INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION DEVELOPMENT BUREAU**

**ITU-D STUDY GROUPS**

**Document RGQ10-1/2/012(Rev.2)-E**
**1 April 2004**
**Original: English only**

RAPPORTEUR'S GROUP MEETING ON QUESTION 10-1/2 - GENEVA, 30-31 MARCH 2004

Question 10-1/2: Communications for rural and remote areas

## STUDY GROUP 2

SOURCE: VICE-RAPPORTEUR FOR QUESTION 10-1/2

TITLE: FORMAT FOR SUBMISSION OF CASE STUDIES ON SUCCESSFUL PRACTICES IN TELECOMMUNICATION FOR RURAL AND REMOTE AREAS

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**Submission of case studies**

The case study submission constitutes of two parts:

- The Case Study Summary Information form (Section a) to be completed, preferably, in electronic format using the template provided
- The Detailed Project Description and Analysis (Section b) to be provided in free text form

The Case Study should by submitted **by 30 July 2004 to:**

**BDT Secretariat**

Fax: +41 22 7305484

E-mail: devsg2@itu.int

Any queries about the methodology or the meanings of the questions should also be addressed to **BDT Secretariat**.

**Language and length**

Reports may be submitted in English, French or Spanish; the description and analysis shall be 7 to 14 pages of A4 sized paper single space, according to the categories specified in Section b.

**Coverage**

Case studies normally cover a single telecommunications project in a rural or remote area. It is, however, permitted to base the case study on several **closely related** projects, instead of a single project, provided that the recommended length and format of the submission is respected.

The following types of projects are acceptable:

1. Operational (ongoing) projects

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Contact point: Mr. John B. Rose, UNESCO, Paris, France, tel: +33 1 45684529, fax: +33 1 45685583, e-mail: j.rose@unesco.org

2. Projects completed within the past three years.

In choosing the project(s), members are invited to ensure coverage of one or more of the topics of concentration defined in the terms of reference of Question 10-1/2:

- Development of multi-purpose community telecentres (MCT), public call offices (PCO) and community access centres (CAC);
- Provision of telecommunication services to rural and remote areas;
- Sound and television broadcasting for rural and remote areas and linkages to MCT's, PCO's, or CAC's;
- Impact of the provision of ICT in rural and remote areas, and in previously unserved or underserved urban and semi-urban areas, particularly in furthering the economic, social and cultural development of the area that meets the needs of both women and men in the community.

Particularly welcome are examples of technologies which are especially relevant for use in harsh climatic or geographic conditions of remote and rural areas, such as solar-powered equipment, and/or of development applications such as e-health and tele-education.

## a) Case Study Summary Information

1. **Title of case study:** Application of the Telemedicine Technology to provide Tele-health Care during Mela/ Festival and Disaster

2. **Details of the person preparing the case study:**

   Name and title of person preparing the case study: Prof S.K.Mishra

   Organization submitting the case study: Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, India

   Address: Prof & Head, Department of Endocrine Surgery & Nodal Officer, Telemedicine, SGPGIMS, Lucknow-226014, India

   E-mail: skmishra@sgpgi.ac.in / skmishra_1956@yahoo.com

   Website: http://www.sgpgi.ac.in

3. **Status of project(s):**

   ☐ Operational

   ☐ **Completed**Ö

4. **Location and population of the project area**

   Location (village, district, etc.) District

   Population of the project area 10 millions people in six weeks

**5. Type of application / service (check one or more boxes)**

- ☐ Multipurpose telecentres, community development
- ☐ E-governance, e-administration
- ☐ Support for small business, e-business
- ☐ **E-health** Ö

☐ Tele-education, e-learning

☐ ICT training

☐ Emergency support / disaster mitigationÖ

☐ Environmental monitoring / protectionÖ

☐ Radio or TV broadcasting

☐ Others (please specify) _____

**6. Type of technology (check one or more boxes)**

☐ Wired local loop: Copper, optical fibre, etc.

☐ Wireless local loop

☐ Fixed wireless access

☐ Mobile wireless access

☐ Satellite two-way communications: VSAT, GMPCS, etc.

☐ Radio LANS and IP-based related networks

☐ Terrestrial voice, data, sound or television broadcasting

☐ Satellite voice, data, sound or television broadcasting

☐ ÖOthers (including hybrid technologies, please specify) **ISDN (128 Kbps)**

**7. Organizations involved in the project:**

Department of Information Technology, Govt. of India ( Funding & Monitoring Agency for the Project)

Online Telemedicine Research Institute, Ahemedabad ( Technology development and support)

Department of Health, Government of Uttar Pradesh, India ( public health support measures)

Department of Information Technology, Govt. of Uttar Pradesh ( State monitoring Agency)

M.L.N.Medical College, Allahabad ( Local Tele-health support and clinical care of patients)

Sanjay Gandhi Postgrduate Institute of Medical Sciences, Lucknow ( Principal Investigator, Implementation, tele-healthcare in the super-specialty subjects, Documentation, Final analysis of project outcome)

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## 8. 150 word summary of the project indicating its expected social /economic impacts

The project titled "Application of the Telemedicine Technology" to provide Tele-health Care during Mela/ Festival and Disaster" was sanctioned on 2nd January 2001 and was implemented on 6th January 2001 during the *Mahakumbhmela* (big festival) held at Allahabad in the month of January – February 2001. The duration of the project at *Mahakumbh mela* was between 6th January to 26th February 2001. An enterprise based telemedicine network was set up connecting Mela site hospital with Moti Lal Nehru Medical College, Allahabad, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, *Mela* Monitoring Cell, U.P. Secretariat and Public Health Cell, Director General of Health Services, Lucknow. All the five nodes were connected with 128 kbps bandwidth ISDN telephone line along with medical equipment accessories and video-conferencing system. Tele-consultation provided by different departments of SGPGI. Daily exchange of Event and water report followed by discussion over video-conference were carried out between public health officials at festival site and state HQ at Lucknow. Necessary corrective measures were carried out in water treatment as per advice obtained

## b) Detailed project description and analysis

1. Overview of the project's targets and objectives

    a. Brief description of the country/region: geography, terrain, climate, demographics, socio-economic situation,

India is a vast country of 1. 4 billion population occupying an area of 3,287,268 Sq. kms. It consists of twenty nine states and six Union Territories governed by a federal system. In north it is surrounded by mighty Himalayas and in south Indian Peninsula by Indian Ocean, Arabian Sea and Bay of Bengal (coastal line of 6.700 km).

In every twelve years, *Mahakumbhmela*, an Indian Hindu religious festival held in holy city of Allahabad, Uttar Pradesh state located in the north-central part of India. The city is situated at the junction of two sacred rivers i.e. Ganges and Yamuna. The confluence is known as *Sangam ( confluence)* where the muddy waters of Ganges and the clean green water of Yamuna can be distinctly seen to merge into one. Bathing at the *Sangam* is believed to be auspicious for the Hindus through out the year especially for 15 days in the month of *Magh* (mid-January to mid-February) during *'Magh Mela'* and longer during *Mahakumbhmela*. Astrologers calculate the holiest time to enter the water and draw up a 'Holi Dip Schedule'. So *Mahakumbhmela* attracts millions of pilgrim of all socio-economic group due to its religious importance and to take holy dip . The climate of Allahabad is of extreme type i.e. very hot in summer and cold in winter. *Mahakumbhmela* occurs in the month of January and February so the weather is very cold at that time.

    b. Objectives and implementation details of the project applications (basic telephony, e-business, e-administration, e-education, e-health, ICT training etc),

    The objectives of the project was to test the utilities of telemedicine application in unique Indian settings of festival to render tele-health care at the festival site in the form of specialty consultation to the doctors working at the make shift hospital there, tele-monitoring public health such as quality of water supply, local hygienic conditions, public health education and daily monitoring of infectious diseases so as to take appropriate steps at right time to content them in order to prevent public health disaster like epidemic outbreaks. It was an unique experiment of its kind to be carried out in India.

    c. Financing and partnership aspects of the project.

The total budget sanctioned for the project was 80,00,000 INR (180,000 USD) which included hardware, software, manpower, telecommunication and other contingencies. It was designed and implemented by a team of medical, technical groups as outlined above.

2. Infrastructure and regulatory environment

    a. Infrastructure components: Pre-existing telecommunication facilities, transport access, electricity supply, distance to the nearest local exchange and/or IP network, human resources, security,

    A temporary telephone exchange was established by the Government Telecommunication department at the Festival site through which the ISDN and PSTN lines were installed at the Field hospital where the Field Telemedicine platform was created. Nearest city exchange was 10 kms away.

    b. Regulatory components: Universal service obligations, licensing conditions, frequency availability (for radio-based projects), other regulatory issues,

    Not applicable

    c. Other factors which influenced the operating environment (manufacturers, standards etc).

    There was no problem with inter-operability of electronic medical records with remaining four telemedicine platforms since the software was provided by same developer. The developer of the software and the network followed international standard for video-conference in its embedded system.

3. Technical description of the project(s)

    a. Architecture, main technical characteristics, frequencies (for radio-based projects), power consumption, performances (capacity, reliability, quality of service), network management, etc.,

An enterprise based telemedicine network (fig 1) was set up connecting the Field hospital (fig 2) at the festival site with M.L.N. Medical College, Allahabad, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, *Mela* Monitoring Cell, U.P. Secretariat and Public Health Cell, Director General of Health Services, Lucknow. All these five nodes were connected with 128 kbps bandwidth ISDN telephone line. Telemedicine System along with medical equipment accessories such as Microscope, X-Ray scanner, ECG and real time video-conferencing was installed at the field hospital. Four other Telemedicine systems having facility of exchange of data and real time video-conference were installed at four other nodes. Barring occasional connectivity breakdown there was no other technical problem.

    b. Installation and deployment: network planning, subscriber management, etc.,

    Two weeks of planning was carried out with technical partner and discussion were held with the district administration and telecom officials looking after the administration of the festival. All the medical and paramedical deployed at the field hospital were explained about the telemedicine network and its purpose. Installation of all the nodes were over within 24 hours including activation of ISDN lines.. All the nodes were manned by technical personnel trained by the technical partner of the project. The users i.e. the Doctors and paramedical personnels were demonstrated about the different uses of the network and platform. A hand holding session was also carried out.

c. Interconnection to national networks/backbones,

Interconnection to other far off locations was smooth since the telecommunication traffic from the telemedicine nodes was going through the national telecommunication network back bone.

d. Cost of the equipment, cost per line and cost of operation of the system.

Breakdown of the Project budget in different heads is mentioned in the table below.

**(Rs. in lacs – One million is equivalent to 10 lakhs)**

| S. No | Head | Approved Outlay | Expenditure Incurred Up To 31.12.2001 |
|---|---|---|---|
| 1 | Capital equipment<br>(i) Monitor –12<br>(ii) CPU - 12<br>(iii) Pen Key Board – 12<br>(iv) Colour Inkjet Printer –05<br>(v) Web Camera – 12<br>(vi) Hub & Adopter – 04<br>(vii) Microphone – 06<br>(viii) Desk Top Modem – 04<br>(ix) ECG Phone – 05<br>(x) Telemedicine Table – 08<br>(xi) Power Distribution Board -<br>(xii) Hand Set – 05<br>(xiii) PFT Machine – 01<br>(xiv) Portable Xray Machine – 01<br>(xv) Ethernet Adopter Card – 02<br>(xvi) Microscope with Camera – 01<br>(xvii) X ray Flatbed Scanner – 01<br>(xviii) Online ECG Monitoring Unit – 02 | Rs.58.50 lacs | Rs.58.50 lacs |
| 2. | Consumable<br>Items/components<br>(Fe comp}<br>(xix) Telemedicine license software – 06<br>(xx) Service Kit – 06<br>(xxi) Cable set – 06 | | |

| | | | |
|---|---|---|---|
| | (xxii) Printer Stationary rim – 05<br>(xxiii) Operating manual - 02 | | |
| 3. | Staff salaries | 6.50 | Rs.3,42,911.00 |
| 4. | Contingencies (including telecommunication, travel, conference organisation and other miscellaneous expenses) | 15.00 lacs | Rs.20,67,239.00 |
| | **Total** | Rs.80.00 lacs | Rs.82,60,150.00 |

4. Technical description of the services provided

   a. For each service delivered (POTS, "IP telephony", etc.): mode (data type and bit rate) and quality (voice quality and bit error rate),

   All the transfer of medical data and video-conference was carried out in 128 Kbps bandwidth.

   b. Cost of each terminal and cost of the service for the user. ( Refer above table)

Effectiveness and sustainability of the project

   c. Effectiveness and benefits of the project for the targeted user groups,

The numbers of tele-consultation provided by different departments of SGPGIMS were as following; Cardiology (n=64), Radiology (n=32), Orthopaedics (n=13), Neurology(n=1), Neurosurgery (n=1), Ophthalmology (n=2), Oncology (n=1), Psychiatry (n=1), Dermatology (n=1), Rheumatology (n=1), Pathology (n=10). Besides tele-consultation, daily exchange of Event report and Water reports followed by discussion over video-conference were carried out between public health officials at festival site and state HQ at Lucknow (fig 3).

The Microbiology department at SGPGIMS carried out analysis of stool samples obtained from the diarrhoea patients in order to detect Cholera**.** The Microbiology department at SGPGIMS carried out analysis of stool samples obtained from the diarrhoea patients in order to detect Cholera. . A small laboratory with a microscope and minimum facility was provided by the Festival authority. In suspected cases of Gastroenteritis few fecal samples collected from a group coming one particular area of a state grew Vibrio cholerae and were confirmed both serologically as well as from the national center (National Institute of Cholera and Enteric Diseases,Calcutta). Immediately through teleconferencing the results were communicated and management was done by the Mela doctors. Due to strict monitoring of the water through coliform counts at SGPGIMS and also OT test in the drinking water outlets at the festival location; the outbreak did not spread and was controlled. The next common patients were with cough. They were mostly suffering from COPD or

allergy. The doctors posted at Festival site field hospital were educated on daily basis over video-conference regarding management of cases referred. Also, they were taught about this new health technology and its applications. Besides doctors and paramedical workers many people and media professionals were appraised about the technology and demonstrations were given. The Sangam water examined before the the Mela started did have some coliforms bacteria and also the free-living amoeba. However, every week and after the bathing day the flowing water did not grow any pathogenic organism. Similarly the outbreak of diarrhea following contaminated food in a near by police camp was prevented by strict monitoring and controlled within 2-3 days. Thus online telemedicine could really help and the infectious diseases could be controlled.

Monitoring through Telemedicine was done of water quality, hospital admissions and fly index. Orthotoludine (OT) Test of drinking water from different sectors of *Kumbhmela* area was performed. Negative Test indicates lack of chlorination in water supply. 1024 OT tests were done, of which 869 samples were positive and 155 were negative. Directions through video-conference were given to the public health laboratory regarding day to day monitoring of drinking water supply, and control measures to be taken in case of an outbreak. 154 samples with Negative OT result were collected. On the basis of bacteriological examination report water supply had been categorized in to excellent, suspicious,and contaminated in 115, 34 and 5 samples, respectively. Faecal contamination was detected during first fortnight of January 2001.Focally contaminated water supply was corrected immediately within 24 hours of obtaining the results through Video Conferencing. Only at one point faecal contamination of water was detected repeatedly, the source of water supply was closed immediately. No further contamination was detected during the whole festival period.

d. Profitability of the project,

It is difficult to objectivise the profitability in terms of money saved in terms of avoiding transfer of patients to specialty hospitals and public health corrective measures undertaken since it was not the objective of the project. The project was enivisaged to study of feasibility of telemedicine applications in a field environment.

e. Specific strategies to respond to the needs of women, youth, handicapped and other marginalized or socially disadvantaged groups

Many of the piligrims belonged to low socio-economic status and the patients could get access to specialist care at the field location.

f. Aspects of the project which could be strengthened to enhance its effectiveness or sustainability.

The fact that the telemedicine technology could be applied in a field location the experiment was translated to developing a mobile telemedicine platform. As a spin off effect of the project we did develop two mobile platforms, one in a vehicle for application in similar situation and the other is a portable one in a suitcase for disaster applications.

5. Social and human development impacts

a. Overview of social and human development needs,

As is evident from the description above, telemedicine in filed locations can be of immense benefit from social and human development angle.

b. Role and commitment of the project in addressing these needs,

Vide supra

c. Socio-economic benefits for, and impacts on, the community(ies) and/or at a wider level, including support for gender equity and the needs of marginalized and disadvantaged populations

Vide supra

d. Means foreseen to enhance future contributions to human and social development.

6. Other observations

a. Unexpected results and lessons learned,

Overall, this project has achieved so many objectives besides fulfilling the ones outlined in the original project. Subsequent to completion of experiment at Mahakumbhmela all the equipments located at different nodes were brought back to SGPGI and an infrastructure for Telemedicine was created for the first time in the Institute way back in 2001, one Telemedicine Station was also established at one of the peripheral Medical College (S.C.B Medical College, Cuttack) in Orissa 1500 km away in East India. During this time Cyclone was set in Orissa so it was the right opportunity to set up a Telemedicine station there to test the utilities in such kind of disaster. In the month of August 2001 doctors from many departments at S.C.B. Medical College Hospital were trained on telemedicine technology. Since the patients suffered in cyclone could be managed there without the need of consultation from SGPGIMS. After that the doctors desired the network and infrastructure created at S.C.B Medical College may be used for Tele-education for their postgraduate students. So from 4$^{th}$ September 2001 tele-educational sessions were carried out between SGPGIMS and S.C.B. Medical College, Cuttack using ISDN media. So the equipments have been utilized to its fullest extent during and continued to be used even after the project. The concept of Mobile Telemedicine i.e. mounting the equipment in a mobile van and taking it to application sites has been emerged during the project. Educating people who matters in health care giving some of them hands-on-experience on this new health technology will go in along way in integrating telemedicine in health care delivery.

b. Anticipated near/long-term project challenges and reorientation.

We feel the telecommunication solution for such kind of project can be made through IP VPN through terrestrial broadband if nodes are located in far off locations and Wi Fi / Wi Max if nodes are located at short distances. Certainly the equipments can be customised and made more cheaper.

c. Additional information considered useful

The Mobile platforms technology developed can be transferred to similar projects envisaged in other developing countries and disaster situations like recent Tsunami.

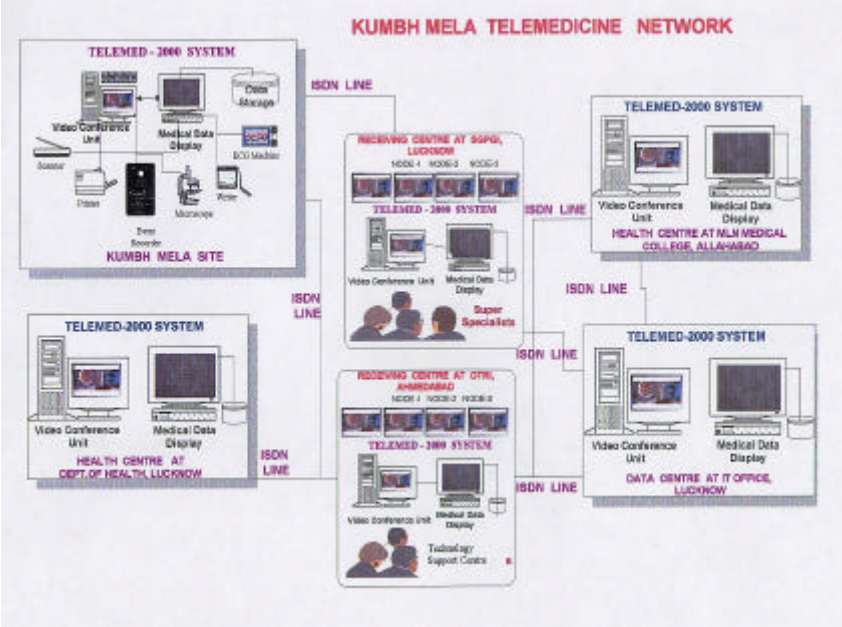


Fig 1 showing the five nodes of Kumbh Mela Telemedicine Network


Fig 2 showing Field Hospital at the Festival Site

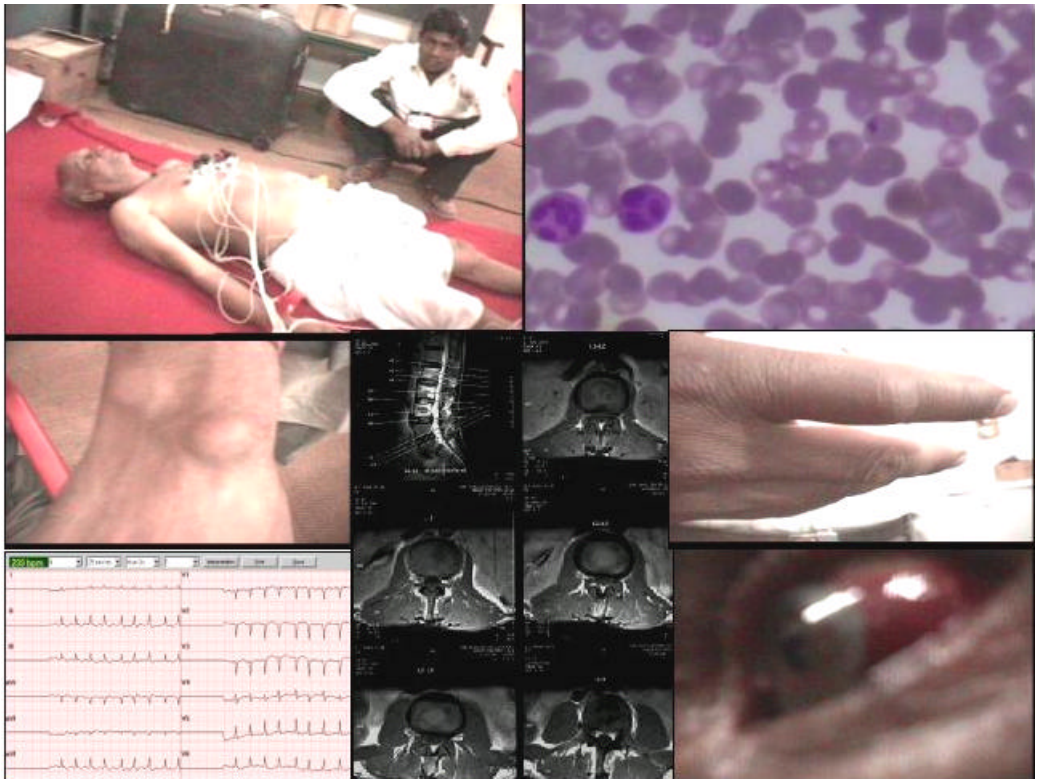

Fig 3 showing types of images transferred