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FIRST MEETING OF STUDY GROUP 1: GENEVA, 10 - 12 SEPTEMBER 1998
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Question 14/2: Fostering the application of telecommunication in health care. Identifying and documenting success factors for implementing telemedicine

STUDY GROUP 2

SOURCE: PROPOSED RAPPORTEUR FOR QUESTION 14/2

TITLE: TELEMEDICINE PROJECTS IN DEVELOPING COUNTRIES: CASE STUDIES

The work on this Question began a few month ago with an inventory of case studies. Other pilot projects which could form case studies for other developing countries will be added in due course.

16 feb 98: case_st4

TELEMEDICINE PROJECTS IN DEVELOPING COUNTRIES: CASE STUDIES

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1. Introduction

This document comprises a set of case studies of telemedicine pilot projects in developing countries intended to be of benefit to others planning or undertaking similar projects. This set of case studies has been selected by either the Bureau of Telecommunication Development (BDT) of the International Telecommunication Union (ITU) or the Rapporteur's Group in Study Group 2 of the ITU's Development Sector or by the Midjan Group.[1]

Most of these pilot projects have been organised as a result of the BDT's request to the Midjan Group to organise a set of telemedicine demonstrations at the World Telecommunication Development Conference (WTDC) scheduled for Malta in 23 March - 1 April 1998. At its September 1997 meeting in Geneva, the Midjan Group agreed a set of principles and guidelines for selecting which projects should be demonstrated for the Malta conference.

2. Principles and guidelines

2.1.1 Principles

At its September 1997 meeting, the Midjan Group agreed to organise demonstrations which show delegates different types of telemedicine applications. Following are the principles agreed by the Midjan Group for selecting demonstrations for the WTDC:

The applications should use technologies which make sense in developing countries. Different technologies should be used.

The demonstrations should be the kick-off for sustainable pilot projects – although existing pilot projects which have already started can be included.

The demonstrations/pilot projects should involve one or more countries in different parts of the world (e.g., Africa, Latin America, eastern Europe/CIS countries, the Arab region).

The demonstrations/pilot projects should involve a diversity of participants, i.e., they should illustrate the multidisciplinary approach required for deployment of telemedicine.

The demonstrations/pilot projects should enable some level of audience participation and/or a hands-on experience for delegates.

Organising the demonstrations/pilot projects must be a collaborative, co-operative effort among Midjan Group members. There should be a full exchange of information among all participants at all times so everyone knows what everyone else is doing.

The principle within the Midjan Group has been that each partner picks up his own costs. The same principle will, of necessity, apply for the demonstrations in Malta, although it might be feasible to obtain some funding from the ITU, the European Commission or other donor. In any event, the costs should be identified and documented.

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[1] The Midjan Group is an association under French law of telemedicine institutes, equipment suppliers, service providers, telecom operators, universities, hospitals, international organisations and ministries of health, all of whom share an interest in facilitating telemedicine pilot projects in developing countries. The Midjan Group is also preparing a directory of European telemedicine suppliers and drafting a European telemedicine strategy aimed at third countries.

2.1.2 Types of telemedicine applications

Among the different types of telemedicine applications which the Midjan Group has considered appropriate for evaluation in pilot projects in developing countries are the following:

- Access to data bases, including telemedicine Web sites
- Distance learning
- Mobile, e.g., an ambulance service in a remote area
- Prevention programs
- Teledermatology
- Teleradiology
- Use of telematics for health care planning
- Vital signs monitoring

Some of these applications can be used with relatively simple means of communications. Other may require more sophisticated videoconferencing and other equipment.

2.1.3 Guidelines for pilot project proposals

See Annex 1 for the detailed guidelines used by the Midjan Group for selecting pilot projects and demonstrations for the World Telecommunication Development Conference (WTDC).

3. ARGENTINA – Teleconsultation, vital signs monitoring

3.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

Guillermo Schor-Landman .

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3.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.?

1. To provide medical support to rural hospitals and populations located far from the main cities, in areas that are inhospitable and/or not easily accessible.

2. To develop ongoing undergraduate and postgraduate medical distance learning programmes.

3. To lower the costs of services in the aforementioned regions, optimizing (using telemedicine) their quality.

3.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

The Argentine Republic comprises a vast territory (2 766 889 km^2) with a population (34 000 000) that is 87% urban and 13% rural. Moreover, one-third of the population (11 000 000) lives in the urban belt around the city of Buenos Aires.

This uneven pattern of distribution is repeated in the medical profession, with a surplus of specialists in the cities, far too few in rural areas, and sometimes none at all in the most remote areas.

As virtually everywhere else in the world, most of the top medical specialists work in centres in the country's main cities (Buenos Aires, La Plata, Córdoba, Rosario, Mendoza, etc.), a long way from those that without any doubt are most in need of their experience.

The SITEM project aims to bring those professionals closer to the aforementioned areas without transferring them there physically and (to the extent appropriate) without transferring the patients to the main cities for specialized medical care. In addition to the medical treatment itself, we would emphasize the importance of the system's teaching potential, in the form of both training courses for other professionals and of general advice and recommendations for the rural populations.

3.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

The application to be demonstrated during the meeting will comprise the assistance side of the project. A link will be established between a hospital in the Salta area (northern Argentina, with very few specialists) and the Santojanni Hospital in the city of Buenos Aires, which comes under the Government of the City and is affiliated to the Faculty of Medicine of the University of Buenos Aires.

The link will enable doctors at the Salta Hospital to consult their colleagues in Buenos Aires on a specific clinical case. SITEM, as the company responsible for services in the telemedicine field, will coordinate the activity and provide the link required for transmission. It will take the following form:

- Salta Hospital: videoconferencing station and vital signs monitoring.
- Santojanni Hospital (Buenos Aires): videoconferencing station.

3.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

The project will seek to demonstrate that telemedicine can bring two major benefits to the various health systems operating in Argentina, by:

1. improving the quality of medical care; and

2. helping to curb the ever-increasing cost of providing health care.

Meeting both objectives will produce a cost/benefit ratio more in line with the country's current socio-economic circumstances.

Equipment: ISDN lines will be used to link the Salta and Santojanni Hospitals, and the Santojanni Hospital with Malta.

3.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

Telecom Argentina

Hospital Santojanni

Contact:

Dr Alberto Eurnekian

Director

Hospital General de Agudos Donacion

Francisco Santojanni

Secretaria de Salud y Medio Ambiente

Municipalidad de la Ciudad de Buenos Aires

Unidad Hospitalaria en Salta

SITEM

Telintar

3.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

The project satisfies the following requirements in Salta Province:

a) Specialist medical support to non-specialist colleagues.

b) Remote training of medical professionals who do not normally have access to in-person training.

The proposed set-up combines relatively simple equipment with the transmission technology currently available in the Argentine Republic.

3.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

The cost of the equipment is in the region of $US 50 000, to be borne by Telecom Argentina and Telintar.

Other costs (travel by representatives and technicians to the locations involved in the demonstration, transmission costs) are estimated at approximately $US 20 000.

3.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

Project Milestones :

Event	***Date***
Selection of hospital in Salta	10 January 1998
Installation of equipment in Salta	3 February 1998
Installation of equipment in Buenos Aires	6 February 1998
Training of staff	13 February 1998
Salta-Buenos Aires transmission test	20 February 1998
Malta transmission test	10 March 1998
WTDC	23 March 1998

3.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

The Argentine Republic has specific plans to bring into use telemedicine applications similar to those to be used in the demonstration project. The plans involve rural areas that will come under the care of more sophisticated centres.

4. CATAI – Telemedicine Support Centre

4.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

Prof. Dr. O. Ferrer-Roca.

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4.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

To establish a mission telemedicine centre unit (MTCU) providing

1. medical support via telephone
2. co-ordination between Rescue Co-ordination Centres (RCCs) and Telemedicine Support Centres (TSC)

4.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

Two main problems in implementing telemedicine applications, particularly in developing countries, relate to:

1. technology transfer problems
2. organisational effectiveness and cost-benefit

Technology transfer scenarios are described in the *Handbook of Telemedicine* (prepared by the CATAI Consortium and edited by O. Ferrer & M. Sosa) and can be characterised as follows:

A) Technology prepared and interested	1) Urgent demand for telemedicine
B) Technology prepared or not able to accept/introduce it	2) No real urgent need

Although the ideal situation is A1, the usual one encountered is B1. To introduce a new technique, we have to take into account:

- Clinical adequacy
- Learning effect
- Cost-efficiency
- Ethical principles

as well the criteria of

- Demonstrated effectiveness
- Solution to the relevant problems
- Quality of techniques

The goals of this pilot project address most of the technology transfer problems and adequacy of the application through the *organisational* and *teaching* aspects of existing and new telemedicine applications taking into account the effort devoted to each individual telemedicine pilot in every country and its involvement in emergency telemedicine support.

PILOT DESIGN

The centre will:

- act as a co-ordination unit in the teaching aspects of telemedicine and other communications systems associated with emergency situations;
- provide organisational schemes and telephone support for telemedicine in co-ordination with other RCCs in the world.

The project benefits from the geostrategic situation of the Canary Islands in relation to Africa, Europe and America, together with its special economic fiscal regime.

TELEMEDICINE TEACHING.

The CATAI consortium, comprising 12 partners from 10 countries, is finishing this year a set of modules about telemedicine which will provide basic theoretical and practical information required for telemedicine practice. The modules cover 12 aspects:

Chapter 1	History of Telemedicine
Chapter 2	Minimal Technical Requirements
Chapter 3	Main Telemedicine Applications
Chapter 4	Basic Technical Knowledge
Chapter 5	Quality Control and Assessment
Chapter 6	Use and Indication of Widespread Telematic Tools in Telemedicine: Internet
Chapter 7	Training, including Distance Training, Teleworking and Teleteaching.
Chapter 8	Data Security and Privacy
Chapter 9	Liability and Legal Aspects
Chapter 10	Health Economics in Telemedicine
Chapter 11	Technology Transfer and Social Aspects
Chapter 12	Emerging Issues

The centre is located in Maspalomas (Gran Canaria) which is also the site of the MCC (Mission Control Centre) and the LUT (Local User Terminal) satellite station for the COSPAS-SARSAT project of emergency location and identification. The centre is expected to serve Africa where, as yet, there is no SPOCs (Search and Rescue Points of contacts). The INTA centre in charge of this survey has taken the initiative through the UN Office for Outer Space Affairs to train African countries in regard to the management of distress alerts originated from distress alerting devices used in the CORPAS-SARSAT system.

CATAI is a partner in the Tele-Invivo project, partly funded by the Telematics programme in DGXIII of the European Commission and UNESCO, which provides support to developing countries.

4.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

The focus mainly will be in support of developing countries in the Mediterranean region as well as in South America, Africa and eastern Europe, particularly within the coverage of the COSPAS-SARSAT satellite system's Spanish Mission Control Centre (see below).

The main tasks of the MTCU in the Canary Islands are as follows:

A.- TRAINING ASPECTS

A1.- Communication systems training, including radio messages through COSPAS-SARSAT

A2. - Telemedicine training

B.- CO-ORDINATION ASPECTS

B1.- Build international co-ordination schemes and co-operation between the CATAI Telemedicine Centre and other telemedicine pilot projects in the area of interest as well as those responsible for health care provision in the RCCs

B2 Develop into practice the co-ordination schemes and agreements in the main area of coverage.

MAIN AREA OF INFLUENCE

1. The COSPAS-SARSAT Spanish Mission Control Centre (SP MCC) provides coverage support for Ascension, Benin, Cameroon, Cabo Verde, Congo, Côte d'Ivoire, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Guinea Equatorial, Liberia, Mali, Mauritania, Nigeria, Central African Republic, Sao Tome y Principe, Senegal, Sierra Leone, Spain, Togo.

2. Mediterranean developing countries

3. Any South American countries, particularly for Argentina and Venezuela.

There is a parallel organisational scheme with the global Rescue Co-ordination Centres. There is a requirement for a health care unit in those centres which could co-ordinate with the Telemedicine Support Centres (TSC) and which could be linked with other telemedicine projects. This could provide telemedicine support in rural isolated areas through any source of emergency call.

Four main steps are require for the achievement of the CATAI pilot project:

STEP ONE – Stimulate the involvement of the relevant international organisations, such as ITU, COSPAS/SARSAT, ICAO, IMO, UNESCO, EC, WHO, INMARSAT, ESA, etc., to support the project.

STEP TWO – Teaching activities aimed at assisting in the transfer of technology and know-how, which could be facilitated with funding from telecom operators (for example) for a Chair of Telemedicine [Unitwin/UNESCO chairs programme?] as well designing the organisational schemes.

STEP THREE – Put into practice the organisational schemes to co-ordinate RCCs and TSCs in the selected countries.

STEP FOUR (which should start in parallel with STEP ONE) – Funding source to build and maintain the required infrastructure for a Mission Telemedicine Centre Unit (MTCU) in the Canary Islands [with funding from the MEDA programme?]

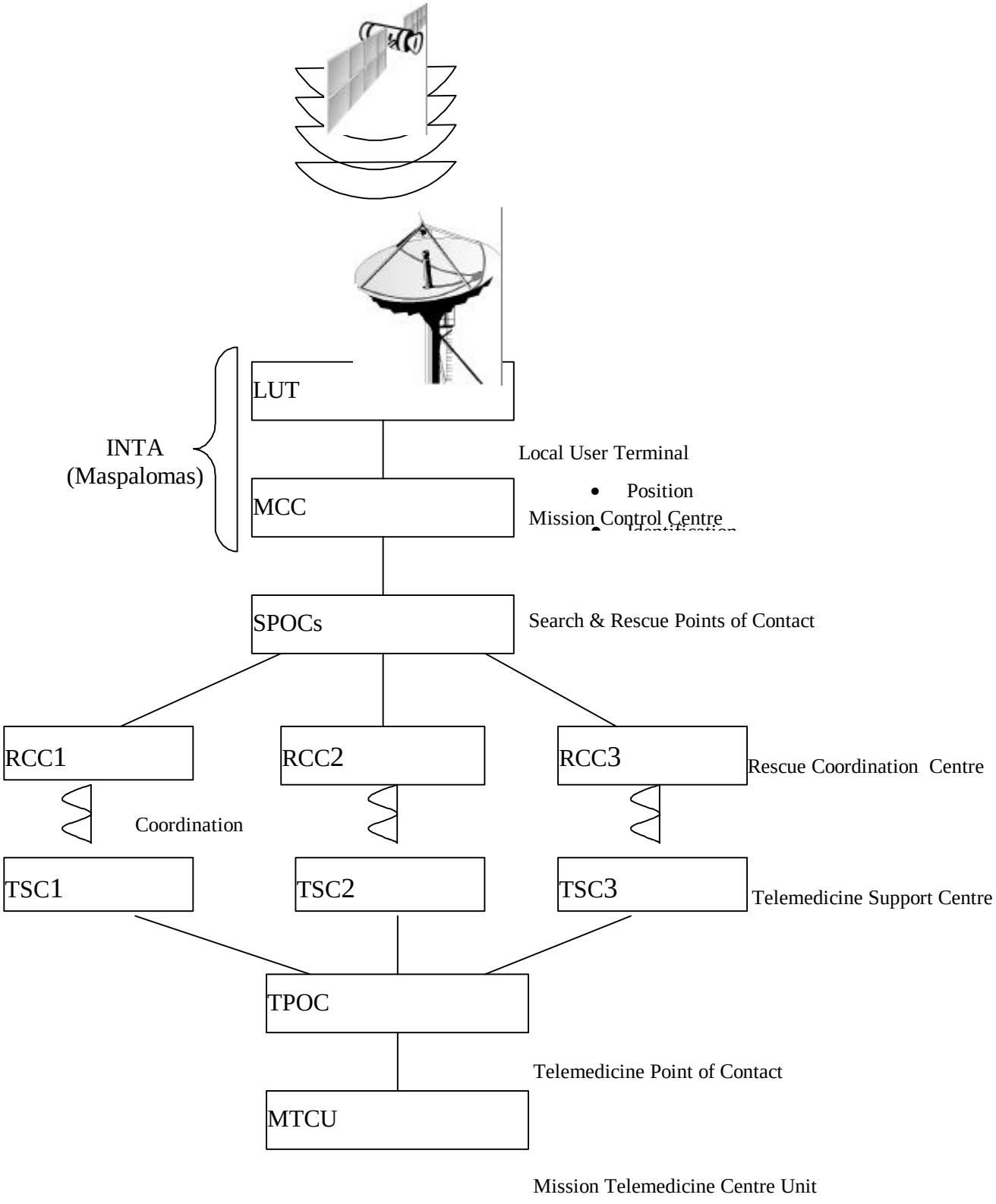
The project is organised in such a way that each step is self-sufficient with its own goals in the improvement of telemedicine support for developing countries.

CO-ORDINATION:

CORPAS/SARSAT project 3 Naoezda satellites satellites 6 NOAA satellites	
(Local User Terminal (LUT) MasPalomas INTA/ESA • position Canary Islands • identification	
MCC MasPalomas (Mission Control Centre)	**MTCU** CATAI Mission Telemedicine Centre Unit • To act in emergency situation • Teaching/training support (personal, at distance) • Co-ordination advice
SPOCs/country (Search & Rescue Point of Contact)	**TPOC** / country (Telemedicine Point of Contact)
RCC1 RCC2 RCC3 (Rescue Co-ordinator Centres) • Health responsible co-ordination	**TSC**1, TSC2, TSC3 (individual pilots) (Telemedicine Support Centres) Co-ordinator

CORPAS-SARSAT Project

3 NAOERDA satellites



4.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

Systems available to be demonstrated :

- All teaching material prepared for personal or distant teaching in telemedicine (including videos and multimedia)
- Videoconferencing connection with INTA in Las Palmas or CATAI in Tenerife.
- Infography (Video) of the design of the Centre.

4.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

1.-CATAI consortium- Prof.Dr.O.Ferrer-Roca. Catedra Anatomia Patologica. Facultad de Medicina. Universidad de La Laguna. Tenerife. 38071. Canarias. tel: + 34-22-642015. fax 34-22-641855. e-mail catai @redkbs.com

2.- Estacion Aeroespacial de MasPalomas- INTA (Institute de Tecnica Aeroespacial). Julio Melian Perez-Marin (director) tel: + 34-28-727120; fax: 34-28-727121.e-mail: marcelloj@inta.es. Earth Observatory/TTC operating and COSPAS-SARSAT support (SPMCC with coverage area of Atlantic Ocean, South West Europe, north-west Africa)

3.- Others to be engaged: ITU, UNESCO, ESA, G7-CARDIO, DGXIII, MEDA programme, COSPAS-SARSAT Committee, UN Office for the Peaceful Uses of Outer Space, etc., together with each individual pilot project.

4.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

This pilot project addresses the urgent requirement for co-operation between the RCCs and health care units which could provide telemedicine support.

4.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

STEP ONE – Convene a meeting of interested international organisations (ITU, UN, COSPAS/SARSAT, ICAO, IMO, UNESCO, EC, WHO, Inmarsat, ESA, etc.) to identify support for the project and its scope. Meeting & working session: 15,000 ECUs

STEP TWO – Teaching activities to prepare adequate technology transfer which would enable African countries to staff their own SPOCs. CATAI would like support for establishment of a Chair

of Telemedicine at the University of Laguna which would be focused on effective telemedicine technology transfer schemes. Cost of maintaining a Chair of Telemedicine: 60,000 ECUs per annum.

STEP THREE – Put into practice the organisational schemes to co-ordinate RCCs and TSCs in the selected countries. Co-ordination and one meeting of local co-ordinators. [15,000] ECUs per annum.

STEP FOUR – Identification of funding to build and maintain the required infrastructure for the Mission Telemedicine Centre Unit in Canary Islands. Prospect: the MEDA programme. Funding is also being considered under a feasibility study granted by the SPRINT project/ Science Park DGXIII- SP-415. Final report expected at the end of July 1998.

Initial approach :

Land acquisition	180,000 ECUs
Infrastructure	96,000 ECUs
Building construction	1,800,000 ECUs
Telematic/inform infrast	1,320,000 ECUs
Operational/personal costs	300,000 ECUs

As mentioned above, the project is structured so that each step is independent of any other.

4.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

STEP ONE

19 Mar 98	SPRINT Science Park SP-415 meeting to identify interest in an EEIG (European Economic Interest Grouping) as an organisational scheme for the Centre. Participants expected from DGXIII, UNESCO, ESA, INTA,G7 Cardiology subproject. To be held in Tenerife.
23Mar-1Apr 98	Project presentation at the ITU-D Malta Meeting
May 98	UN Office for Outer Space Affairs meeting that will join a political, RCC and health representative from each of the countries covered in the SPMCC (see above). Las Palmas. INTA. Canary Islands. Presentation / support demand project
17-24 June 98	Las Palmas-INTA. SARSAT-CORPAS annual joint Committee meeting. To present the project and get support from the institutions as well as from ICAO and IMO.
July 98	Completion of the feasibility study of the SP-415 for the Telematic Centre in Tenerife, Canary Islands.

STEP TWO.

Connections with UNESCO already stablished, waiting for reply

Get other sources support in the previous scheduled meetings

Long-term: Horizontal activities that should be considered as part of life-long continuous training.

STEP THREE

Get support in the previous scheduled meetings

Duration: At least two years.

STEP FOUR

Get funding and support from the previously mentioned international organisations and meetings. End feasibility study: July 1998

Funds required for one year.

The activity of the Centre will be permanent.

4.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

The project is designed as a permanent co-ordination and training/teaching support for developing countries. It addresses a real co-ordination need. The co-ordination of the Rescue Centres with Telemedicine Support Centres could support rescues. The centre would support development of applications and services for the individual telemedicine centres to assure cost-efficiency. It is designed to run in co-ordination with country-based telemedicine pilot projects. The Telematic Centre itself will not be limited to rescue actions and other self-sustainable activities will be taken into consideration in the feasibility study under the SPRINT project.

5. CHINA – Construction and Evaluation of Telemedicine Network

5.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

This pilot project will be led by Shanghai Medical University (SMU), which is a comprehensive university with the task of medical treatment, teaching and research and has several thousand students. The technical capability of SMU is of high reputation in China. The departments in SMU's clinical colleges are well equipped and some departments are ranked the best in the country. SMU has participated in and set up the Medical Information Network. SMU has also set up a co-operative relationship with other universities and health care centres. SMU provides continuing education in

medical techniques, training, on-the-job study programmes, teachers' training for many hospitals, including some in Tibet, Yunan, Hainan and Jiangxi Provinces.

SMU has been involved in the development of telemedicine in China since 1994. In 1995, SMU was the first in China to put telemedicine into practice by using common dial-up telephone lines and low bandwidth satellite communications according to the communications status in China. It has made demonstrations of the telemedicine applications on the network. This pilot project, however, would move from the demonstrations which have already been made to a pre-operational telemedicine service to selected rural areas, with the intention of assessing the benefits and feasibility of an operational service available via the modern information and communications technologies.

A Pilot Project Steering Committee (see Attachment A) will be set up after the project has been approved to ensure the project is well planned, organised, co-ordinated, carried out smoothly and completed on time. The committee will be composed of a chairman, vice chairman and members. Professor Chen jie will be the chairman of the committee and the leader of the project. A subordinate project office (Professor Zhao jiao, director of the project office) will be in charge of daily management affairs of the project.

5.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

This paper proposes establishment of a pilot project, using the medical and information technology resources of Shanghai Medical University, to provide telemedicine services to rural hospitals in Tibet, Yunan, Hainan and Jiangxi provinces. The purpose of the project is

- to assess the cost-benefits of delivering telemedicine services to rural areas;
- to determine which telemedicine services are most useful and the demand for particular services;
- to evaluate the feasibility of using satellite and other means of communications to deliver health care in a more cost-effective manner than otherwise would be possible by conventional means.

The project is expected to serve as a model for the configuration of telemedicine services in other rural areas of China. The pilot project will build on and expand the existing network.

The main objective of the project is to determine the feasibility of using telemedicine techniques to provide medical and health care, and to improve the health of people in rural areas by fully using the medical resources of SMU and its affiliated hospitals.

The proposed pilot project will be set up as an experimental (pre-operational) network linking SMU and co-operative hospitals in Tibet, Yunan, Hainan and Jiangxi Provinces. The cost-benefit and feasibility of the network will be evaluated and it will provide a model for a large scale deployment of a China Telemedicine Network. There is not a real CTN because of the insufficiency of communication in some rural and remote areas of China.

This project will use modern information and communications technologies to provide medical consultation and help to less developed areas of the economy, solve the difficulty in getting medical care in rural areas, raise the quality and efficiency of health service, improve people's health status, adjust the imbalance in levels of medical care and education available to those in urban and rural areas, and make optimum use of existing resources.

5.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

As an important application of future information highways, telemedicine has been widely developed in the United States, Europe, Japan and other countries. Telemedicine services using networked multimedia techniques can overcome the traditional limitations in providing health care services in rural areas. Telemedicine has excellent prospects for further rapid development. At present, the use of telemedicine in China is just beginning.

China is a country of wide area, huge population and an inadequate telecommunications infrastructure (although improvements are being made rapidly). There is a big difference in the level of development between the coastal areas of the country and rural areas in western China. The health resources are relatively well developed and easily available in the coastal areas while there are serious shortages of medical care and drugs in the poor and rural areas. Patients in rural areas often cannot get good medical care on time. If they can travel to get medical care, they will incur a heavy financial burden.

Telemedicine can be used to change this situation. It will improve access to medical care and result in significant savings for the patients as well as China's health care system. More than 200 hospitals including 4 hospitals in the project around our country have said they are very interested in telemedicine, and expressed need to connect by writing and calling to SMU for access to the medical and information technology resources of SMU.

5.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

The pilot project will be used by SMU and its affiliated hospitals to provide remote diagnosis, specialist consultation, information services and on-line examinations to those in rural areas. Consultations between medical specialists and professors will take place using videoconferencing techniques as well as simple voice telephony and low speed data communications. The telemedicine project will make use of the already existing campus communications network of SMU (see Fig 1: Topography of the campus network), which has optical fibre, satellite and microwave communication facilities.

The key tasks to be carried out under this pilot project include:

1. construction of a telemedicine network management system,

2. installation of a videoconferencing system for remote diagnosis, consultation and study in each of the designated locations,

3. setting up a multimedia database for case history retrieval and processing which could be shared by each consulting hospital. The multimedia database must accommodate text, images and audio-video information. It will be used for consultation and teaching. Medical and health care data will be shared by means of the World Wide Web after legal users and passwords will be checked.

4. training 20 technicians and operators of the telemedicine service at the consulting hospitals or at SMU. The companies which supplied the equipment will train the operators and technicians of the consulting hospitals how to operate and maintain the equipment. SMU will provide the training for

them how to apply the consultation, how to access and manage the information of consultation and diagnosis, etc.

A key element in the configuration of the pilot project will be a Consultation Management Centre, the duties of which will include:

- Management and maintenance of the consultation network, including installation of the communication facilities (point-to-multipoint and multipoint-to-point), configuration of various network lines (DDN and satellite) and protocols. Multipoint-to-point is considered because the patients in rural hospitals can get advice from different specialists in SMU affiliated hospitals at same time. Multipoint-to-point and point-multipoint are advanced technologies and very useful for telemedicine in China.
- Dispatch of the remote consultation requests on the network and the centralised settling of accounts among the various consultation stations.
- Provision of database maintenance, sorting, statistics, backup and retrieval service.
- Development of application software, including the management of consultation and multimedia databases of case history and images.

The pilot project will use Inmarsat mobile earth stations (MES) which can be hand-carried to rural and remote areas with inadequate telecommunications so that local health care personnel can immediately contact regional hospitals for consultation or training. Inmarsat mobile earth stations support high-quality telephone, fax, telex and high speed data (HSD) at 56/64 kbit/s.

Four MESs will be equipped in the project. Three MESs will be installed at No.2 People's Hospital (250 beds) of Tibet Autonomous Region, the county hospitals (about 200 beds) in Yunan and Hainan provinces. One will be installed at the management centre of SMU that already has connected to its affiliated hospitals via the optical fibre and microwave communication facilities. As other means of communication for medical consultation, DDN will be considered. Two videoconferencing units will be installed at county hospital in Jiangxi and also at the management centre of SMU. Consultation services can be provided by specialists at SMU and the affiliated hospitals, and clinical tele-education and advanced study services can be offered.

5.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

Not applicable.

5.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

SMU, its affiliated hospitals, WHO, ITU and the Chinese Inmarsat signatory are envisaged as participants or partners. Their contribution to the project would be as follows:

Shanghai Medical University

- management of telemedicine service;
- training the operators and technicians;
- Evaluation of the project;

Affiliated hospitals

- response of medical consultation;
- response of medical training;

Ministry of Health

- Setting up a telemedicine network in China according to the model of the telemedicine service if it is feasible to China.

Ministry of Posts and Telecommunications

- DDN and communication service;
- waiver of licence fees and customs duties on imported equipment

WHO

- supporting funds;
- getting report from SMU about the development, feasibility and cost-effectiveness of telemedicine in China;

ITU

- supporting funds;
- getting report from SMU about the development, feasibility and cost-effectiveness of telemedicine;

Inmarsat and Beijing Marine Communications and Navigation Company (MCN)

- supporting the Inmarsat mobile earth stations (MESs);
- supporting the cost of communications of MESs.

Midjan Group

- advice and guidance with regard to project formulation, sustainability, etc.

World Bank

- supporting funds from the InfoDev programme.

5.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

The telemedicine service to be provided by this pilot project will demonstrate a new mode for the provision of medical care. It will raise the medical/technical capabilities of those using the service. It will improve the quality of life and, in particular, the quality of medical care of the patients.

The pilot project is expected to provide valuable information in regard to the development, feasibility, utility and cost-effectiveness of telemedicine in China.

5.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

Implementation of this pilot project will require external funding which could come from the WHO and the ITU as well as any other interested partners. The budget for the project has been calculated as follows:

1. Equipment

- Four sets of Inmarsat mobile earth stations (MESs) and personal computers, estimated at a total of US$ 150,000. The equipment will be installed at SMU, Tibet, Yunan, Hainan. These hospitals in rural area just have telephone lines which not good enough for medical consultation and medical information service.
- Two videoconferencing units, estimated at US$80,000. To be installed at SMU and at county hospital in Jiangxi province.
- One Cisco Router, estimated at US$50,000.

2. Communications

- Satellite communications, to be provided by Inmarsat and its Chinese Signatory, Beijing Marine Communications and Navigation Company (MCN). Budgeted requirement: 300 minutes a month (10 minutes a day). A charge of $US 10 a minute for an Inmarsat-B ISDN circuit is assumed. MCN is invited to waive these charges or to provide such service at a reduced rate for this pilot project.
- DDN communications, estimated at US$ 20,000 for the duration of the pilot project.

3. *Application Software*

- Development of applications software for the telemedicine and management, estimated at US$ 50,000.

4. Staff Training

- The operators and technicians of the consulting hospitals will be trained in Shanghai. The total fees of travel, accommodation, teachers, materials and practice for training, estimated at US$ 30,000.

5. Installation

The total fees of the travel, accommodation and communication for the technicians who will install the system are estimated at US$ 30,000.

6. Evaluation and Research

Item	US$
Travelling Expenses	14,000(500/hospital*2*14)
Material, Communication	4,000(2,000/area*2)
Expert Advising	5,000(2,500/area*2)
Statistical analysis	10,000

Evaluation Report	3,000
Other	2,000
Sub Total	38,000
7. Total Budget	
Equipment	US$ 280,000
Communication Cost	US$ 20,000 + Inmarsat
Application Software	US$ 50,000
Staff Training	US$ 30,000
Installation Expense	US$ 30,000
Evaluation and Research	US$ 38,000
Total	US$ 448,000 + satellite services charges estimated at US$3,000 a month.

We would like to see the World Bank, WHO and ITU share the $448,000 cost. We hope Beijing Marine Communications and Navigation Company could support the communication fee of Inmarsat MESs.

By means of this application, SMU is proposing that the funding for this pilot project be shared by the World Bank, World Health Organization and the International Telecommunication Union. Additional support (in-kind or in cash) could come from Inmarsat or its Signatory shareholder or manufacturers, since it is proposed to use Inmarsat terminals to provide the means of communications to rural locations where currently there is no means of communications.

5.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

It is proposed that the partners involved in this project have a "kick-off" meeting at SMU to review the project plan, the schedule and critical success factors.

The first stage of the pilot project will involve requirement analysis, system design, hardware installation, debugging and the development of software.

Requirement analysis and Software development	3 months
Hardware debugging	3 months

The second stage will involve operation of the telemedicine network (SMU will provide services of consultation, continuing education, on-the-job study programmes and teachers' training via the network) over a period of 12 months. The evaluation of the project will be finished at the same period.

5.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

Technology assessment for the project is to evaluate the potential side effect of technology while assessing the benefits and effectiveness. The pilot project will be evaluated in several different ways.

A "before and after" comparison will be made based on the difference which the telemedicine services makes in health status of patients, economic burden of disease, illness or injury, and quality and efficiency of health care. A comparison will be made between the telemedicine-concerned patients and the non-telemedicine-concerned patients. Patients incur two types of economic burden: direct (such as medical cost, travel fees, nutrition cost) and indirect (such as loss of working time and loss to families resulting from the patient's disease, disability or death).

The users of the telemedicine service will be health care professionals, not computer specialists. While developing and installing the telemedicine service, SMU will do its best to make it a user oriented and easy to use system. This aspect will be evaluated.

The evaluation will also include the following elements:

- Forecasting and evaluating the need and demand for telemedicine;
- Promptness, accuracy and validity in diagnosis and treatment;
- Effectiveness and impact on cure rate, improving rate, length of cure, rehabilitation, quality adjusted life year (QALY), disability adjusted life year (DALY), social ability, patient satisfaction;

Cost-benefit or cost-effectiveness (utility) analysis:

- To evaluate the overall effectiveness of the telemedicine services provided;
- Feasibility of developing telemedicine in China;
- Based on a comparison of the use of telemedicine services in different wards and diseases, to select the appropriate wards and diseases;

Social impact:

- to evaluate the availability, accessibility and acceptability of telemedicine.

The results of evaluation will contribute to the feasibility study of setting up a telemedicine network in China. Ministry of Health (MOH) will be interested in the evaluation report, and encourage the application of better cost-effectiveness technology.

ATTACHMENT A

Participants in the Project

Steering Committee

Chen jie Chairman

Wang weiping Deputy Chairman

Jin pihuan Deputy Chairman

plus sponsors to the pilot project (World Bank, WHO, ITU, etc.)

Researchers

Chen jie Leader

Wang weiping Deputy Leader

Zhao jiao Deputy Leader (director of the project office)

Xu yixin Computer Network Information Centre (SMU)

Gu yudong Huashan Hospital

Jiang jingen Zhongshan Hospital

Jia hongli Children Hospital

Wang shengzi EENT Hospital

Wu yi Cancer Hospital

Hung minli Gynaecology and Obstetrics Hospital

Cao jianwen Pubic Health School (SMU)

Ding shiteng Computer Network Information Centre (SMU)

Song zhijian Computer Network Information Centre (SMU)

Xia zhiyuan Computer Network Information Centre (SMU)

Luo xiaozhen Computer Network Information Centre (SMU)

Zhou xinyu Computer Network Information Centre (SMU)

Hu guanghong Computer Network Information Centre (SMU)

Tu honglei Computer Network Information Centre (SMU)

Li yungang Computer Network Information Centre (SMU)

6. EHTO – Web Access & other Health Telematics information dissemination

6.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

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6.2 Objectives of the European Health Telematics Observatory

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

- To help users to quickly find the best, most up-to-date and validated information for implementing health telematics (using a network of multi-lingual EHTO affiliated sites, installed at national or regional level), including access to educational multimedia software.
- Help producers disseminate data on their bio-medical equipment and services to the right audience (including developing countries).
- To identify and to give access to Web sites expected to be of interest to health care professionals in developing countries.
- To provide information about European telemedicine suppliers.
- To provide information about selected telemedicine pilot projects in developing countries which will serve as case studies for others interested in telemedicine in developing countries.
- To help research projects disseminate their results.

6.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

A key problem for those interested in finding more information about telemedicine is the fragmentation of information. The innovative concept of EHTO and its network of national language affiliated sites (NLAS) is to overcome that problem, and to enable a fine tuning of information to the different structures of health care, at national and regional levels.

6.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

EHTO is a unique European entry point for access to qualified, classified and categorised information on health telematics (includes telemedicine). EHTO disseminates the latest information on European Commission initiatives, programmes, projects and calls for proposals. Information about existing European expertise and research results in health telematics can be accessed through the diverse PROJECTS home page.

EHTO aims both to help organisations and/or projects to disseminate specific information, documents and results, and to help them to find useful and up-to-date information.

EHTO can be used to search for information on specific domains and key areas using telematics applications or solutions, just by "clicking" on their key-words. Users can ask questions of general interest to the Commission Health Telematics Office or move on to related Web sites.

The ETHO Web site hosts a specific site address for the Midjan Group and gives access to a variety of other related Web sites expected to be of interest to health care professionals in developing countries. The Midjan Group Web site provides information about selected demonstrations and pilot projects in developing countries, and access to the European Telemedicine Directory, which is updated regularly.

EHTO also acts as an electronic marketplace, displaying information which can be exchanged by health professionals, industries and service providers. The EHTO Web site offers space for discussion groups and for electronic workshops.

Multilingual affiliated sites have been created at national and regional level. Each site is different, with health telematics information in their own language, according to their cultural specificities and to the organisation of local health care services. The EHTO-NLAS[2] Network is intended as a practical implementation of health telematics and a contribution to the Information Society.

EHTO-NLAS Network is fully interactive, and each affiliated site can act as a link to Web sites in other countries speaking the same language (e.g., the existing affiliated sites in France, Portugal, and Spain are establishing links respectively with other countries in the developing world speaking French, Spanish or Portuguese). Other affiliate sites have been installed already in Greece and Finland.

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[2] NLAS = National Language Affiliated Site

New Affiliated Sites are expected to be created in 1998 in South Africa, eastern Europe (Romania, Czech Republic, Bulgaria and Ukraine), Germany, Canada and Australia.

6.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

EHTO acts at WTDC as being as a supportive *multi-media platform* to the Midjan Group, for health telematics information dissemination, helping in their demonstrations, and giving access to health telematics related data bases and to a directory of European telemedicine suppliers of products and services that could be of interest of developing countries.

Other major features of EHTO are also available, e.g., access to affiliated sites which could serve as a model for the decentralisation of information on health telematics to developing countries.

6.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

The EHTO co-ordinating partner is Portugal Telecom via Maria Laires, in Brussels.

RAMIT (B), CNEH (F), IHC (UK), VTT (FIN), BIOTRAST (GR), and IETT (ES) are the partners within the original consortium.

EHTO should become an independent organisation by the end of 1998, e.g., a European Foundation acting in an international basis. Industries would be a key driver in that new phase.

EHTO is a member of the Health-on-the-Net (HON) Strategic Board, of the Midjan Group, and of the affiliated partnership of the Canadian Institute for Health Information.

In addition to the DG13 Health Telematics Unit, EHTO works closely with the Information Society Forum, the TEN-TELECOM Programme (DG13), ACTS Programme (DG13), and the Telecities Project.

6.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

- To expand the network of multi-lingual affiliated sites.
- To become an independent foundation.

6.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

For three years, until December 1998, EHTO costs have been 100 per cent covered by the European Commission (US $220,000 per annum). EHTO affiliated sites costs are fully supported by each of the national organisations and the Ministries of Health (approximate costs per annum for

developing countries: US $ 95,000; for developed countries, costs of becoming an affiliated site is about US $ 220,000.

Upon becoming a Foundation, EHTO costs will be supported directly by members (mainly industries and telecom operators). Portugal Telecom will play a key role through its links with international partners and will be indirectly supported by Health Ministries (through services), the European Commission (as a particular user), advertising and specialised services (organising conferences and electronic work-shops, disseminating information, stimulating private discussion fora, etc.).

6.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

EHTO already is in full operation.

6.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

The project is being evaluated through the European Commission Annual Technical Reviews. The major success of EHTO is the creation and implementation of its EHTO-NLAS Network which involves both Health Ministries and telecom operators.

Another success indicator is the frequent invitations to become partner for the set-up of conferences and demonstrations (also for virtual demonstrations).

EHTO has been asked to host other public Web sites, either from projects or from organisations such as the Midjan Group.

Helping rural areas is one of the key objectives of EHTO: access through the Internet to EHTO (or to one of its affiliated Web sites) will give new opportunities to distant areas. EHTO integrates images and voice and facilitates access to health care information and contacts. Access can be achieved via terrestrial and satellite means. It facilitates participation in practical medical events (remote video conferences could be watched through EHTO), and remote areas can also benefit from educational tools (video, CD-ROM, specific distant symposium or conferences, etc.). The possibility to access the European Telemedicine Directory is another helpful tool for health professionals and decision-makers in remote areas, to keep informed on updated products and to choose the most appropriate one.

Rural and remote areas could benefit from the existence of a national/regional Affiliated-Site, in the respective language, which will act as an “entry” point to all local information available on health telematics, linking to EHTO or to any other affiliated sites if more specific information will be needed.

7. ETHIOPIA – Teleradiology and rural consultations

7.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

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7.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

- to improve access to health care for people in remote areas of Ethiopia;
- to organise telemedicine demonstrations to show the possibilities and benefits of telemedicine applications such as teleradiology, ultrasound and laboratory information to doctors, specialists, government, the Ministry of Health and Ethiopian Telecom; also, to demonstrate successful collaboration between the participants;
- to initiate new, high quality project proposals based on the needs of Ethiopia;
- to initiate and co-ordinate the telemedicine project in Ethiopia with other international development programmes such as COPINE in East Africa;
- to make available European expertise to the developing world, and to identify the best practice, using the lowest cost, most appropriate equipment, software and services.

7.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

Ethiopia suffers from a severe shortage of health care professionals, especially in remote and rural areas (see Table 3). People need improved communications to link remote clinics and hospitals with urban hospitals or with the main Hospital in Addis Ababa. In Ethiopia, there are 5 - 9 radiologists for

almost 60 million people. There are 21 radiological centres, so specialists must travel from centre to centre to examine the patients. An alternative is to connect local doctors with medical specialists outside the country. Ethiopia also needs improvements in the administration of its health care sector. It needs improvements in the provisioning of rural clinics and hospitals with pharmaceuticals and other medical supplies. They need to minimise the number of patients referred to distant hospitals who may already be overwhelmed. They need to raise the level of awareness about health care practices.

Ethiopia also suffers from a poor communications infrastructure, great distances between cities and villages and a lack of doctors, specialists and medical equipment.

The basic demographic data of Ethiopia are as follows

Population	
Urban	11.3 million
Rural	45.5 million
Total	56.9 million
Average persons per household	4.3
Natural rate of increase	3.1 %
Infant mortality rate	
Female	98.3
Male	112
Mortality rate for under age 5 per 1,000 live births	
Female	154.1
Male	165.7
Both	159

Health Facility to Population Ratio		***WHO Standard***
Hospital : Population	1 : 646,330	
Hospital Bed : Population	1 : 5,678	1 : 3,000
Health Centre : Population	1 : 293,787	1 :100,000
Health Station : Population	1 : 22,242	1 :10,000

The project will take place in the Tigray region of Ethiopia. Tigray has a total of six hospitals with 640 beds. These hospitals are responsible to the Ministry of Health (MOH). Tigray also has 18 health centres with 220 beds (Ministry of Health) and 142 health stations (132 MOH and 8 others).

The number of health care professionals in Tigray can be summarised as follows:

Doctors	***No.***	***Nurses***	***No.***	***Technicians***	***No.***
Surgeons	3	MCH Nurse	3	Lab technicians	41
Internists	1	Mid-wife nurse	5	Sanitarians	41
Paediatricians	2	Psychiatry nurse	2	X-ray technicians	16
Obstetric gynaecologists	2	Anaesthetist nurse	8	Pharmaceutical. technicians	42
Ophthalmologist	1	Dental nurse	0	Health assistants	844
ENT specialist	0	Staff nurse	275	Ophthalmologist assistant	1
Anaesthetists	0			Dental assistant	-
Dermatologists	0			CHA[3]	989
Psychiatrists	0			TBA[4]	991
Orthopaedists	0			Others	461
Neurologists	0				
Dentists	0				
Radiologists	1				
Gen. Practitioners	64				
MD + MPH	2				
MPH	6				
Physiotherapists	7				
Health officers	0				
Pharmacists	0				

7.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

The project will include a teleradiology application. The medical and communications equipment will be installed in one or two local clinics in Tigray region.

Two configurations are envisaged. The first is to connect one health clinic with the Black Lion hospital in Addis Ababa. The second is to connect a doctor travelling from village to village with the

[3] CHA = Community health agents.

[4] TBA = Traditional birth agents.

Region Hospital in Tigray. The Inmarsat system will be used to provide communications between the rural areas and the Tigray hospital.

The equipment to be supplied for the project will include the following items:

Telemedicine equipment

- analogue X-rays will be converted into digital form by using a Lumiscan 20
- CCD film digitiser
- diagnostic workstation
- portable ultrasound system
- personal computer

Satellite equipment

Two Inmarsat B HSD mobile earth stations, to be supplied by Inmarsat for three months. An Inmarsat-phone would be most appropriate for the travelling doctor.

When the sick patient visits the local clinic then:

1. The doctor or the nurse prepares an X-ray or ultrasound image.
2. The doctor converts the image into digital form by using a digitiser and stores the images in a database.
3. The doctor sends the X-ray or ultrasound images via Inmarsat to a specialist in the central hospital.
4. The specialist stores and examines the image and send the results and recommendations back to the doctor in the local clinic.

7.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

At the telemedicine stand at the WTDC, Bilton intends to make a video presentation of the telemedicine project in Ethiopia. The video will include images from the remote areas of Ethiopia with a graphic presentation of the telemedicine via Inmarsat satellite.

7.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

The project co-ordinators will organise the installation, photographs of installations, training, on-site trouble shooting in the event of problems. They will be the interface with the authorities responsible for licensing, Ethiopian Telecommunications Corporation (ETC), Ministry of Health and all partners in this project. The co-ordinators will be Jaroslav Liska (Bilton), Masfin Haile (Ethiopian Telecom) and Dr. Milliard (Ministry of Health in Ethiopia).

The following are the partners in the project and the tasks to be performed by each.

Co-ordinators & Bilton

1. Provide funding for Worldphone Mini-M terminal.
2. Liaise with other parties involved in the project.
3. Participate in the project engineering.
4. Establish and maintain contacts between the Ethiopian Telecommunications Corp, Ministry of Health and other authorities responsible for regulatory issues.
5. Establish and maintain contacts with all Ethiopian staff involved, both at the management level and at the local level.
6. Install office and mobile communication and medical equipment and manage the activation process in co-operation with suppliers.
7. Provide maintenance and repair services for the equipment in co-operation with suppliers.
8. Write progress reports re problems encountered, etc. Report to be submitted to all principals of the project.
9. Provide training and guidance for local doctors, specialists and nurses.
10. Analysis of the requirements of the staff involved in this project.
11. Monitor and control project progress (activities, milestones, deadlines).
12. Provide final report with conclusions.
13. Report any problem immediately to the responsible authorities and try to achieve solutions.

Inmarsat

1. Supply two Inmarsat-B HSD satellite terminals to ETC for three months for the tele-radiology project.
2. Engineering and technical advice.
3. Assist other parties with information regarding network related issues.
4. Direct support to co-ordinators in case of technical, network related problems.
5. Help the co-ordinators prepare letters to authorities responsible for Inmarsat use in Ethiopia.

ITU

1. With the co-operation of other partners, provide funding for the medical equipment involved in this project to the value of US $ 52,000.
2. Fund the visit of a telemedicine expert familiar with teleradiology for a week or two during the start of the project in Ethiopia. The expert should provide advice for the configuration of the application and training in regard to use of the teleradiology equipment.
3. Support the project through communications with the authorities of Ethiopia.

[Inmarsat Land Earth Station Operator – to be determined]

1. Provide free satellite time for the Inmarsat-B and Inmarsat-phone terminals used in this project.
2. Discuss with Ethiopian Telecommunications Corporation ways of improving telecom costs.

Ethiopian Telecommunications Corporation (ETC)

1. Provide funding for personal computers in co-operation with local partners valued at US$ 6,700.
2. Participate in the project engineering.
3. Technical assistance.
4. Co-operation with the Ministry of Health.

7.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

The pilot project is expected to meet real needs for radiology services in Ethiopia.

7.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

Item Nr.	Description	Amount US $	Quantity	Total Amount
1	PC Computer Pentium 160	2400	2	4800
2	Laptop	1900	1	1900
3	Nera Worldphone	3000	1	3000
4	Inmarsat B HSD Terminal	25000	2	50000
5	Portable ultrasound system	10000	1	10000
6	Lumiscan 20 CCD film Digitiser	10985	2	32955
7	Tele-Radiology Package	3000	3	9000
			Total	106855

Specification of services supplied by co-ordinators:

Item Nr.	Description	Amount US$	Quantity	Total
1	Declaration, pre-installation of the equipment in AA Office based on 24 hours.	1500	1	1500
2	Installation equipment in remote areas, based on 8 hours per one installation	500	4	2000

3	Training program of doctors, specialists and other people in use and maintenance of the system (based on 4 sessions of 4 hours) (manpower)	500	4	2000
4	Training program of 1 week (continuous) in Ethiopia, training staff in use, maintenance and use of the system (manpower)	2000	1	2000
5	Travel and expanses during installation and training period and for additional 6 visits for supporting doctors in case of unforeseen problems and meetings.	4300	1	4300
6	Provide funding for1 piece Mini M Satellite Mobile telephone Worldphone NERA	3000	1	3000
	Total cost of services supplied by Bilton		US $	14800

Specification of services supplied by Inmarsat:

Item Nr.	Description	Amount US$	Quantity	Total
2	Lend two Inmarsat B HSD terminals for 3 months	25000	2	25000
2	Support the project with one person during initial training of the people and by the installation of the equipment incl. tickets, hotel, visa. etc., by start of the project.	3000	1	3000
3	Transport of satellite terminals to the office of Ethiopian Telecom	3000	1	3000
	Total cost of services supplied by Inmarsat			31.000

Specification of services supplied by Land Earth Station Operator (to be determined):

Item Nr.	Description	Amount US$	Quantity	Total
1	Free limited traffic via Inmarsat B-HSD for 3 months (cca 25 min x 22 days x 3 = 1650 min)	18000	1	18000
2	Other costs	3000	1	3000
	Total cost of services		US $	21000

Specification of services supplied by Ethiopian Telecom:

Item Nr.	Description	Amount US$	Quantity	Total
1	Provide funding for laptop computers with modems	6700	1	6700
2	Other services and costs	2000	1	2000
	Total cost of services supplied by ETC			8700

Specification of services to be supplied by the ITU:

Item Nr.	Description	Amount US $	Quant ity	Total
1	Provide funding for medical equipment in this project	52,000	1	52000
2	Visit by teleradiology expert			
	Total cost of services supplied by ITU			52 000

To avoid the high cost of travel and to provide quick response to reported problems, the computers must be equipped with modems for remote support. This could also allow Lumisys or other software company to have access to these systems in case problems cannot be resolved by the co-ordinators.

7.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

The pilot is proposed to run for 6 months, with installation scheduled for May 1998 and operational start in June 1998. During the first month of the program, Bilton will have weekly progress and status meetings with the local clinics and hospitals. Monthly meetings will continue after the first month of this pilot project. Progress reports will be submitted to all partners indicating the status of each medical unit and the benefits realised from this project. A final report will be provided to all members within six months of the project completion. This report will include an evaluation of the documented benefits realised during the project.

7.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

The evaluation of the project will be done one month after the end of this project by the meeting of all parties. The main result expected of this project will be the improvement of health care in rural areas of Ethiopia and the evaluation must be done especially for the Ethiopia Ministry of Health and Ethiopian Telecom. We plan to continue the telemedicine services in Ethiopia and we want to open a special office for telemedicine services in Ethiopia. If the project will be successful, we want to expand to other rural clinics and hospitals in Ethiopia and to connect the Black Lion Hospital in Addis Ababa with others engaged in telemedicine internationally.

8. GUYANA – Telediagnosis, distance learning, field research

8.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

Dr Norma Bubier, working from the Durrell Institute for Conservation and Ecology at Kent University (UK), will organise the project, but will work with a counterpart in Guyana from the CHEC. There will also be a medical person and a technical person appointed to assist.

8.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

- To develop distance learning and health education programmes for local inhabitants using satellite communications technology.
- To provide distance diagnostic work for the rural health workers under the supervision of the Remote Area Medical Team.
- To provide distance health care planning for rural areas.
- To test the telemedicine requirements for a mobile medic team.
- To develop traditional health care remedies and practices in conjunction with western medicine.

8.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

Green College has already a link with Guyana, specifically Region 9 - Annai region and, in particular, Surama Village, but a larger area of villages will be served in this project. Surama is approximately 250 km south-west of the capital, Georgetown, at the edge of the rain forest and the savannah. The Amerindian and rural people live in reserved areas covering 13,900 km2 where they practise shifting cultivation, cattle breeding, hunting, gathering, fishing and handicrafts. The limited communications and roads have contributed to these 49,000 Amerindians (6.8 per cent of the national population) still preserving a tribal life and culture and maintaining their own languages. The Guyana government has recognised the Amerindians' right to utilise the territory in accordance with traditions. According to a UNDP-funded national survey in 1993, there are fewer than 3,000 Amerindians above the age of 55, indicating a much higher degree of disease, morbidity and mortality than the rest of the population. 46 per cent of births to Amerindian women are below 2,500 g, compared to the national average of 24 per cent, reflecting these women's vulnerability and low nutritional status. Between 75 and 90 per cent of rural people rely on traditional medicine as their primary health care.

The area of the Rupununi in Guyana will be an ideal test site for the following reasons:

- the people are English-speaking
- there is an excellent NGO who can work with Green College and facilitate all necessary government approvals
- the villagers are keen and have the support of their government.

The medics involved in this programme are already providing a roving service to many remote villages.

Green College gave the village in Guyana a satellite telephone, computer with CD ROM, printer and digital camera as part of a programme to develop sustainable livelihoods and to document traditional knowledge about health and medicinal plants. Green College aims to use technology to encourage projects on sustainable development and alternative products from the forest. We are also attempting to put into place an ecological monitoring system and to demonstrate how this technology could be useful to provide such services.

Eight young people have learned the basic skills of how to use the technology. Green College is showing that the technology can be used to generate jobs and skill training for preserving the culture and lifestyle of the villagers and to encourage young people to stay in the village. Assisting the Amerindians to make a sustainable living from the rain forest is the only way to attempt to secure these Amazonian forests from the overwhelming pressures from the logging and mining industries.

The Green College Centre and Wellcome Trust are collaborating in the testing of CD ROM materials for training rural health workers in prevention of malaria and AIDS.

8.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

Green College Centre plans to use the same equipment put into place for this project to provide tele-education programmes for the Amerindian Institute for Conservation and Training. It would use any

telemedicine or tele-education programmes to training young people in the skills needed to work in these fields.

Green College proposes to work with the Department of Health and local communities on an integrated health care system which ensures the continued use of traditional medicines. It also seeks to identify potentially marketable products and plants.

8.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

8.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

Green College Centre for Environmental Policy & Understanding, Radcliffe Observatory, Oxford, England. Contact: Dr. Norma Bubier. tel/fax: + 44 1223 504 681.

The IUCN [????] has provided a grant to establish a training institute for Amerindians in this same region. This same group of people will organise this pilot project.

Amerindians in Guyana

Remote Area Medics. Contact: Dr Marta Ware. Dr Ware is Guyanese by birth but has been living in Canada. she is now returning to Guyana to provide medical training and better services for remote villages.

British Telecom. Contact Julie Williamson.

BT will provide expertise, equipment and transmission time for the link between the remote villages of Guyana [and?].

Other potential partners include:

University of West Indies, which is developing distance learning programmes.

Commonwealth Human Technology Council (CHEC), an NGO in Guyana.

Health Department of Guyana

University of Guyana

8.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

Currently, there are no medical facilities in this region except for a rural nurse with limited training who had no equipment or medicine whatsoever. The nearest hospital is in Georgetown, either 10 hours by car on very bad roads or two hours by air. Air tickets are very expensive for local people, equivalent to two months wages.

Malaria is a huge problem even though with adequate support, it could be controlled. AIDS is increasing a problem because many young people go to work in Brazilian mining camps.

However, the Remote Area Medics, a Canadian medical team, come to each village for two weeks once a year. During this time, they diagnose and treat as many patients as possible and then move on to a different area.

The villagers have no transport except for a few bicycles so when medical care is needed, they must ride three hours to the next village and, through a radio network, contact a doctor, who then tries to arrange a lift for the patient with anyone who may be coming to the village during the next week with a vehicle.

The entire country, even Georgetown, is need of the type of medical support to be provided through this project. Among the benefits would include the following: Rural health workers could be better trained. Diagnostic support could be provided. Proper follow-up and consultation could be provided for projects like malaria control.

Benefits are expected for both the health care provider as well as the local recipient. Local people have a wealth of knowledge about medicinal plants and there are areas in which they may know more than doctors from developed countries, such as in treating poisonous snake bites.

8.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

BT will cover the cost of some equipment, airtime and expertise, including on-site training in use of satellite phones, computers and medical equipment.

Additional funding may be needed.

8.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

Action	***Date***
Locate all partners and sources of financial commitment	
Prepare an assessment on needs for the pilot project	
Prepare full costing	
Meet with European medical partners and establish the programme to be tested.	
Acquire the equipment and finances.	
Send a team to Guyana to establish linkages and on-site preparations.	
Start-up project.	
Demonstration at the World Telecom Development Conference, Malta	23 Mar-1 Apr 98
Test programmes and adapt and change as needed.	

8.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

9. KENYA – Teleradiology

9.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

Torbjørn Sund

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Norway

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9.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

- The first objective is to test and demonstrate how the use of teleradiology can enhance the quality of radiology service in rural districts of Kenya. The pilot project will take place between the central Aga Kahn hospital in Nairobi and a rural site lacking fully qualified radiologist, to provide diagnosis of X-ray images taken at the rural site.
- Secondly, it is expected that the personnel at the rural site will enhance their skills in radiology interpretation, by using the facilities for having an on-line consultation with the radiologist at the central site.
- Third, the equipment and facilities can be used in difficult cases by the medical professionals at the Aga Kahn hospital in Nairobi to seek expert advice from renowned centres of excellence.

9.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

There is a shortage of radiologists in Kenya as in many other parts of the developing world. Furthermore, transport to or from rural sites is slow and expensive. Teleradiology can help to

alleviate these problems, since it makes it possible to have a trained radiologist review X-ray cases without having to move either the patient or the radiologist.

The Aga Kahn foundation is operative throughout Kenya as well as in other countries in Africa. Some of the Foundation's hospitals like the one in Nairobi are well staffed and equipped, whereas smaller rural institutions do not have equally good access to medical expertise. With its already existing network of co-operating institutions the Aga Kahn foundation is a good candidate for implementing and testing out teleradiology.

Telenor, the Norwegian telephone company, has actively pursued telemedicine research and development since 1987. Telenor has achieved excellent results in teleradiology. Telenor has refined the technology so that a multipart, computer-supported radiology conference with full diagnostic quality can take place over a low-speed communication line, using the same equipment as is used for the diagnostic viewing. Telenor also has experience with the "classical" case of off-line, remote diagnosis based on transmitted images. Telenor proposes to draw on that experience, and to make a demonstration of teleradiology involving both on-line radiology conference and off-line, remote diagnosis.

Telenor intends to evolve the demonstration into a more permanent project after the conclusion of the conference.

9.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

Two or three sites will be involved:

1. The primary requesting party. This will be a small clinic with X-ray equipment, but without permanent radiologist staffing. It will have equipment for scanning X-ray films into digitised images, software for compressing, encrypting and transmitting the images, communications equipment, and a one-screen workstation. The workstation serves both to check the quality of the digitised images, and for radiology conferencing including audio and video.

2. The conference site at Malta, to be equipped for teleradiology conference, including a two-screen workstation, audio and video facilities, and communications equipment.

3. Possibly an expert medical partner. We propose to co-operate with the University Hospital of Tromsø (Norway), which has extensive experience with teleradiology. Optionally, the expert radiologist may be located at the main hospital in Malta, but this depends on close assistance from the Malta authorities.

The equipment to be used in the project will comprise the following:

Communications equipment

The communications equipment at the primary site in Kenya will be VSAT, with 64k or 128 kbit/s transmission. The VSAT antenna, router and other necessary gear will be provided by Telenor for the demonstration. The VSAT connection will be taken down at Eik (Stavanger, Norway) to be distributed to the other two partners. At the conference site in Malta and in Norway, the transmission will be based on ISDN.

All communication uses IP as low-level software protocol.

X-ray image scanner

The film scanning will be based on a standard commercial package, including a high-quality X-ray scanner, quality control computer, and necessary disk and local network.

Radiology conferencing hardware and software

The radiology conferencing will be based on the Mira-IV software program, running on a Silicon Graphics Indy or O2, with integral sound and video, and superfast graphics.

9.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

At the stand in Malta three types of demonstration are possible:

1. Malta acting as the requesting site, scanning the X-rays, controlling and transmitting them to the radiologist.
2. Malta acting as the receiver site, reviewing the received X-rays and supplying the diagnosis.
3. Connecting with either Kenya or Tromsø for live teleradiology conference, including video and audio connection, and synchronised editing and manipulation of the X-ray images.

The equipment at the stand in Malta comprises the following:

- Indy or O2 computer box (similar to a medium size PC). Can be placed under table.
- One large (20”) screen, keyboard, mouse. The monitor is heavy (40 kg). Needs about 60 cm wide x 80 cm deep table space.
- X-ray film scanner. Floor-standing, needs about 1m x 1m floor space.
- ISDN router (if the ISDN line is terminated at the stand)
- Possibly a standard PC acting as a communications gateway, will need table space

The application can be demonstrated as soon as the equipment is installed, probably around mid-February

9.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

The project head is Grete Thøger, Telenor Global Services. POBox 6701, Oslo, Norway. Tel (+47) 22777085. Fax (+47) 22778901. E-mail: grete.thoger@oslo.global.telenor.no.

The project manager is Torbjørn Sund, Telenor InfoMedica, Boks 1156, Strandgt 9, 9001 Tromsø, Norway. Tel (+47) 77612700. Fax (+47) 77612702. E-mail: torbjorn.sund@infomedica.telenor.no.

The project liaison in Nairobi is Dr S. Malik, the Aga Khan Hospital Dept of Radiology, POBox 30270, Nairobi, Kenya. Tel (+254) 2 740000, Fax (+254) 2 741749.

University hospital in Tromsø

A radiologist will diagnose the X-rays sent from the local clinic, and assist the local physician. The radiologist will be available at designated 1-hour sessions. Outside of these sessions, there will be personnel from Telenor to play the role of the radiologist.

We have two different options for local support in Kenya, and will get back with more details when one of these is selected.

At the Malta conference site, there will be personnel from Telenor to demonstrate the equipment and answer questions.

The personnel involved at the requesting side will be the local staff at the clinic, most important the radiographer responsible for taking the X-rays and the physician responsible for the patient.

9.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

The project meets the following needs at the primary site:

1. radiology advice / diagnosis from radiologist,

2. radiology training,

3. enabling discussion of cases between the local clinician and the diagnosing radiologist.

The expected benefits are (1) better patient treatment through better and more precise diagnosis based on the X-rays, (2) gradual "learning by seeing" for the physician / clinician at the local site.

Equipment cost has not been considered critical in this pilot project. We therefore do not know whether the teleradiology set-up is the most cost-effective one. When the project is to be extended to other sites detailed equipment costs will be taken into consideration, to obtain a solution which is both effective and affordable.

9.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

The cost of the equipment as new excluding satellite is approximately NOK 350,000 (US$ 50,000). This includes 3 workstations and one film scanner, but does not include any software cost. The cost of the satellite connection is company confidential information. The cost of travel and the work associated with preparing and running the demonstration has not been estimated.

Telenor assumes the full responsibility for all equipment costs in connection with the demonstration, but reserves the right to use equipment which may not be new. Telenor also assumes the

communication costs of the satellite connection during the conference. Telenor assumes the travel costs for its own personnel in connection with preparing and running the demo. Telenor can not a priori assume responsibility for travel costs and labour costs for personnel from other institutions or companies engaged in the demo.

Irrespective of the above, Telenor reserves the right to seek full or partial reimbursement of its costs, if any such reimbursement is made to those who organise demonstrations and pilots for the conference.

9.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

Project milestones:

Event	***Milestone***
Selection of site in Kenya.	December
Setting up equipment and functional testing at the local site. 6 work-weeks after selection of site (excluding Christmas).	1 Feb 1998
Training and testing with Tromsø. 3 weeks	21 Feb 1998
Testing of equipment to be installed in Malta. Runs in parallel with Tromsø tests.	21. Feb 1998
Installation at the conference site at Malta. At least 2 days before the conference starts.	
WTDC	23 Mar-1 Apr 98

There has been talks of time-sharing of the stand area, meaning that each of the pilot demonstrations at the WTDC will only get half of the full conference period, either 23 – 27 March or 28 March – 1 April. Because of the quite laborious set-up and testing procedure, the teleradiology demonstration would in this case need to be in the first group.

9.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

The project members in Kenya and in Norway will report on the project from both a medical and a technical point of view. The project head will conduct an independent, company internal project evaluation, to decide whether the project is successful enough to warrant extending to other institutions.

The project is sustainable, and the aim of the project is to point the way for further exploitation of teleradiology in Kenya and other countries with similar demographics and health service structure.

10. MALTA – Teleconsultation via videoconferencing

10.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

Dr Hugo Agius-Muscat

Director, Health Information

Health Division

Government of Malta

10.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

The Health Division has these objectives for telemedicine development:

- to further enhance the Malta health care system,
- to reduce costs and
- to acquire experience and competence, which can be used for exploiting future business prospects in the region and sub-Sahara Africa.

10.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

The BDT (ITU Bureau for Development of Telecommunications) requested Telia Swedtel to assist Maltacom plc (formerly Telemalta Corporation) and the health authorities in Malta to define, plan and implement a telemedicine system for Malta. Maltacom has been instrumental in the establishment of a telemedicine pilot project in Malta to be demonstrated as a sustainable system during the WTDC.

Telia Swedtel undertook to support this project by assigning expertise for studying the feasibility, determining standards and specifications for a system and assisting in the overall planning and implementation of the telemedicine pilot project.

Silas Olsson, project manager, SPRI and Per Olof Jansson, Telia Swedtel made the first visit to Malta in November 1997 to discuss:

- Health care needs and priorities in relation to telemedicine in Malta
- Current telecommunications status and development plans in regard to telemedicine

- Feasibility of a telemedicine pilot project in Malta
- Project definition and planning

10.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

The main component of this project is to connect St Luke's Hospital in Malta with the General Hospital in Gozo, a separate island a few kilometres north of Malta with about 30,000 inhabitants. The aim is to provide dedicated services for high speed data communication between the hospitals.

The existing telecommunications network utilises digital transmission over copper wire from the hospital internal termination points to the nearest exchange and between exchanges via fibre optic cable. The data communication link is established through a cross connect exchange that can aggregate several data links ranging in speed from 2.4 to 64 kbit/s.

Maltacom has also the capability to offer data circuits with 2 Mb capacity by utilising HDSL on copper wire. Also ATM technology is being tested for specific high capacity requirements, as well as utilisation of Frame Relay Nodes. Within hospital premises at St. Luke's and Gozo, LAN networks at 10 Mb capacity with central servers and routers have been installed under the supervision of Malta Information Technology and Training Services Ltd (MITTS).

Another component of the project is a telemedicine link between the Special Care Baby Unit (SCBU) at St. Luke's Hospital and Great Ormond Street (GOS) Hospital for Sick Children in London, that is planned to meet an existing clinical need. On an annual basis, St. Luke's refers about 20 to 22 children for open heart surgery at GOS in London. The SCBU has a long established relationship with the London hospital.

The telemedicine link to London should provide off-line consultations by transmitting moving images from a colour Doppler Echocardiography machine for expert interpretation in London.

A videoconferencing system is to be established between Gozo and Malta to allow different medical disciplines in Gozo to have peer to peer consultations with St. Luke's in Malta. The videoconference system on the transmitting side should be equipped with a document camera as well as a free standing camera allowing for patient/doctor consultation procedure with Malta.

At the Gozo end, the telemedicine terminal is to be located in the library of the Gozo Hospital. At the Malta end, it was proposed to locate a terminal near the emergency (Casualty) department. However, this is a busy area with many different physicians and therefore might not be the best place to accommodate the telemedicine terminal. Alternative sites have been identified and feasibility is being established.

The telemedicine project in Malta will include the following applications.

1. *Clinical case discussions and/or interactive education and training*, by utilising either PC based or small studio based videoconference terminals, one based at St. Luke’s Hospital, Malta and the other unit at the General Hospital, Gozo.

2. *Analysis of ultrasound images of heart and ECG signals*, by digitised data, transmitted from St. Luke's Hospital, Special Care Baby Unit to the Great Ormond Street Hospital, via the Government leased connection to London.

3. *Interactive case discussion and education and training regarding diabetics*, by utilising either PC

based or small studio based video conference terminals, one based at St. Luke' s Hospital, Malta and another at a University Hospital in Sweden.

10.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

Videoconferencing links will be set up by Maltacom between the demonstration area at the Mediterranean Conference Centre in Valletta and St Luke's Hospital. Delegates will be able to follow practical examples of the use of the telemedicine links between Malta and Gozo and between Malta and Sweden. The link between SCBU and GOS may be demonstrated by means of a video.

10.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

Health Division, Government of Malta

Contact: Dr. Hugo Agius-Muscat

The Health Division will finance the investment cost for the telemedicine system, including associated software. The Minister of Health, Hon Dr. Michael Farrugia and Dr. Joseph Zarb Adami, advisor to the Minister, have confirmed their support for the telemedicine project. The planning, purchase and implementation of a telemedicine system is the sole responsibility of the Health Division, assisted by Maltacom and from the purchase viewpoint by MITTS. The Health Division will obtain the necessary approvals for initiating the purchase process of system components, as well as ensuring approval and financing of the same. The Health Division will arrange and prepare the premises for the optimal location of the telemedicine project between St. Luke's Hospital and Gozo General Hospital. The Hospitals will assign and appoint staff to be responsible for the terminal equipment, premises and evaluation of the project. The Health Division will prepare and train staff on the use of the equipment in co-operation with MITTS.

Maltacom plc

Contacts: Eng. Joseph M. Pace, Eng. Charles Mifsud

Maltacom is responsible for the arrangements necessary to demonstrate the telemedicine project at the WTDC, including the installation of the terminal equipment at the Mediterranean Conference Centre (MCC), at St. Luke's Hospital (SLH) and the transmission facilities between the MCC and SLH. Maltacom will ensure the provision of all necessary external transmission installations, including the link between the two hospitals participating in the pilot project as well as the linking up to the WTDC that will be hosted within the premises of the MCC. Maltacom will install the telecommunications capacity necessary for data and video conferences between SLH and Gozo General Hospital. Maltacom will provide the telecom links for data and video conferences between SLH and the MCC.

Telia Swedtel

Contacts: Mr. Silas Olsson, Mr. Per Olof Jansson

Telia will provide all necessary expert assistance to the equivalent maximum amount of US$ 40,000. The visit to Malta in November 1997 was the commencement of the agreed consultancy support.

Telia Swedtel will provide the international telecommunications capacity for a link between St. Luke's Hospital in Malta and a University Hospital in Sweden. Telia Swedtel will prepare specifications for the telemedicine system components, including approximate cost estimates. The basic telemedicine system will provide compatibility to integrate PC-based and studio video conference two-way interactive applications, fixed and movable video camera, as well as during a later stage an application for radiology, i.e. a document digitiser, archiving, etc. The specification will also include three PCs, one to be used for the telemedicine project concerning the Special Care Baby Unit.

Malta Information Technology and Training Services Ltd. (MITTS)

Contact: Mr. Mark Gialanze'

MITTS will assist in the purchase and implementation of the system components as well as all supplementary equipment required for the existing hospital LANs. MITTS will ensure that the government leased connection from Malta to the High Commission in London can be used for the transmission of data in regard to the application for the Special Care Baby Unit at St. Luke's Hospital.

10.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

SCBU/GOS link

Sending echocardiograms to Great Ormond Street (GOS) for interpretation is expected to lower the threshold for consultations, allowing for better clinical planning, timing and decisions for surgery. This might not lower the number of referrals from Malta for open heart surgery in London. The aim however is to raise quality of care by improving the planning and timing of the individual referrals.

Gozo/Malta link

The physicians in Gozo General Hospital would like to consult with their peers in different clinics and departments in St. Luke's Hospital in Malta. Among the expressed needs for telemedicine at Gozo General Hospital were the following:

- Medical education: to link with the regular activities held at St. Luke's Hospital. For the training of nurses, a link with the Institute of Health Care would be required.
- Consultation regarding ENT, dermatology and psychiatry, specialities not available in Gozo
- Clinical telemedicine (radiology, pathology)
- Access to Internet
- Access to different databases
- Access to other telemedicine networks

Most of the telemedicine from Gozo is expected to involve peer to peer consultation and discussions in different medical disciplines.

10.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

Telia Swedtel will provide up to an equivalent of US$ 40,000 in expert assistance.

The costs of operational-system telemedicine equipment will be borne by the Health Division.

The costs of equipment at and telecommunications links to Mediterranean Conference Centre for WTDC98 will be borne by Maltacom.

10.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

The Gozo/Malta and SCBU/GOS links are expected to be fully operational by the end of February 1998.

Milestones:

	Maltacom	MITTS	Health
15 January		Procurement under way	All procurement approved; all sites identified
31 January	GGH/SLH link in place	New LAN points in place (incl. GOS)	
14 February	SLH/MCC link in place	Peripherals installed	Training of end-users starts
1st week March	Trial run at MCC		
2nd week March			Live

10.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

Telia will prepare an evaluation protocol for monitoring the use of the telemedicine application for improving and developing the system with regard to experience and competence gained.

11. Mediterranean region – Distance learning in epidemiology for field health professionals

11.1 Project leader

This project involves a multidisciplinary team including the following partners: Institut Pasteur, France Telecom, RNSP, Université Claude Bernard Lyon1, IUSI, Ecole veterinaire and Fondation Marcel Merieux.

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11.2 Objectives

1. Develop a distance learning programme in epidemiology for public health professionals in developing countries with a focus on countries in the Mediterranean region. Therefore contribute to the development of a Mediterranean network of health competencies aimed at improving health in specific areas of priority needs of the population.

2. Develop a centre for those wishing to learn techniques of epidemiological investigation in developing countries as well as for the transmission of distance learning information to other locations. Eventually this centre will become a centre for consultation and expertise in epidemiology and public health for developing countries.

3. This centre will become a clearing house for consultation on problems in public health as a logical complement to its role as a centre for distance learning in public health

11.3 Background

There is not a sufficient number of those able to teach techniques of epidemiological investigation in developing countries. This objective is difficult to achieve under current conditions because there is not a sufficient number of those able to teach these techniques in the countries in question, and it is too costly and time consuming to provide training to a sufficient number of individuals through travel to the developing countries by teachers or travel by students to developed countries (where the training is often not directly relevant).

Therefore, we believe that the most cost effective method of teaching a large number of health professionals these techniques is through distance learning, using the Internet, telephone and satellite communication.

The training of professionals in public health in the techniques of epidemiological investigation will assure the improvement in, effectiveness and durability of health programs in these countries.

This will also stimulate collaboration and the formation of more effective networks than currently exist between health professionals in developing and developed countries. Such collaboration can range from practical public health collaborations, e.g., surveillance, travellers health issues, local outbreak situations to scientific collaboration on public health issues, e.g., emerging infections, antibiotic resistance, food and water contamination, outbreak investigations.

Furthermore, specialists in infectious diseases, for example, stress that many factors have contributed to the present emergence and re-emergence of infectious diseases. They identify the inadequate resources provided for public health structures and programmes as one of the most important factors. They call for a revitalisation of public health practices world-wide including better surveillance, preparedness and control. All of these subjects are part of the distance learning epidemiology programme and will help to respond adequately to the threat of emerging and re-emerging diseases.

Training in techniques of epidemiological teaching is an expertise already developed at the Merieux foundation by a collaborative group of health professionals in charge of the yearly training sessions in applied and clinical epidemiology.

The distance learning programme is currently being developed by the Centre Pensières of the Merieux Foundation.

11.4 Description of project

Training modules will be made available in written form as well as on the Internet. Presentation of modules will be in interactive modes by telephone and satellite transmission, as will be problem solving and consultation sessions. The training modules can be provided to multiple sites at the same time, permitting not only interaction with the central site, but between other sites.

In particular, this method of teaching provides an effective means of follow up after the courses are taught, to provide continuing training, advice and even supervision.

The Resource Centre for Distance Learning for Health at the Merieux Foundation has a studio equipped with videoconferencing equipment. The centre will transmit programmes to various parts of the world. The centre will have experts available to teach methods of distance teaching, and it will create a resource bank for material for distance learning for developing countries that will be available on the Internet as well as by other means. It will develop a clearing house system for answering questions and providing consultations to those in developing countries.

11.5 Arrangements for the demonstration at WTDC

This project is in its first phase, and the Merieux Foundation plans to:

- demonstrate a session of interactive distant learning in the field of epidemiology from the training centre to a distant health centre in the Mediterranean region;
- present the rationale and expected impacts of such teleteaching and training as well as the steps required to implement such a programme to other locations in developing countries.

The demonstration will present a videotape showing the rationale and the important steps of distant learning. It will also present a live distance learning session presenting a specific case study and using it as a problem-based learning to exemplify techniques of applied epidemiology and the interactive work between distant students, facilitators and local teacher.

A poster will also show the design of the Euro-Mediterranean network project and how it may evolve as a collaborative health network.

11.6 Partners

The Institut Pasteur, France. Contact: J. B McCormick

France Telecom, France. Contact: Catherine Chevanet

The Merieux Foundation, France. Contact: Caroline Dupuy.

Resource Centre for Distance Learning for Health

The Centre Pensières of the Merieux Foundation will provide training in techniques of epidemiological investigation. The centre provides training to those wishing to learn the techniques and transmits distance learning information to other locations. It plans to provide consultation and expertise in epidemiology and public health for developing countries. It will become a clearing house for consultations on problems in public health.

This centre is developing at the Merieux Foundation which has already a studio equipped with videoconferencing equipment and which can transmit programmes to various parts of the world.

Potential partners include practitioners of public health, professors of public health and epidemiology, epidemiologists, scientists, teachers with skills in pedagogical methods and telecommunications experts.

The European Health Telematics Observatory (EHTO) will include information about this project on its Web site.

11.7 Needs and expected results

This project is aimed at field health professionals who deal with current health problems of the population. The training of professionals of public health in developing countries in regard to the techniques of epidemiological investigation should improve the effectiveness and durability of health programmes in these countries.

The most cost-effective method of teaching a large number of health professionals these techniques is through distance learning.

The choice of epidemiology will give to people working in the public health field a tool with which they can address the real health care problems in their countries, which confront them on a daily basis.

The development of a group of health professionals with a solid methodology and a common scientific language will facilitate communication and an integrated approach to health problems and priorities.

The project is expected to lead to improvements in:

- development of skilled field professionals in health
- enhancement of efficiency of action toward specific health issue by

  ⇒ improved handling of problems with efficient techniques

  ⇒ communication of results and sharing of information

  ⇒ avoidance of repetition and loss of work

  ⇒ enabling and facilitating the process to transfer research results into action
- resource reallocation
- the health of the population.

11.8 Costs

The project is currently receiving some financial and other support from the Fondation Marcel Mérieux, Institut Pasteur, France Telecom and partner institutions. Additional necessary financial support is being sought from the European Commission's information society programme and the MEDA programme.

11.9 Schedule

Feasibility study.

The following steps have been completed :

- constitution of a pilot group;
- teaching programmes have been identified;
- partners have been identified which will enable trans-European and Mediterranean collaboration
- a survey has been made of the main competencies and interests, human and material resources

The pilot phase has been prepared and will include the following events:

- transmission session exercise (Dec 97)
- design of the first case study transmission (dec97)
- first distant transmission (Jan 98)
- distant transmission to developing country (Feb 98)

11.10 Evaluation and sustainability

This program will be evaluated for the number and quality of people who are instructed by it with a cost and resource comparison with traditional methods of providing similar instruction. It will be evaluated by its cost effectiveness compared to traditional methods of teaching.

12. MOZAMBIQUE – Teleradiology and specialist consultation

12.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

Per Olof Jansson, Telia Swedtel.

12.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

12.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

12.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

Teleradiology and consulting advice. Videoconferencing equipment to be installed at all participating locations. Communications will be transported via ISDN links between the countries. A hub in Stockholm will serve as a bridge for the international communications between Mozambique, Sweden and Malta for the purposes of the demonstration at the Malta conference.

12.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

12.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

Telia Swedtel. Contact: Silas Olsson and per Olof Jansson, Regional Manager for Africa & Latin America.

Telia will be responsible for the planning, co-ordination and presentation of the demonstration at the World Telecom Development Conference in Malta. It provide the transmission of a real time demonstration of telemedicine based on interaction between two hospitals in Mozambique.

Telia Publicom.

University Hospital, Maputo.

Regional and Central Hospital, Beira, Mozambique.

Telecomunicacoes de Mozambique

University Hospital, Lund, Sweden

WDS. Contact: Ronald Welz.

12.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

12.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

Telia agrees to cover all costs incurred in connection with the planning, co-ordination and presentation of the demonstration, according to the preliminary budget.

	Cost (US$)
Video conference equipment for Malta, including rental charges, freight, installation, network charges in Malta.	11,000
Personnel for presentation and installation. Salary, travel, accommodation.	8,500
Telecom charges	15,700
Contingency	3,000
Total est. costs	38,200

12.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

Event	***Date***
Proposal submitted to the Midjan Group	
Approval of proposal	
Formation of project task force	
Project plan	
Commitments and agreements with all parties concerned.	
Agreements on rental of equipment.	
Agreements for network services	
Test demonstration in Malta	6 March 98
Malta conference	23 Mar - 1 Apr 98

12.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

13. SENEGAL – Tele-obstetrics, distance learning

13.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

M. Matar Seck, 06, Rue Wagane Diouf, BP 69, Dakar, Senegal. Tél : + 221 839 22 21. Fax : +221 821 40 06. E-mail: seck@sonatel.senet.net

13.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

The emergence of new information technology and the development of virtual reality have led to a considerable change of approach in health, medical tuition and therapeutics. The health sector, in which exchanges are being assigned top priority, occupies a prominent position in the economies of the world; technological progress has contributed and will continue to contribute to the remote performance of medical activities developed by telemedicine.

Sonatel, in the interests of keeping Senegal abreast of technological progress, especially in the medical field, has launched a pilot telemedicine awareness project in collaboration with the Medical Association and the health sector.

The purpose of this application is to provide the population of Saint-Louis and its surroundings with an ultrasound service intended mainly for pregnant women. By means of prenatal screening it is possible to anticipate complications which may arise at the time of birth and act accordingly at the health care level.

The project aims to develop a telemedicine network among the country's district hospitals, with the help of French reference hospitals.

The ongoing remote training of health professionals constitutes one of the key elements of this application.

To ensure that all members of the population have access to modern telecommunication services, as tools in the development process, this project will be implemented in low-income urban and suburban areas and in rural and isolated areas.

13.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

Senegal is situated at the extreme west of the African continent, with a North Atlantic coastline of 531 km; its frontiers with Gambia, Guinea, Guinea-Bissau, Mali and Mauritania extend for 2 640 km. Covering an area of 196 190 km^2, Senegal is generally flat and consists mostly of savannah with considerable variation between the north (semi-desert) and the south (semi-wooded). The territory is subdivided into ten regions, each of which is composed of three departments.

As of 31 December 1996, Senegal had a population of some 8 446 000, the great majority being young people: 45% of the population are under 15 years of age and only 3% are over 65. The rate of population growth is in the region of 3% per year and 70% of the population live in rural areas. In addition to French, which is the official working language (administration, large companies, international relations, etc.), six (6) national languages are recognized as well as a large number of local dialects.

Average life expectancy is 57.16 years: 55.65 for men and 58.71 for women.

In the social sector, health expenditure has declined by 20% over the past two decades. Unemployment has worsened, with a growing number of layoffs since 1986. According to a survey of priorities, 30% of Senegalese households live beneath the poverty line. Children are worst affected, followed by households whose head is unemployed, women and young job seekers.

The National Plan of Action against Poverty focuses on creating conditions conducive to growth based on a more egalitarian distribution of wealth and better provision for the basic needs of the population.

Following the devaluation of the CFA franc in 1994 and the adoption of (internal and external) adjustment measures, economic activity picked up, with an annual growth rate in the region of 6%. However, its benefits have been slow to make themselves felt through better living conditions for the majority of the population.

Since 1 January 1997, the local authorities - consisting of regional councils, municipal councils and rural councils - have been exercising full management responsibility. Decentralized State structures (governorates, prefectures, sub-prefectures) see to it that this responsibility is exercised in conformity with the country's legislation and policies.

Health pyramid

The ten medical regions, which constitute the apex of the health pyramid, are divided into 45 districts containing health centres and health posts. The health post network is supplemented by health booths and rural maternity units. Each district caters for, on average, between 150 000 and 250 000 persons.

Distribution of health infrastructure

In terms of coverage, the following figures - public and private sectors combined - were recorded for the country as a whole in 1993:

- one hospital for every 465 000 inhabitants;
- one health centre for every 155 000 inhabitants;
- one health post for every 11 000 inhabitants;
- one health booth for every 6 400 inhabitants.

In general, health facilities are heavily concentrated in Dakar and other urban areas.

Coverage ratio of medical personnel

The following coverage ratio of medical personnel, which is far below WHO standards, was recorded in 1993:

- one doctor for every 13 550 inhabitants;
- one midwife for every 2 844 inhabitants;
- one State registered nurse for every 7 565 inhabitants;
- one health officer for every 6 211 inhabitants.

Training facilities for the health system are heavily concentrated in urban centres.

The mortality rate associated with birth complications is very high in Senegal. During the period 1979-1992, some two out of every five cases of death in women aged from 15 to 49 years were associated with pregnancy, birth or post-natal complications. In the same period, the maternal mortality rate is estimated to have been 510 deaths per 100 000 (this figure can be as high as 1 000 deaths per 100 000 live births in certain African countries).

13.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

Visual conference media make it possible to create a shared visual environment (everybody sees the same images) and a shared aural environment (everybody hears the same sounds) for a number of distant sites. In-service distance training for health professionals is one of the key components of this application.

Training occurs in remote health centres through videoconference systems adapted to the medical environment which are connected by remote links to videocentres, videostation-type terminals or other group or individual terminals located in national or international hospital centres.

The Lille Regional University Hospital (CHRU) and the European Institute of Telemedicine in Toulouse, who have considerable experience of the videoconference applications used, are prepared to assist us in the distance training project by placing their equipment (lecture hall and study with a videoconference system, multipoint bridge) and other forms of assistance at our disposal. At the Lille CHRU a medical videostaff specializing in obstetrics has a routine session every Tuesday morning from 10 a.m. to noon, during which pathological pregnancy cases are discussed by a panel of experts. Other medical meetings in gynaecology are planned.

In view of the socio-economic and geographic environment, the following sites were chosen for the pilot projects in the early stages:

Saint-Louis Hospital because it belongs to Senegal's telemedicine pilot project and because it is twinned with Lille Hospital and the health area of Saint-Louis and the Lille CHRU have been cooperating in a mother-child programme since 1994. A steering committee brings the French and Senegalese participants in the partnership together on a regular basis. This will facilitate not only South/South but also North/South development in the area of telemedicine.

It is therefore planned to extend the Saint-Louis initiative to the whole of the region, particularly to Ndioum whose primarily agricultural population lives along the banks of the Senegal river.

In Dakar the Clinique du Cap, which specializes in obstetrics and gynaecology, is the correspondent of Saint-Louis Hospital.

Saint-Louis Hospital and the Clinique du Cap will be connected by a telemedicine link using telecommunication infrastructure. The establishment of such a link may prove beneficial for the clinic, for education and, more generally, as a means of promoting a spirit of collaboration among medical institutions.

The operator in Saint-Louis moves the probe on instructions from the expert in Dakar and the transfer of images occurs in real time. It will also be possible to send a case file from one site to another.

The two sites are interlinked by means of ISDN circuits. Signals are transmitted between Dakar and Saint-Louis via a codec which digitises and compresses the ultrasound images; in Dakar the procedure is reversed: decompression and analogue conversion of the signal which is viewed on a television screen. A videoconference connection permits close co-ordination between the doctor and the operator.

A demonstration of this technology will be given at the forthcoming World Telecommunication Development Conference in Valletta.

As a second stage, we looked at the medical scenarios associated with the Senegal project. A link between Dakar and Saint-Louis is envisaged to enable remote obstetrical examinations to be carried out, with the help of CHU Lille. An expert situated in a private clinic in Dakar will thus, via the network, be able to provide a second opinion to a local doctor in Saint-Louis operating an ultrasound scanner. A number of participants questioned the medical feasibility of such an arrangement, pointing out that the Loginat project in Lille operates rather on a "video-staff" basis, whereby doctors examine pre-recorded case images. This has yet to be verified. [5]

The scenario with respect to the link between Dakar and the hospital in Toulouse remains to be defined, but the theme of the training had already been identified at an earlier stage.

The participants then went on to consider the technical requirements. Videoconferencing will be used, and the networks will rely on ISDN at 384 kbit/s. Although SONATEL intends to purchase a multipoint bridge, it would be preferable to use the Lille and Toulouse bridges in order to be sure that the network is fully operational next March. The Senegal bridge will be used in the operational version of the application after the Conference.

13.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

The diagram sets out the network architecture required for the demonstrations. The terminal equipment will consist of:

- a videoconference station in the Dakar clinic, to be transferred from the SONATEL building;
- a videoconference station in Saint-Louis, with a camera, to be brought from Dakar;
- the existing equipment in Lille and Toulouse;
- a videoconference station with video recorder, to be set up in Valletta.

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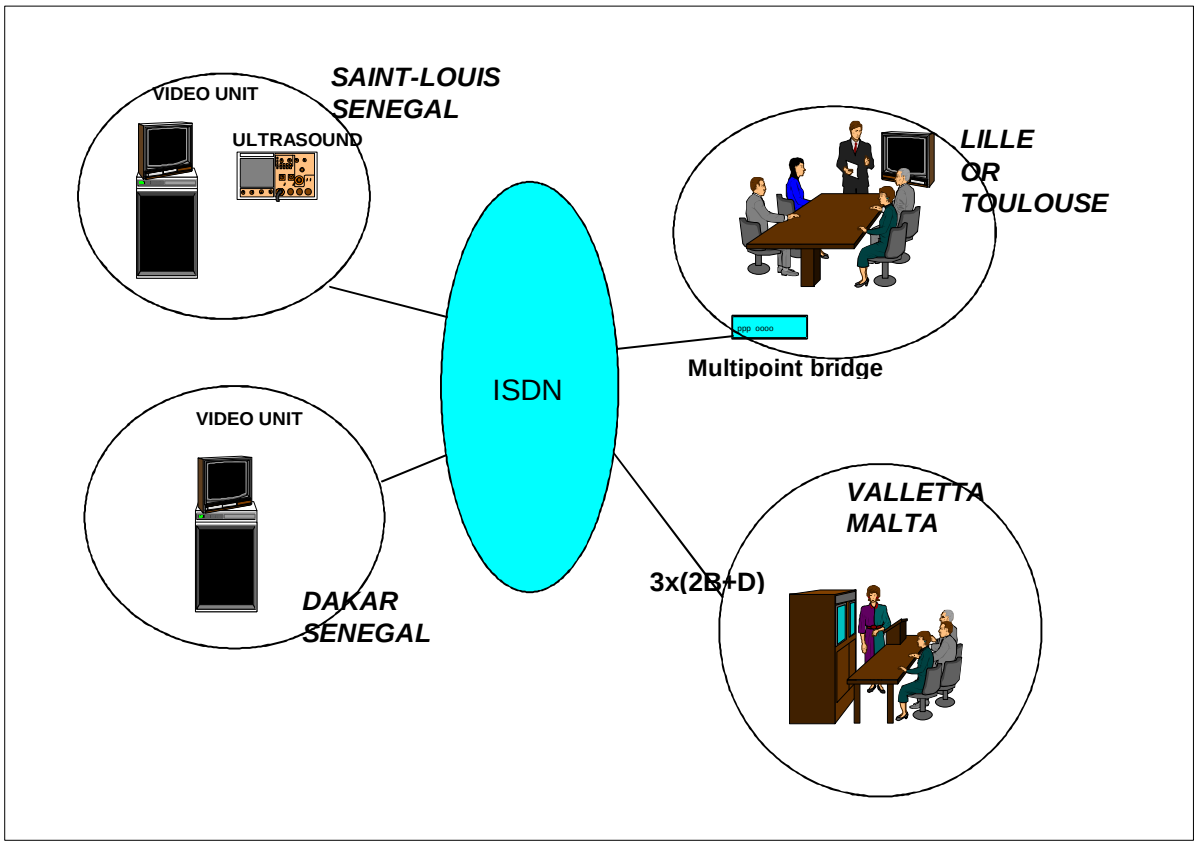
[5] This technique is in fact already in use in Languedoc-Roussillon (Maternet project), and is therefore feasible provided the image quality is sufficiently high.

There will thus be two live sessions, one involving obstetrics between Dakar/Saint-Louis/Lille and Valletta, the other between Dakar/Toulouse and Valletta. Each session will last approximately 20 minutes, at a communication cost of 3 600 French francs (FRF)[5] per demonstration, assuming a unit cost of FRF 10/minute for a 64 kbit/s channel. Both demonstrations will be video-recorded for subsequent playback during the remainder of the Conference period.

Architecture of the demonstration network



13.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

Sonatel. Contact: M. Matar Seck, 06, Rue Wagane Diouf, BP 69, Dakar, Senegal. Tel : 221 + 839 22 21. Fax : 221+ 821 40 06. E-mail: seck@sonatel.senet.net

Medical equipment, video equipment in Dakar and Saint-Louis, codecs, ISDN interfaces and connections.

CHU Lille, Mr. Tiers, Ms. Piton

Equipment in Lille and medical expertise.

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[5] Three six-channel links, at FRF 200 for 20 minutes per channel.

Thomson-CSF health, Mr. Chaines

Equipment in Valletta.

Guy Rossignol

IET-CHU Toulouse, Professor Louis Lareng

Equipment in Toulouse and medical expertise.

France Telecom, Mr. Rosiejak

International communications.

Telemalta

Connections in Valletta.

The project's prospects of success will be greatly enhanced if it is conducted as part of a concerted multidisciplinary and multisectoral community development initiative. It must also be jointly monitored and evaluated. Telemedicine is a relatively new field. A large number of companies and organizations must collaborate to ensure that it succeeds in practice. To that end, a steering committee chaired by the Medical Association has been established during the current preliminary project study phase:

- Ministry of Health
- Medical Association of Senegal
- Saint-Louis Hospital
- Regional District of Saint-Louis
- Rural community of Ndioum
- Fann Hospital
- Dantec Hospital
- Grand Yoff Hospital
- Clinique du Cap
- Sonatel.

13.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

Hospitals which depend on the public health service or on the regions and municipalities have major requirements in terms of services, content and systems related to the use of new technology and communication networks for remote medical care.

These requirements include in particular:
- assistance in diagnosis or tele-expertise requirements;
- detection of high-risk pregnancies;
- improvement of services to the general public;
- action against practices that are damaging to health;
- information for women on reproductive health;

- dissemination of survival techniques for maternal and child health;
- circulation of information within and outside hospitals;
- initial and in-service training for medical, paramedical and technical staff;
- home-based hospitalisation;
- access to information;
- incorporation of global solutions in existing communication architecture.

Studies have shown that maternal and child health care requirements are still on a large scale. Senegalese women are still faced with enormous problems at all levels: illiteracy, **high maternal mortality rate**, overwork, etc. Action to promote maternal and child health and to eradicate certain practices that are damaging to health has therefore become a major development challenge. For that reason, our project centres on a pilot application in obstetrics and training based on videoconferencing and real-time exchanges of ultrasound images.

The project is expected to produce a variety of results:
- detection of high-risk pregnancies;
- lowering of the infant mortality rate;
- lowering of the number of deaths among pregnant women;
- possibility for the authorities to solve priority problems and fulfil their potential for development in the twenty-first century;
- monitoring of patients while at the same time reducing travel expenses for patients and doctors;
- immediate access to specialised installations for treating patients in a critical condition;
- promotion of health monitoring facilities within communities;
- reduction of inter-hospital evacuation requirements;
- greater equality of health care.

13.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

The project will be implemented in two phases: during the first phase the Saint-Louis - Dakar link will be established and demonstrated in Malta and during the second phase it will be extended to Ndioum.

First phase

Equipment in Saint-Louis	**Quantity**	**Unit price (FF)**	
Ultrasound: Two-probe colour Doppler ultrasound (1 x 6.5 MHz vaginal probe; 1 x 3.5 MHz vaginal probe)	1	350 000	estimated
Codec	1	150 000	
Camera	1		included in the codec price
Monitor	1		included in the codec price
Imux	1	10 000	
Consumable goods	1	10 000	

Room camera	1	12 000	
Modem	1	1 500	
Microcomputer	1	15 000	
Equipment in Dakar			
Codec	1	150 000	
Camera	1		included in the codec price
Monitor	1		included in the codec price
Imux	1	10 000	
Modem		1 500	
Microcomputer		15 000	
Training/Installation/Configuration		15 000	
Total cost of project (first phase)		**735 000**	

Second phase			
Equipment in Ndioum	**Quantity**	**Unit price (FF)**	
Ultrasound: Two-probe colour Doppler ultrasound (1 x 6.5 MHz vaginal probe; 1 x 3.5 MHz vaginal probe)	1	350 000	estimated
Codec	1	150 000	
Camera	1		included in the codec price
Monitor	1		included in the codec price
Imux	1	10 000	
Consumable goods	1	10 000	
Room camera	1	12 000	
Modem	1	1 500	
Microcomputer	1	15 000	
Total second phase		**549 000**	

NOTE - Sonatel will be responsible for installing the requisite infrastructure on its telecommunication network for the transport of all information resulting from this application.

13.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

The videoconference station for Valletta must be delivered to ITU-D (Geneva) by 5 February 1998, for onward transportation to Malta by ITU.

Video testing with existing equipment	January 1998
Video meeting of doctors to determine the medical scenarios	February 1998
Testing in Valletta	5 March 1998

13.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

In specifying the type of relationship that must exist among these different participants, account must be taken of the need to ensure that the activities undertaken are durable and, in particular, self-sustaining.

That the application should remain operational after the Conference constitutes one of the prerequisites for the demonstrations in Valletta. Although this is assured on the Senegalese side, studies remain to be carried out on the French side. It would be a question of continuing with the technical assistance provided by Lille and Toulouse in the form of regular meetings held within the framework of the existing co-operation programmes, for example the "mother and child" programme between Lille and Saint-Louis. The study must also take into consideration links between the district hospitals and local clinics, as well as the financing of the operation. The Valletta demonstration would mark the launch of this collaboration between France and Senegal.

This project, when implemented, will respond to the needs of health professionals for training, diagnostic assistance and access to medical information and expertise throughout the world, while at the same time reducing health costs.

The pilot project was designed with the effective assistance of actors who will most likely contribute to its subsequent implementation. As a result, they developed a framework that is as comprehensive as possible. Obviously, all the strategic components of the pilot project that have been identified will not be implemented with the sole support of BDT; the participation of other partners who share the same objectives is essential. However, it is important for BDT to approve substantial investment over a period that is long enough to implement the project, evaluate its results and draw useful conclusions for the introduction of telemedicine in the developing countries as a whole.

The co-operation begun in July 1997 between Mali, Benin, Burkina Faso and Senegal in the field of telemedicine in West Africa could also be featured in Valletta, thereby setting the Franco-Senegalese application in a wider context.

14. UKRAINE – Consultations from mobile clinics

14.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

The project manager is Leonid Androuchko of ITU-BDT. On-site co-ordination is handled by Hospital No. 2 in Kiev.

14.2 Objectives

What are the objectives of the proposal? Be as specific as possible in order to evaluate results.

To improve access to health care for the population residing in the radio-contaminated area suffering from the Chernobyl nuclear disaster by providing mobile satellite communications between the mobile medical laboratory and the central hospital in Kiev.

14.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

The worst nuclear accident in world history took place on 26 April 1986 in one of the four reactors of the Chernobyl nuclear power station in Ukraine. It resulted in the release of large amounts of radioactive nuclides to the surrounding area.

The continued release of radioactive nuclides over a period of several months and their spread in the environment posed major problems to the population in the areas surrounding the nuclear plant. Evacuation of all residents within 50 km of the power station took place within several days.

Large-scale programmes of medical surveillance were initiated for the population of the contaminated areas, and still continue.

Assistance in dealing with the impacts of the disaster has come from several sources. The Government of Japan offered the largest cash contribution for implementation of an International Programme on Health Effects of the Chernobyl Accident (IPHECA) administered by the World Health Organization. Japanese non-governmental organizations provide humanitarian aid to the population residing in the contaminated areas and first of all to children. The necessity to continue these activities has been unanimously recognised by the scientists and practitioners concerned.

14.4 Description of the project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

The Ministry of Health of Ukraine has two buses equipped with medical apparatus in order to check the health of people, especially children, living in rural areas surrounding Chernobyl. These buses are a donation from the Sasakawa Memorial Health Foundation of Japan.

It is possible to improve the efficiency of these mobile medical laboratories by providing a telecommunications link between them and Kiev. In this project, Inmarsat satellite-phones will be used for administrative purposes and remote medical consultations, including transfer of medical data from remote sites to Kiev.

14.5 Arrangements for the demonstration at WTDC

Describe what you intend to demonstrate at the telemedicine stand at the World Telecommunication Development Conference and what equipment you will need to bring to Malta to make it happen. Specify which dates you can demonstrate your telemedicine application.

14.6 Partners

Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

Telecommunication Development Bureau of the ITU. Contact: Leonid Androuchko. Tel: + 41 22 730 5433. Fax: + 41 22 730 6449. e-mail: androuchko@itu.int.

- General management and supervision of the project.
- Co-ordination with local authorities in Ukraine.
- Participation in the evaluation and monitoring of the telemedicine service during the pilot project.

Basic Association of Japan

- Mobilisation of funds for project implementation
- Co-ordination with other partners from Japan.
- Co-ordination for shipment of Inmarsat-phones from Japan to Kiev.
- Participation in the evaluation and monitoring of the telemedicine service during the pilot period.

Inmarsat. Contact: Pal Horvath. E-mail: pal_horvath@inmarsat.org.

- Project engineering.
- Provision of the required space segment capacity (free or at reduced rate) for the duration of the pilot demonstration or during a pre-determined period.
- Technical and operational assistance to solve possible interconnectivity problems.
- Participation in the evaluation and monitoring of the telemedicine service.

Ministry of Health of Ukraine, Hospital No. 2 in Kiev

- Co-ordination of all medical aspects concerning specialised assistance during the pilot operational period.
- Identification of appropriate telemedicine applications.
- Preparation of application for the operational licence.

- Administrative and logistic support in Ukraine (local transport, storage of equipment, material, etc.)
- Participation in the evaluation and monitoring of the telemedicine service during the pilot period.

Ukrtelecom

- Participation in the project engineering.
- Technical and operational assistance with interconnection to PSTN.

Ukrspace/National Space Agency of Ukraine

- Project engineering.
- Interconnection to the PSTN.
- Assistance in the preparation of the application for the operational licence.
- Putting system into operation.
- Participation in the evaluation and monitoring of telemedicine services.

Ukrainian State Centre of Radio Frequencies

- Provision of the operational licence (free of charge).
- Assistance in the frequency allocation and any other associate matter.

14.7 Needs and expected results

Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

14.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

	Partners		***Amount*** *(SF 000)*
1	Basic Association	cash	85
2	BDT	cash in kind	8 25
3	Inmarsat	in kind	20
4	Ministry of Health/ Hospital No. 2 in Kiev	in kind	12
5	Ukrtelecom	in kind	25
6	Ukrspace/National Space Agency of Ukraine	in kind	25
7	Ukrainian State Centre of Radio Frequencies	in kind	15
	TOTAL		215

14.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

	Action	***Responsible***	***Time***
1	Preparation of project documents	BDT	Oct-Nov 96
2	Network design	Inmarsat	Nov 96
3	Delivery of Inmarsat-phone from Japan to Kiev	Basic Association	Mar-Aug 97
4	Delivery of other associated equipment from Japan to Kiev	Basic Association	June- Sept 97
5	Customs clearance	Ukrtelecom, Ministry of Health	Mar-Aug 97
6	Revision of project document	BDT	Oct 97
7	Update of network design	Ukrtelecom, Ukrspace, Inmarsat	Nov 97
8	Licence for operation	Ukrtelecom, Ukrspace, Ministry of Health, Ukrainian State Centre of Frequencies	Nov 97
9	Installation	Ukrtelecom, Ukrspace	Nov-Dec 97
10	Commencement of service	All partners	Jan 98

14.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?

15. ANNEX 1 – guidelines for projects/demonstrations

15.1 Project leader

Identify who the project leader will be, the person who will be in charge of organising the pilot project and its day-to-day management.

15.2 Objectives

What are the objectives of the proposed demonstration/pilot project? Be as specific as possible in order to evaluate results.

15.3 Background

What is the current situation with regard to the provision of health care in the rural areas to be involved in the project? What are their needs? Why is this project being undertaken?

15.4 Description of project

A brief description of the telemedicine application(s) to be demonstrated. Include a schematic drawing, if possible. Identify as precisely as possible the equipment and services to be included in the project. Where exactly will the equipment be used and the service(s) provided?

15.5 Arrangements for the demonstration at WTDC

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Provide the names and contact details of all those people who will be involved in the project in some way or other. Identify what each participant/partner will contribute to the project. Each partner should confirm in writing his commitment to the project.

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Will the pilot project meet real needs? What benefits are expected from the proposed configuration of the telemedicine application(s)? Is the proposed configuration of equipment and services the most cost-effective?

15.8 Costs

How much will the demonstration/pilot project cost? Identify capital and operating costs. Who will share those costs?

15.9 Schedule

What are the main milestones for planning and implementing the demonstration/pilot project? How long will the pilot project last?

15.10 Evaluation and sustainability

How will the project be evaluated? What are the measures of success for the pilot project? What lessons can be learned from the pilot project? Is the project or service sustainable? After the pilot project, what will happen next? Are there plans for continuing the service? If the project is successful, can it be expanded to include other rural areas?