, edit and adapt, if necessary, materials they consider suitable for distribution. If you wish to have some information distributed through the HELINA-L, please send the text to:

HELINA-L@uku.fi

IV. 6 Recommendations of Note Taken from "Telecommunications in Health and Health Care for Latin America and the Caribbean" (see appendix of the same name)

It is preferable to apply health care applications to existing technologies than to develop technology to meet the expectations of health care applications. This is to avoid investment in technology that will not meet needs and to ensure that the infrastructure is scaled to the purposes and policies identified. As an example, assuming that the basic information technology infrastructure is not well-developed, the initial set of applications could be an intelligent telephony network that enables voice communications, electronic mail (message switching), file transfer and dial access to existing package-switched networks for remote execution and connectivity. This initial network could then be upgraded as resources become

available....

Support the development of small-scale implementation efforts: Small-scale efforts will emphasize the use of community resources and will allow for experimentation and learning to occur among many stakeholders. Furthermore, smaller projects can be corrected more easily mid-stream than can larger projects. Corrections will be expected if the necessary ongoing evaluation occur.

V. USE OF ICT'S IN CANADIAN HEALTH CARE AND CANADIAN INTERNATIONAL HEALTH CARE INITIATIVES

V.1 International Health Communications in Canada - Phase III, IDRC, HS - Special Initiatives

Phase three of this project will provide continuing support for the International Health Communications Service (IHCS). IHCS is a communications link that reaches across Canada and the world. Established in 1987 by the Association of Universities and Colleges of Canada (AUCC).

The services were transferred in 1992 to the Canadian Society for International Health (CSIH). The Canadian University Consortium for Health in Development (CUCHID) will also continue to be an active partner, especially in the area of electronic communications initiatives. New links have been established with the Canadian Public Health Association (CPHA), with other health-oriented development organizations, and with the Pan American Health Organization (PAHO) for which CSIH is the technical representative in Canada.

Its major components are ASynergy, a Canadian bilingual quarterly newsletter devoted exclusively to international health issues, and related information services and electronic communications service ("Synergy on-line", Electronic Forum, International Health Human Resources Registry). Synergy was designed to deal with the perceived problems of Canadian institutions' relatively low levels of activity in international health, and with the lack of communication between researchers involved in international health and with developing countries.

V.2 Telemedicine/TETRA, Faculty of Medicine, Memorial University (see article of Telemedicine/TETRA)

The telemedicine Centre of Memorial University developed and is the host for SatelliLife and has had a number of international health projects in collaboration with IDRC, CIDA, etc., such as SHARE in East Africa (Satellites in Health and Rural Education), which established a four-wire dedicated system connecting medical schools in Canada with Nairobi and Kampala. The system was used for teaching sessions, administrative meetings, the transmission of EEGs and a variety of other applications.

Technical configuration of Telemedicine and TETRA: The current audio teleconference platform made available through Telemedicine and the Telemedicine and Education Technology Resource Agency (TETRA) utilizes "voice grade" facilities and end equipment that supports the real time exchange of audio and graphic information within a 300 -3khz bandwidth. network configurations include 4-wire multi-point and 2-wire dial-up interconnections accessible through standard telephony service offerings of Newfoundland Telephone Company (NTC).

End equipment consists of analog audio conference units, personal computer-based workstations, interface communications devices, and applicable software packages. These systems provide users with audio interaction and the ability to share written text, annotated computer graphics and medical imagery.

Telemedicine also provides video conference service via compressed video technologies over 56kBit facilities. This system provides users with the ability to see each other and exchange visual materials in either point to point or multi-point configuration. Access to this type of service is limited to areas supported to digital telecommunications systems.

CONTACTS TO BE MADE FOR AND/OR IN BENIN

1. A private sector company (Secni SARL) has made a good start on developing a web site providing basic information about the country (www.secni.com) and it aims to be an information site for all the countries in the Gulf of Benin.

2. Director General of CREDESA,

Professor EusPbe Alihonou, Faculty des sciences de la santé,

Université nationale du Benin, B.P. 1892, Cotonou, Benin

Also a principal researcher of CREDESA - Centre régional pour le développement et santé

3. Organizations in Benin to contact:

Centre National Hospitalier et Universitaire,

Centre de Santé de la Circonscription Urbaine de Ouidah,

4. Ministry of Public Health

B.P. 882, Cotonou

tele. (+229) 33-04-64

fax: (+229) 33-01-28; 33-37-69

Minister: Veronique Lawson

5. Société Béninois d'Electricité et d'Eau (SBEE)

B.P. 123

Cotonou tele 31-21-45

Fax: 31-50-28

Director General: Emile Louis Paraiso

6. Office de Radiodiffusion et de Télévision du Bénin

B.P. 366, Cotonou, Tel. 30-10-96

Director General: Nicolas Benon, Director of Radio: Emile Désiré Ologodou, Director of Television: MichPle Badarou.

7. Hotel Gben Ouidah

P.O. Box 208

tel. (229) 34-12-15

Relevant Contacts in Other Countries of Africa

1. Pan African Development Information Systems (PADIS)

Economic Commission for Africa (ECA)

P.O. Box 30001, Addis Ababa, Ethiopia

Research contact: Ms. Nancy Hafkin

2. Institut African d'Informatique (IAI),

B.P. 2263, Libreville, Gabon

Research contact: Mr. Ambroise Faye

3. Dieter Neuvians, MD Health System Research

Moderator, AFRO-NETS Souther African Region

P.O. Box 2406 Tel. (263)-4-733696

Harare, Zimbabwe Fax. (263)-4-733695

100100.1612@compuserve.com

Relevant Contacts in Canada

1. Telemedicine/TETRA at Memorial University (in Newfoundland, Canada)

2. Canadian Society for International Health (CSIH)

1565 Carling Avenue, Suite 110, Ottawa, Ontario K1Z 8R1

Research contact: Mr. C. Shields

3. Canadian University Consortium for Health in Development (CUCHID)

Ottawa, Ontario

4. Candian Public Health Association (CPHA),

Relevant Internet addresses (websites, listservs):

<http://www.bellanet.org>

<http://www.healthnet.org>

<http://www.healthnet.org/afronets/>

to subscribe to AFRO-NETS send an electronic message to majordomo@usa.healthnet.org, (leave the subject line empty) subscribe afro-nets end

HELINA- L (health informatics in Africa) helina-1@messi.uku.fi, or korpela@messi.uku.fi (mikko Korpela - for help and/or subscription).

AFYANET (general health-related discussions focussing on Africa)

afyante@arcc.or.ke, to subscribe, send a message SUB AFYANET to listserv@arcc.or.ke. (note: Aafya@ is Swahili for Ahealth@ and Arabic for Agood health@)

Annex B of Initial Report. Overview of Technologies for

Feasibility Study of Communication and Information Technology in the Health Sector in Benin

Note: This is an initial report only.

Introduction

The following is a brief listing of Information Communications Technologies (ICT) which might be used in Benin's Health Care System. Conceptually, there are three major types of ICT: (1) wired, (2) broadcast and (3) line of sight or beamed. Telephones and telegraph are examples of wired technologies. Radio, whether AM, FM, VHF or UHF are all examples of broadcast technologies. Satellites and Microwave Stations are the primary example of Beamed technologies.

Each of these classes has advantages and disadvantages as a class in terms of carrying capacity, range, capital cost, maintenance costs, and technical skills required. The following are general statements.

- Carrying capacity is highest on broadcast systems and lowest on wired technologies.
- Range is more limited when using broadcast technologies though coverage may be highest. Both beamed and wired technologies are point-to-point and have virtually unlimited range.
- Initial capital costs vary tremendously depending on the level of technology within each category.
- Maintenance costs are generally higher with more sophisticated technology. However, the recent trend of packaging of components has reduced the maintenance requirements of beam technology. Broadcast maintenance costs are therefore the highest. Wired technology is more subject to vandalism and may incur higher than expected costs.
- Technical skill requirements are low with most wired technologies and highest with broadcast technologies.

As stated above, these are very general statements and there is significant variation within each class of technology.

The following is a list of specific technologies that will be considered for Benin.

Low Earth Orbit Satellite (LEOS) Systems

Overview

These are low orbit satellite, altitude approximately 800 km. At present there are no continuous coverage world systems. The ORBCOM system has two satellites which give windows of use which provide 10-15 minutes of useable transmission time. The baud rates are 2400 on the uplink and 4800 on the link from the satellite to the subscribers terminal. Currently only 2 LEOS have been lofted. The final configuration will consist of 26-28 satellites to ensure constant communications.

Capital Costs

ORBCOM's promotional literature boasts equipment costs will be half the cost of other systems offering similar service. They speculate that by late 1997 the price of communicator will be \$500 US. The current cost is \$1,300 US.

Equipment Available:

- Panasonic KX-6700 \$1,300
- Antenna \$ 200
- Computer \$1,400

Operational Costs:

In determining operational costs, ORBCOM will request a profile of expected use from which they will determine the user rate. ORBCOM Canada speculates the average user fee will be between \$30 - \$60/month, however, reduced rates may be available initially.

Technical Competence:

Computer skills are necessary. There will also be a small amount of semi-skilled technical requirements.

Positive Findings:

Relatively inexpensive to set up. Lower power requirements. Not hard to set up or maintain.

Negative Findings:

Not fully operational. Have not seen it in operation. May require tracking if the system is not complete.

Recommendations:

No recommendation is possible at this time given the incomplete nature of the technology.

Healthsat2***Overview***

HealthSat is a dedicated satellite system for supporting Healthnet. Healthnet is a satellite-based technology for the access and sharing of health information especially the distribution of medical publication and bulletins . This project is currently being funded by IDRC. Eighteen countries have set up ground stations accessing Healthnet. In Canada the gateway to Healthnet and the Healthsat2 is through Memorial University

Capital Costs:

If Benin were to follow the example of Memorial University and equip itself with a Kenwood 386 with VHF radio and Yagasumi rotor antenna, computer the approximate investment would be about \$2,800 plus the cost of a power source (possibly a generator or a UPS system)

Operational Costs:

To be determined.

Technical Competence:

Medium competencies required though not necessarily provided in-house. Computer technology associated with the communications link will require greater sophistication.

Positive Findings:

Constant (24-7) access. Existing technology that works. Linked to larger international agencies so guarantee of stability over time.

Negative Findings:

Requires a well trained technician if it has problems.

Recommendations:

Looks promising. This will be investigated further.

INMARSAT M

Overview

INMARSAT M consists of 3 Geostationary satellites which provide world coverage. The system has been operational for several years. It can provide services at 2400 BAUD on the uplink and 4800 BAUD on the downlink. It can carry voice mail, fax, and allows tele-conferencing.

Capital Costs:

A base station will cost approximately \$6,500.00. There are several systems available including:

- • Thrane and Thrane - TT 3060A \$4700US
- • Nea-World phone \$5000 US
- • NEC (not recommended) \$3000 US

Operational Costs:

Current rate is approximately \$4.25/minute

Technical Competence:

Generally the system is reliable once put in. However, if there are problems with the ground station then a trained technician will be required.

Positive Findings:

Reliable

Negative Findings:

A bit slow for current technology. The cost per minute is quite high

Recommendations:

This might be the best satellite option today.

INMARSAT D+

Overview

INMARSAT D+ consists of 3 geostationary satellites which provide constant world coverage. This system is not yet operational. It will be available in 1998. The system offers 4 message types and has 1-4 levels of alert in order to control data flows. It will be able to accept 32-bit characters, and packets of up to 2000 bits in a transparent data message format. This system is totally digital and does not accept analog.

Capital Costs:

No costs are available at this time.

Operational Costs:

No costs are available at this time.

Technical Competence:

During the initial setup a trained technician will have to be on site. In general the maintenance requirements will be low. However, should problems occur fixing them will require bringing in a trained professional.

Positive Findings:

Not operating

Negative Findings:

Not operating

Recommendations:

This system has not been brought on line. It is still too early to tell whether or not to use it.

Local Radio*Overview*

Radio is perhaps the most common nation-wide communication system in operation in many countries. It has several flavors: HF, VHF, UHF. Radio systems can be used to connect regions and can carry not only voice but also E-mail. Having a dedicated radio will require licencing from the Federal Government for all but very low watt transmitters. It is assumed here that the need is for a regional radio system.

Capital Costs:

The equipment needed depends on use. For voice only the following configuration or one similar might be purchased:

- Terminal Mode Controller (TMC) This is usually an IBM-compatible computer so costs could vary significantly depending on what else the computer is being used for.

And either:

- VAF UHF 6M 300 \$700
- Antenna \$150
- Power supply \$150
- or Solar Panel \$300

or

- HF Icom IC-77 \$1000
- Antenna \$150
- Power supply \$150
- or Solar Panel \$300

To send Data:

At the user's location:

- TMC Kamtronics 9612 \$450
- Computer \$2000

At the LAN Hub

- Zyxel V-1496E modem \$300?
- Pentium 166MHZ (as the hub) \$1800
- TMC Kamtronics 9612 \$450

Operational Costs:

Monthly telephone rates if using a dedicated line

Technical Competence:

This is a relatively sophisticated technology and will requires significant knowledge on staff because it will likely be a unique configuration.

Positive Findings:

Can be evolved over time and need/demand is identified and skills are developed. Maintenance costs are low so long as man-hours are not considered a cost.

Negative Findings:

Sensitive to changes. May be unreliable and produce errors which are hard to trace or fix. Licencing may be difficult to obtain.

Recommendations:

This technology is not recommended for a low-tech environment

Plain old telephone System (POTS)

Overview

Communications technology in developed nations is largely based on POTS which is the major installed communications infrastructure. It is very reliable though not versatile. It has limited capacity to transmit data. Until recently been a simple electrical-mechanical system. Telephone has evolved considerably over the past decade and become largely electronic and digitally operated within the switching systems. However, the receiver is still an analog device. In developing nations POTS is moving relatively quickly to digital switching systems in order to maintain compatibility with the rest of the world and because of easier maintenance. Within larger centres telephone is relatively inexpensive to install. In the rural areas, theft is a factor. Copper wire is useful for many purposes and a low population density allows for easy cutting and removal of line sections with little possibility of being caught. An associate reported having a phone for five months and not being able to use it for four of those months because of missing line.

Capital Costs:

Low in areas already serviced. Can be very high where lines and poles have to be strung.

Operational Costs:

Generally very low. With increasing use of electronic switching the cost is decreasing further.

Technical Competence:

Some but generally sufficient competence can be found locally.

Positive Findings:

Generally, a simple technology. Even with electronic systems coming in it is a matter of identifying and replacing cards.

Negative Findings:

Subject to theft and line problems over larger distances. Billing system has, in several reported cases been corrupted i.e. theft of long distance time.

Recommendations:

POTS has served the developed nations well. It may, however, be leapfrogged by other technologies which have a greater carrying capacity and better over-distance reliability. This will require field assessment.

Additional technologies being researched:

- Cellular telephone
- ISDN telephone
- ADSL telephone

Making Connections

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**Making Connections:
An Assessment of the Information
and Communication Technology
Needs of CREDESA for Health Care Work
in the Ouidah District of Benin**

FINAL REPORT

IDRC Study/Acacia Initiative
Prepared for IDRC by
IntraDelta Management
Consultants International Inc.

Dr. Michael Bopp, Allan Fuller and Richard Neufeld
in consultation with

CREDESA
Dr. Alphonse Guideme,
Dr. Theodore Soude and
Dr. Timothee Gandaho
April, 1997

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 - ANNEX D. People Contacted and Interviewed

ANNEX C - Proposed Budget

The estimates below are preliminary minimum estimates for recommended hardware as well as research and development costs for the proposed three (3) year ICT Introduction Project with CREDESA in Benin. Four Options are presented. Option One, the Full System, is recommended.

OPTION ONE - FULL SYSTEM

Equipment, facilities and maintenance costs

1. Simplex Radio (radios, solar panels,
batteries, regulators, accessories, installation)
@ \$2,330/unit X 65 sites \$151,450
2. Broadcast Radio Station and Tower 32,000
3. Computer equipment
@ 5,650 ea X 10 sites 56,500
4. Radio telephone
@ 4,025 ea X 8 sites 32,200

5. Shipping / Insurance 8,000

Subtotal \$280,150

6. Buildings to house village simplex radio and

CCS communication buildings

Costs to be contributed by CREDESA

(\$1,200 X 60 villages) 72,000

Total equipment and building costs \$352,150

7. Maintenance and Repair @ 10%/year)

(Cost is affected by phases and time when equipment is put into the field.) 67,295

TOTAL EQUIPMENT, BUILDINGS AND

MAINTENANCE COSTS \$419,445

Research, Development and Capacity Building Costs

1. CREDESA Personnel

- One Research Coordinator
- One Advanced Medical/Epidemiological Research Specialist
- One Community Health Research Specialist

@ \$26,600/yr X 3 years = \$79,800

2. CREDESA Research and Overhead costs

(Includes Communication equipment travel, supplies and other research-related

expenses) @ \$10,000/yr X 3 years = 30,000

3. Capacity-building costs

- In-house Research and Development and

Field Workshops (6 conferences of 14 days each)

- 1 Canadian Specialist for

@ \$600/day X 14 days = \$8,400

plus travel = 5,000

plus accommodation

@\$124/day

X 15 days = 1,860

Subtotal per session = 15,260

Subtotal for Canadian specialist participation

in 6 Conferences (6 X \$15,260) = 91,560

- CREDESA's In-house session costs (housing, local travel of trainees) for all

capacity-building sessions 48,000

Subtotal Capacity-building costs 139,560

4. On-going technical assistance/training costs 20,000

TOTAL Research and Development/capacity building \$269,360

Breakdown of estimated Research and Development/capacity building cost by year

ANNUAL CUMULATIVE

YEAR COST COST

Year 1 \$89,766 \$89,776

Year 2 89,766 179,573

Year 3 89,767 269,360

Budget Summaries

Option One - Full Program

Option One Costs

Full system equipment costs \$419,445

3-year Research, Development and

Capacity building costs 269,360

Total Option 1 - Full Program

3-year total project cost \$688,805

Option One - Cost sharing

Total cost of Option 1 - Full Program 688,805

- CREDESA's in kind contribution 72,000
- Total external contribution(s) 616,805

Option One - Cost by Phase

Option One Costs for Phase One (Years 1 and 2)

Equipment

Simplex radios 151,450

Broadcast Radio station 32,000

Computer equipment

\$5,650 X 3 16,950

Shipping 6,000

Subtotal Equipment 206,400

Buildings to house radios 72,000

R&D/Capacity building 179,573

Maintenance (@ 10%/yr) 40,080

Subtotal Phase One 498,053

Option One Costs for Phase Two (1 Yr)

Equipment

Computer equipment

\$5,650 X 7 39,550

Radio telephone 32,200

Shipping / Insurance 2,000

Subtotal Equipment 73,750

R&D/Capacity Building 89,787

Maintenance (@ 10%/yr) 27,215

Subtotal Phase Two 190,752

Total for Option One, Phase One and Two 688,805

Option Two - The broad-based, narrow-topped, minimal system (Simplex Radio at the village, commune and CREDESA / Zone Hospital levels and FM Broadcast Radio.)

Costs

Equipment

Simplex Radio 151,450

Broadcast Radio Station 32,000

Shipping / Insurance 5,000

Subtotal Equipment \$188,450

R&D/Capacity Building 269,360

Maintenance (@ 10%/yr) 55,035

TOTAL \$512,845

Cost sharing

Total cost of Option 1 - Full Program 512,845

- CREDESA's in kind contribution 72,000
- Total external contribution(s) 440,845

Cost by phase

Single phase

Option Three - The narrow, top-to-bottom research/pilot system (Complete system at the CREDESA and Zone Hospital levels and in 2 selected communes and 4 selected villages in each commune.)

Costs

Equipment

Simplex Radios

\$2,330/unit X 12 \$27,960

Broadcast Radio 32,000

Computer Equipment

@\$5,650 X 4 22,600

Radio telephone

@\$4,025 X 4 16,100

Shipping / Insurance 5,000

Subtotal Equipment \$103,660

R&D/Capacity Building 269,360

Maintenance (@ 10%/yr) 29,598

TOTAL \$402,618

Cost sharing

Total cost of Option 3 -The narrow, top-to-bottom research/pilot system 402,618

- CREDESA's in kind contribution 7,200
- Total external contribution(s) 395,418

Cost by Phase

Single phase

Option Four - Broadcast Radio Only

Costs

Equipment \$32,000

R&D/Capacity Building 269,360

Maintenance (@ 10%/yr) 9,600

Shipping / Insurance 3,000

TOTAL \$313,960

Cost sharing

Total cost of Option 4 - Broadcast Radio only 313,960

- CREDESA's in kind contribution 0
- Total external contribution(s) 313,960

Cost by Phase

Single phase

ANNEX D. People Contacted and Interviewed

People at CREDESA

NAME TITLE TEL.

Dr. Eusebe Alihonou Director 301301

Dr. Alphonse Guedeme Epidemiologist 300001

Dr. Theodore Soude Health Management 300001

Dr. Phd. Timothee Gandaho Medical Demography 300001

Aime Robert Hounkpe Administrator 300001

Moukaramou Lawani Activity Director 300001

Alexis Adohinzin Water Projects 300001

Annie Kouton Community Bank 300001

Irène Ayite Sociologist 300001

Sarafatou Inoussa Sociologist

Seraphin Vissoh Sociologist

Epiphane Gainsi Ouidah Medical Director

Marcel Sagbohan Director Education Training & Diffusion

(Community Health)

Saadou Issifou Medical Parasitologist

People at CCS

NAME TITLE AREA

Nestor Gali Nurse (Pahou)

Alberte Sossou Midwife (Pahou)

Rufin Hanlannon Nurse (Savi)

Olga Ayilara Midwife (Savi)

Achille Dossou Nurse (Gakpé)

Germaine Clegbaza Midwife (Gakpé)

People in the Information Department

NAME TITLE

Thierry Goutondji Resource

Eric Azonhe Program Analyst

Partners

NAME TITLE TEL.

Jean Tchougbe University-Syfed-Refer 350642

Stephane Paucot University-Syfed-Refer 350642

Malick Sene UNICEF Director 300266

Beatrice Kouoepa WHO (OMS) Director 301907

Augustine Tchobo Accountant for popular bank project

CRS (Catholic Relief Services)

Government of Benin

NAME TITLE TEL.

Dr. Pascal Dossou-Togbe Assistant director of the Ministry of 3312299

Health

Pascaline Ahouillihoua Journalist Rural Radio

Maurice Dossouve Journalist

Frederic Medegan OPT Commercial Development 312500

Division Chief

Local Resource People**NAME DESCRIPTION TEL.**

Jacque Tevoedjre Benine online services (Internet) 333838

Soule M. Issiaka Radio Nederland (Program Resource) 333326

Joseph F Jebara Internet & computer sales & service 312608 ENERDAS Solar panel sales
(They installed the 301490

existing radio network)

Gracien Ahouanmenou Founder Association (ABLODE) for 300350

private enterprise communication and

development rights

Communal and Village UVS and CCS Workers**NAME**

Anatole Atomabe

Elisha Lucie

Alberte A. Sossou

Amoule Hovenassi Eve

Rufin Hanlannon

Honongan Dernicle

Eugene Nassara

Veronique Dossou

Leonie Kegnikpe

Element Ayosso

Robert Sekpe

Leopold Sdjovi

Theophile Adjaho

Faustin Agbessi

Herbert Agiagbo

Alpaonse Giuedette

Timothee Gandaho

Epiphane Gainsi

Ignace Egounlety

Clarice Padonou

Village Bank Association

Village Hiyo Comune Aveleketé Circonscription Ouidah

Management committee and 42 members present.

Making Connections

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