



IRHIS - BANGLADESH

(Integrated Rural Health Information System in Bangladesh)

1.0 EXECUTIVE SUMMARY

In the last decade, technological innovations have led to the rapid development of applications for the enhancement of human life and its value, much of this advancement still largely remains limited to certain areas of the world, creating what we refer to as the Digital Divide.

In addition, the rapid growth and development in areas of the telecommunication industry has given the opportunity for the easier deployment of other technologies, irrespective of geographic distance, but again such technological advancements remain mainly accessible to urban areas of advanced and developing nations, leaving others far behind, creating what we refer to as the Digital Access Divide (**DãD**).

The **Rural Organ for Access to Development (The ROAD Project)** is an initiative that bridges the DãD by providing rural populations in less developed nations access to these technological innovations and advancements as well.

Traditionally, “rural” projects are considered to be non-profit generating endeavors, but such is not the case with the ROAD project. ROAD was designed to create an atmosphere for sustainable business development, in the field of healthcare, education, agricultural, banking, information and telecommunication services which will empower development schemes of government and non-government machineries, to create a viable, visible and sustainable access mechanism for continued development of rural population, as new technologies evolve. The first industry of concentration for the ROAD project is rural healthcare.

The healthcare industry of developing countries is itself in a state of illness. There are some promising ‘bits’ like increasing awareness among populations as well as massive government and non-government initiatives, but there are also some distressing ‘dots’ such as the lack of coordination amongst various parties that contribute to the healthcare industry, the absence of health information systems and disoriented management mechanisms. This illness is visible enough in urban areas, which is just the tip of iceberg compared to the situation in rural areas.

The gap existing between healthcare services of developed and developing nations is further widened between healthcare services of urban and rural areas of developing countries. The Telemedicine Reference Center Ltd. (TRCL) of Dhaka Bangladesh has taken a giant step towards implementing a rural health system in certain developing countries under the ROAD project, named **IRHIS – Integrated Rural Health Information System**. Even so, the IRHIS program will serve <10% of local morbid population, which is <0.5% of total population surrounding one rural medical center.

IRHIS provides a comprehensive system of medical services through (i) *integration* of healthcare industry segments, (ii) creation, positive management and distribution of *health information*,



and (iii) the infusion of acquired expertise from urban to rural areas through a ***rural information management system*** by intelligent & low-cost use of telecommunication and computer technologies.

1.1 MISSION

To harness the advanced efficiencies and capabilities of current medical, information, and communications technologies to improve the delivery and affordability of health care, both primary and specialized, in rural populations.

1.2 OBJECTIVES

- Meet basic and primary health care needs of rural communities.
- Deliver expert medical services to rural doctors, nurses, healthcare aids.
- Provide network-based tele-diagnostic services.
- Assure timely intervention into disease processes.
- Provide an intervention resource for disease.
- Increase awareness for safe motherhood and childhood.
- Improve patient compliance; reduce drug abuse.
- Improve delivery and administration of prescription drugs.
- Deploy each Rural Center at a startup cost <US \$10,000.
- Provide support resources to rural medical professionals to improve care delivery to their patients.
- Elevate the rural economy by
 - ③ reducing morbidity rate and healthcare costs
 - ③ reducing frequency and costs of travel for medical purposes
 - ③ improving productivity

1.3 OWNERSHIP MECHANISM OF IRHIS PROGRAM

The overall ownership and maintenance of the IRHIS, with the exception of the rural medical centers themselves, will belong to the IRHIS central management. TRCL has arranged financing and management for the establishment and operation of the IRHIS program through various arrangements with financial institutions from both local and international sources along with partnership arrangements with medical institutions and organizations as well as healthcare technology companies. As a result, Telemedicine Reference Center Ltd. (TRCL) of Dhaka will have significant management control on IRHIS along with its local and foreign investors and partners.

The IRHIS program will finance up to US\$ 10,000 for establishment of each rural medical center under a soft-loan mechanism. The financing program of IRHIS will cover the proper equipment, software, training and maintenance of the medical centers. The cost of renting or constructing a single rural medical center facility is the responsibility of the local owner and operator of that rural medical center of IRHIS, which is estimated to be less than US\$ 5,000 per center.



The management and ownership of each rural medical center will be with IRHIS for a minimum 36 months after the start of operation, during which time, the local owner of the center will pay a fee of 15% from its monthly profit in order to repay the Head Quarter's investment of US\$ 10,000. During the initial 36 months, a "NO PROFIT – NO FEE" philosophy is in effect, by which the owner does not have to pay the 15% fee during non-profit months.

Immediately after completion of 36 monthly fees from each rural medical center, the ownership of the center will be transferred to the local operator under certain terms and conditions set by IRHIS to maintain quality and authenticity of medical services under the IRHIS program.

A definitive selection process is in place to identify local candidates for owners of rural medical centers, with priority given to newly graduated (MB BS) licensed physicians, who would be willing to locate and operate the center in their own locality. An open invitation will be given for nation-wide selection of local operators. However, on a case to case basis, some operators will be chosen based on prior experience and exposure in healthcare industry.

The total cost of ownership of a rural medical center is less than US\$ 5,000, which is approximately $\frac{1}{3}^{\text{rd}}$ cost of center establishment.

2.0 BASICS OF IRHIS:

The Integrated Rural Health Information System (IRHIS) has five distinct processes, namely,

1. Integration Process;
2. Intelligent Process (or Process Portal);
3. Physical Process (or Warehouse & Distribution Network);
4. Delivery Process of Deliverables; and
5. End Users;

2.1 Integration Process:

To provide efficient medical services at the rural medical centers, a broad network of consulting physicians is essential. About 10% - 15% of teleconsultation patients will be referred to **previously designated tertiary medical facilities in Metropolitan cities** for advanced care, and as a result, appropriate facilities are to be arranged for timely care of referred patients from rural centers. A significant number of human samples will arrive in the Dhaka main facility for advanced **diagnostic services**, so, an advanced pathological laboratory is absolutely necessary. An **imaging facility** is an optional necessity in order to provide comprehensive services to loyal patients to rural healthcare program. In addition, there is a demand for medical consultation services from **international medical experts** for critically ill patients and to deal with complex patient illnesses or circumstances. Bangladeshi patients spend US\$ 300 Million each year traveling abroad for expert medical



services. These patients may use teleconsultation services if physicians of USA, UK, India, Singapore, etc. are included in to the physician network. Integration of theses above-mentioned physical and information processes are maintained through intelligent software in process portal.

Pharmaceutical products, laboratory supplies, maintenance of technical items of rural medical centers require efficient **procurement, supply chain and distribution mechanism**, again these are organized and integrated through intelligent central software of the process portal – *the Nucleus of IRHIS*.

2.2 Process Portal:

The integrated processes involved in IRHIS are maintained by a hybrid of multiple portals, which we call the **Federated Portal**. The portals involved are (i) the Enterprise Information Portal (EIP); (ii) the e-Business Portal - Extranet; (iii) the e-Marketplace Portal; (iv) the ASP Portal; (v) the WAP Portal; (vi) and the Public (Internet) Portal;

2.2.1 Business Communities

The process or Federated portal will serve the following divisions of the IRHIS program within the business community. These are (I) the Employee Community; (II) the Customer Community; (III) the Supplier Community; and (IV) the Partner Community:

2.2.1. I Employee Community

- Human Resources
- Recruiting
- Training
- Accounting
- Financial Planning & Analysis
- Legal
- IT
- Project Management
- Research & Development

2.2.1. II Patient / Customer Community

- Marketing
- Prospecting
- Sales
- Field Service
- Relationship Management
- Ordering
- Customer Service
- Support

2.2.1. III Supplier Community



Ordering and Fulfillment
Procurement
Planning
Sourcing
Inventory Control
Logistics and Distribution
Manufacturing

2.2.1. IV Partner Community

Share Marketing Documents, Product Release Schedule
Distribute leads to appropriate channel
Manage Forecasts from multiple channel partner
Collect up to date partner profile information
Collaborate on joint selling opportunities
Provide channel with a knowledge base for both sales and technical support
Provide access to partner-specific training, documents, etc.
Schedule resources based on demand
Collect feedback from partners on both sales and product issues

2.3 Physical Process:

The physical processes of the ROAD project are divided into 5 distinctive levels or stages. These are:

1. **Head Quarters (HQ):** The control center of all operations. The process portal, telecommunication facility, distribution center, and other support services will be located at Head Quarters along with the control and operations center. Two six storied building of 50,000 square feet of space is being renovated as per the design and needs of the IRHIS program, which will include a state-of-art physician practicing chamber for 70 physicians, a training center for medical professionals, as well as other support facilities.
2. **Point of Assembly (POA):** These are the facilities that will receive goods and supplies to meet the operational needs of the system. Independent packaging systems will re-pack products into specific units as designed by the HQ. All products either in original or re-packaged quantities will be labeled with customized bar-codes. For the initial phase, **one (1) POA facility** in the Tejgaon Industrial area of Dhaka city has been established.
3. **Point of Distribution (POD):** These are strategic points depending on the transportation network of the concerned region. **Six (6) POD physical facilities, including one in Dhaka division,** will be set up to receive and deliver products to and from POTs. The future expansion of the IRHIS system includes a referral hospital facility of 50-100 beds under each of 6 division based POD.



4. **Point of Transaction (POT):** This is the heart of the entire system also called the “Access Point”, and houses (i) the rural health center, (ii) the pharmacy, (iii) the laboratory, (iv) the telemedicine facility, and the administrative system. **The IRHIS program has set up 3 such facilities and will complete establishment of 50 such centers in rural areas of Bangladesh by June 2004 and an additional 150 centers by September 2005.**
5. **Field Medics (FM):** Either Nurses, paramedics, or village doctors. They are the mobile work force of the POTs. Their main activities include; medical follow-up house calls, selling pharmacy products, collecting samples for laboratory, etc. Each rural medical center will employ 2-5 Field Medics based on salary plus commission basis.

2.4 Delivery Process of Deliverables:

The deliverables of the IRHIS system are:

- (i) Onsite medical consultation by licensed local physician;
- (ii) Referral Electronic Medical Consultation with IRHIS National & International Physician Network;
- (iii) Diagnostic Services;
- (iv) Pharmacy Services;
- (v) Imaging Services;
- (vi) Mobile Field Services;
- (vii) Rural Health Insurance Program; and
- (viii) Awareness Programs;

2.5 End Users:

Although our target market is the rural populations of under-developed nations, our services are also designed to act as a B2B. In other words, IRHIS facilitates interactions and transactions between medical professionals, health insurance providers, diagnostic, and hospital facilities and as a result provides a service to a market which was originally unavailable. In another way, IRHIS may be regarded as a HMO, thus our major clients are (i) rural medical centers, (ii) general practitioners, (iii) field medical personnel, and (iv) retail pharmacy outlets as well as individual patients.

3.0 TECHNICAL

Major technologies involved in IRHIS are:

- a. Telecommunication & Networking technology;
- b. Telemedicine Technology;
- c. Biomedical Engineering; and
- d. Information Technology.

3.1 Telecommunication & Networking Technology



The main process portal of IRHIS program will be connected to a major telecommunication hub in the Far Eastern region of Asia. This will allow dedicated global connectivity and information services to different departments of IRHIS program. An independent ISP (Internet Service Provider) system is being installed to provide access to the main process portal using VPN, Dial-up, and Broadband Internet Service from remote rural medical centers. The dedicated ISP will play a vital role in integration process of IRHIS program. In addition, the public portal system is also integrated in order to provide information and customized services to the individual patient population as well.

3.2 *Telemedicine Technology*

Technological advancement in telemedicine science is being undertaken in different parts of the world and IRHIS takes advantage of some of these advancements by partnering with telemedicine software and applications companies from USA. Together, a customized software system was designed and will be used as operational backbone to the teleconsultation and referral system of the IRHIS program.

3.3 *Biomedical Engineering*

There are many vendor driven telemedicine device components in the market, unfortunately, these devices and ~~or~~ solutions remain inaccessible to many developing nations and their citizens due to financial constraints. The IRHIS program, through continued R&D programs of the Telemedicine Reference Center Ltd. (TRCL) in biomedical engineering, has acquired very low-cost telemedicine peripheral devices (e.g. digital stethoscope, diagnostic scopes, etc.). The deployment of cost of each rural medical center will be completed at a cost of US\$ 10,000 a little more than $\frac{1}{3}^{\text{rd}}$ the cost of a similar telemedicine system setup elsewhere. As a result, the technology, software and related medical devices have become a unique and customized solution of IRHIS program.

3.4 *Information Technology*

The information technology system is the backbone of the IRHIS program and can be seen throughout the various levels of the Process Portal. It will provide the various healthcare providers with the ability to effectively and efficiently record, manage and access all information gathered on all patients.

4.0 SERVICES OF IRHIS

4.1 *Onsite Medical Consultations by Licensed Physician:*



A **Licensed Physician** (MB BS), usually the owner of the rural medical center will consult a maximum 40 patients in a day and will work 6 days/week. This is a service which will be paid for by the patient to the local physician, who will retain all income generated from this segment of the IRHIS program. The regular fee for each medical consultation is equivalent to < **1.00USD**. The following categories of medical cases will be seen by local physician:

- (i) Primary healthcare services;
- (ii) Minor trauma cases;
- (iii) STDs & HIV;
- (iv) Follow-through care to chronic patients;
- (v) Immunization;
- (vi) Patient Registration & Identification;
- (vii) Electronic Medical Record (EMR);

4.2 Referral Electronic Medical Consultation with IRHIS National Physician Network:

Rural Licensed Physicians, in addition to providing primary healthcare services, will prepare telemedicine data, based on the IRHIS protocol, for following categories of medical cases:

- (i) Hypertension;
- (ii) Cardiac Patients;
- (iii) COPD including Asthma Patients;
- (iv) High Risk Pregnancy;
- (v) CVD;
- (vi) Orthopedics;

The fee for referral electronic medical consultation is a maximum of **US\$ 5.00**

4.3 Referral Electronic Medical Consultation with IRHIS International Physician Network:

A vast network of international physicians is being developed in the USA, the UK, and India for the IRHIS program and will be available for both physicians of Bangladesh origin as well as foreign nationals. All physicians under this program shall have their own account with IRHIS, which includes storage capabilities for their patient information as well as access to clinical decision support amongst other things. When needed, the IRHIS will be able to provide their expert consultative opinions to medical cases. Participation is voluntary and a fee will be payable against each consultation. Many physicians of Bangladeshi and foreign origin have expressed their sincere interest to provide free consultation services to rural population and options to avail such opportunity for poor patients will be kept in IRHIS.



4.4 Diagnostic Services:

- (i) Rapid testing services by available test kits;
- (ii) Human sample collection system to send samples to reference laboratory for advanced diagnostic tests;
- (iii) Blood Sugar;
- (iv) Urine Sugar;
- (v) Pregnancy;
- (vi) Stool R/E;

4.5 Pharmacy Services:

IRHIS includes a nationwide pharmacy retail chain management system, which is controlled from the HQ of IRHIS. This system will ensure a proper supply of prescription and non-prescription standard pharmaceutical products throughout the IRHIS as well as provide clinical decision support when prescribing and dispensing drugs to patients.

4.6 Imaging Services:

Imaging services will include X-Ray, Ultrasonography, Echocardiography, CT, etc. These services will be available in Divisional IRHIS facilities during the initial phase. There are plans to have X-Ray and Ultrasonography services in each rural center at a later stage.

4.7 Mobile Field Services:

Each rural medical center has two or more Field Medics, which can be Nurses, paramedics, or village doctors, and are the mobile work force of the center. Their main activities include; medical follow-up house calls, selling pharmacy products, collecting samples for laboratory, etc.

4.8 Rural Health Insurance Program:

Jointly with a local health insurance company, IRHIS will offer health insurance products and services to the rural population. At present, health insurance programs are being developed under the IRHIS project.

4.9 Awareness Programs:



IRHIS, jointly with government, NGOs and international donors, will conduct and deliver awareness programs and workshops through mass media, printed publications, digital and online education projects. Customized awareness campaigns and products are being developed for patients of each rural medical center including drug information products and services.

5.0 PROJECT SCHEDULE

The Telemedicine Reference Center Ltd. took more than three (3) years for research and development of the IRHIS program. From concept to development and then to deployment took another fourteen (14) months. Completion of the project will take another six (6) months to setup fifty (50) rural medical centers including establishment of the state-of-the-art Head Quarter and logistic services.

IRHIS Program Timeline:

January 21, 2004: Inauguration of the first 3 rural medical centers in Bangladesh from the US Trade Show 2004.

April 30, 2004: Completion of Head Quarter and automated logistics service system establishment.

June 30, 2004: Completion of 50 rural medical center deployments.

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