ITU

Second World Telemedecine Symposium
for Developing Countries

Buenos Aires (Argentina), 7 - 11 June 1999

FINAL REPORT

Secretaría de Comunicaciones
Presidencia de la Nación

Organized by:
Telecommunication Development Bureau (BDT)
of the
International Telecommunication Union

With the Cooperation of the:
Secretaría de Comunicaciones
de la
Presidencia de la Nación

República Argentina

SOURCE: UKRAINE - OLEG YU. MAYOROV[1], VICTOR M. PONOMARENKO[2],
           VALENTIN V. KALNISH[2],
           [1]MINISTRY OF HEALTHCARE OF UKRAINE
           [2]DEPT. OF MEDICAL INFORMATICS, KHARKIV STATE MEDICAL
           ACADEMY OF POSTGRADUATE EDUCATION

TITLE: EXPERIENCE OF TELEMATICS DEVELOPMENT IN UKRAINE

SUMMARY OF CONTRIBUTION:

The concepts of the creation and the architecture of the National Direct Access Computer Network "UkrMedNet" are given. The experience of medical telecommunication networks in Ukraine is described.

CONTRIBUTION:

1   THE NATIONAL STRATEGY OF TELEMATICS FOR HEALTH AND SOCIAL CARE

Ukraine already has experience in the creation of National Medical Networks and databases. Two of the most developed medical networks operate within the framework of the first generation national computer network "HealthNet".

The most sophisticated of the two is the national register of the persons affected by the Chernobyl disaster. This register monitors the health of nearly 700 000 persons. A computer network has been created in order to maintain this register, covering 25 districts and cities under direct central administration at Kiyv and Sebastopol.

The second is the Net of the Sanitary and Epidemiological Service of the Ministry of Health of Ukraine, based on the computer centres of the district healthcare administrations (ca. 70 computer centres). It transmits operative information on the current sanitary, epidemiological and ecological situation to the Ministry of Healthcare of Ukraine. The two nets are integrated in a common Net called "HealthNet".

A third medical network monitors oncological patients in Ukraine and links regional oncological dispensaries (19 regions) with the Institute of Oncology in Kyiv, enabling an oncological register to be operated.

In 1997 Ukraine joined the international organization "Eurotransplant". A medical computer network was created linking regional centres with the national centre for the coordination of

information concerning the transplantation of organs, cells and tissues, located in Kyiv. The network currently links 12 such regional centres, and it is being further developed.

In connection with growth of sexually transmissible diseases including AIDS, a network linking regional dermatological - venereological databases (registers) and regional dispensaries enables regional tendencies in the development of such diseases to be analysed and predicted and effective preventive measures to be taken.

One of the regions where the computerization of healthcare is the furthest developed is Kharkiv. The Department of Medical Informatics of the Kharkiv State Medical Academy of Postgraduate Education, which includes five clinical hospitals in Kharkiv and the first telemedicine cardiology centre to be created in Ukraine, has introduced telephone ECG transmission technology. All equipment for this technology, including portable ECG amplifiers and modems, is developed and created in Ukraine.

Since 1998, a teleconsulting medical centre for the analysis of MRI images has been operating in connection with the Institute of Neurosurgery of Academy of Medical Sciences in Kyiv.
Kyiv National Medical University has a telemedicine consulting centre "Patholog", in which competent oncologists-cytologists may be consulted on morphological studies. The Centre is able to receive "a second opinion" from experts at a military hospital in the United States.

In 1996 the Ukrainian Association of Computer Medicine (UACM) created a WWW-server in three languages: Ukrainian, Russian and English (**http://www.uacm.cit-ua.net**). UACM members (78 scientific research institutes, universities, scientific societies, enterprises and hospitals, and over 900 scientists who are individual members) are able to access databases and scientific information on medical informatics worldwide and throughout Europe in Ukrainian and Russian (WWW-servers of EFMI, IMIA, WHO, EHTO European Observatory on Telemedicine), UNESCO and different WWW-servers of IMIA/EFMI (WGs and SIGs). The UACM, in response to an offer, has created a national language affiliated site (EHTO-UKRAINE **http://www.ehto-ukr.cit-ua.net**) of the European Health Telematics Observatory. In 1996 the United Commission on Telemedicine of the Ministry of Healthcare and the Academy of Medical Sciences was created. The Commission cooperates with the International Telecommunication Union (ITU) and European Commission's competent body for telemedecine (DGXIII). In July 1998 UACM specialists took part in the International Telemedecine Conference in Visby (Sweden) for cooperation and efficient use of resources by building networks within the Baltic Region. In 1998, under a UACM initiative a Ukrainian-American project on monitoring of birth defects in Ukraine was launched (a detailed description of the project may be found on **http://www.uacm.cit-ua.net**).

The above medical networks are standalone networks and are not inter-connected. They function with modems and inter-city phone lines. Clearly, the technologies used in the various medical networks in Ukraine over the last 5-10 years now require significant updating.

At present the National Open Direct Access Medical Network is under creation on the basis of the existing "HealthNet" and some other autonomous medical networks.

This project also envisages the integration of all existing separate medical nets in Ukraine - medical universities, medical R&D institutes - into the "UkrMedNet", as well as the creation of a "common information area" and its integration into the European Information Area.

The "UkrMedNet" project has been developed in accordance with the State's policy on computerized healthcare in Ukraine [1, 2] (adopted in June, 1995), Presidential Order No. 186/93 of 31 May 1993 "On the State Policy of informatization in Ukraine", and decision No. 605 of the Cabinet of Ministers of Ukraine, adopted on 31 July 1994 "Problems of Computerization".

Preparations are well under way for a radical reform of the entire healthcare system. It must be underlined that healthcare is to be reformed in the light of the consequences of the Chernobyl ecological disaster, which affected and still affects the health of hundreds of thousands of people. It should be noted that Ukraine occupies 607.7 thousands of sq. km and has a population of about 52 million.

Under these conditions, a key role will be played by state-of-the-art information technologies enabling all the above problems to be solved quickly, effectively and at the lowest possible cost. The National Direct Access Computer Network, "UkrMedNet", is the basis for a comprehensive medical informatics infrastructure. The aim is to provide an infrastructure for the operation of all existing and future medical networks and telemedicine consulting centres, to organize a medical and ecological data exchange system in and outside Ukraine, based on the state-of-the-art communication technologies.

2   THE MAIN OBJECTIVES FOR THE NEAR FUTURE

1) Update the national medical computer network to state-of-the-art level, using advanced computer technologies, communication lines and telemetry technologies, and integrate it into the Internet.

2) Integrate Ukraine's medical universities and R&D institutes into the National Direct Access Computer Network "UkrMedNet".

3) Continue to create, develop and maintain WWW servers (languages: supporting Ukrainian, Russian and English), support links to these WWW-servers; integrate the Chernobyl Register Net into "UkrMedNet" and create a WWW server containing the Chernobyl Register information. Provide access to the above WWW servers to "UkrMedNet" users and, via European partners (providers), to all countries (in Europe, the Americas, Asia and Africa).

4) Hospital information systems (HIS) at various levels (district hospital, regional hospital, specialized institute) equipped with up-to-date telecommunication facilities for transmitting biological signals and images (EEG, ECG, Ro-grammes etc.), texts, graphics, audio and visual information according to telemedecine concepts; integrate these systems into the "UkrMedNet" and provide access to the Internet therefrom.

5) Continue to create, develop and maintain data banks on patients requiring organ transplants, and link them to existing cell and tissue banks within the information-and-coordination nucleus of the "Ukrtransplant" system; connect the State information system on organ, tissue and cell transplants in Ukraine to its European counterpart "Eurotransplant", via the Internet.

6) Continue training medical specialists to work with the telematics applications, and advocate the utilization of up-to-date communication technologies in healthcare. Envisage the creation of a republican or international training centre coming under the Department of Medical Informatics and IT in Health Care Management of the Kharkiv State Medical Academy of Postgraduate Education, and prepare and conduct a course of lectures and workshops on the theoretical aspects and use of telematic applications in healthcare in Ukraine.

7)   Continue to create, develop and maintain servers which provide access to:

- strategically important information on radiological, epidemiological and toxicological monitoring;

- databases with quick-access information and instructions on urgent measures in emergency situations;

- information on the various branches of medicine;

- medical information for the general public, including on: diabetes, epilepsy, pregnancy, cardiovascular diseases, healthy living and rational nutrition, toxicology and pharmacology, data on prohibited food products, current pharmacological advice, other relevant information for general public;

- information from other fields of knowledge necessary for healthcare (biology, physics, chemistry, etc.);

  - data on industry and agriculture;
  - other information of economical, geographical and demographic nature;
  - information specially selected and prepared for medical students.

A business-related database is also planned: medical insurance, paid medical services, healthcare products, etc.

The information will be organized on the Net in the form of hypertext distributed databases with multimedia components (graphical, photo, audio and video illustrations) located in the WWW servers of the National (central) telecommunication node, inter-regional nodes and WWW servers of the specialized institutes (e.g. institutes of oncology, neurology and psychiatry, health protection for children and adolescents, maternity healthcare, AIDS institute).

This will make accessible to the general public the vast amount of information accumulated by relevant leading R&D and other organizations in Ukraine. This project is envisaged as part of the Ukranian telecommunication development programme.

## 3   ORGANIZATIONAL BASIS OF THE UKRMEDNET PROJECT

The project is coordinated by the Ukrainian Association of Computer Medicine (UACM), which is an amalgamation of 74 R&D institutes, universities, scientific societies, hospitals and enterprises located in various districts of Ukraine, which are involved in the development and utilization of information technologies for healthcare. The UACM has a Scientific Council consisting of 68 leading scientific experts in the fields of medical informatics, medicine, radioelectronics from Ukraine, CIS, USA, Japan, Great Britain, France and Poland. Such an association provides the best possible means of achieving the project goal and objectives and coordinating the efforts of the project participants.

Within the framework of the National Network of Ukraine we will support all district and regional information projects.

4 "UKRMEDNET" ARCHITECTURE

"UkrMedNet" is a three-level structure

The first level consists of the national and four interregional nodes. All the nodes of this level have a similar structure and service five or six districts (district nodes). It will be connected to the national node, whose base is the Ukrainian Institute of Public Health in Kiyv.

The Ukrainian national node performs also the functions of the interregional node for Kiyv and adjacent districts (Figure 1)
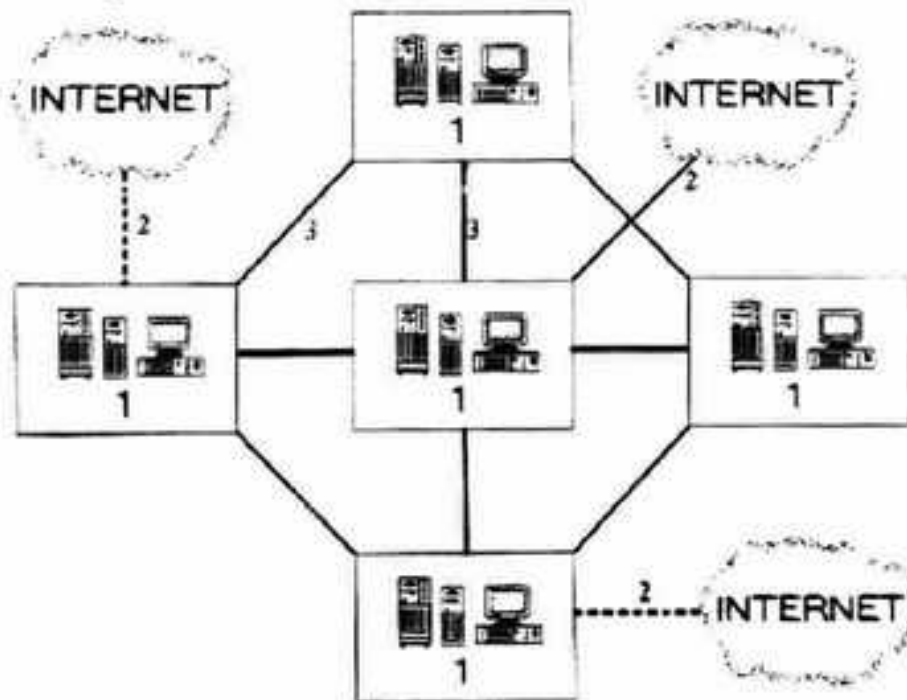

All Interregional nodes are directly connected to:

a)   national node (1); b) an interregional node (1); c) an Internet node (2) which is not a part of the Net of the Ministry of Healthcare of Ukraine. Such connection layout ensures doubling of the connections of the first level nodes, i.e. ensures virtually 100%-proof data transmission. This enables us to consider the proposed architecture to be highly reliable.

The national and interregional nodes provide connection to the Net for the second-level nodes (Figure 2 (2)), as well as direct connection for major scientific and medical organizations and universities. The district healthcare departments are the basis of the second level. The second-level nodes are connected to the nearest inter-regional node (1). They provide connection to the Net for medical organizations located in the district and preferably to Internet, which is not covered by the Net of the Ministry of Healthcare (Figure 2).

The third level consists of regional nodes (Figure 2 (3)) and end users (Figure 2 (4),(5),(6)). They are connected to the nodes of the district healthcare departments. This level is built on the basis of member-organizations of UACM, as well as all healthcare organizations willing to join the project at their own expense or at the expense of the Ministry of Healthcare of Ukraine under the Ukranian telecommunication development programme.

Fig.2
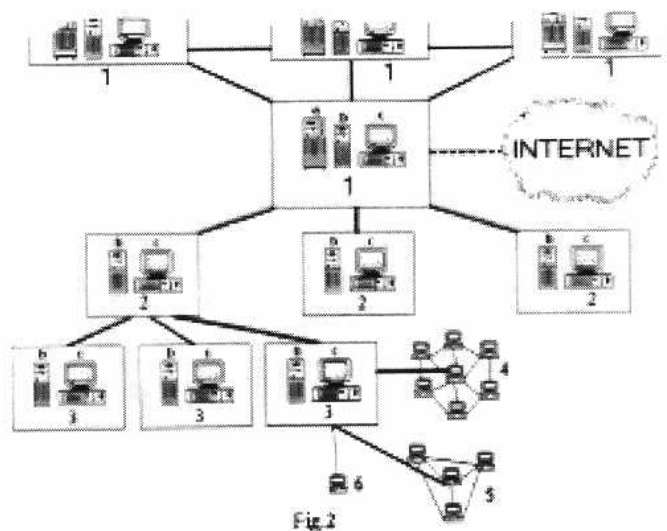
5 BENEFITS

The Ukrainian National Medical Network affords the opportunity to exchange medical, ecological and scientific information. Physicians, scientists in R&D institutes and universities can access the information they need, receive electronic copies of scientific journals and articles, run programmes otherwise unavailable to them.

A unique regional computer network for calculating and analysing the health and epidemiological situation is being created as a component of the integrated network of the Ukranian Ministry of Healthcare.

The Ukrainian national system for organ, tissue and cell transplants, connected at present with "Eurotransplant", will be incorporated in the common European computer system for organ transplants, thus giving Ukraine a real opportunity to benefit from progress in this field. Information technology adapted to national conditions will be created for supporting organ, tissue and cell transplant operations at the national and regional levels.

Based on international experience, a technical project with standardized patterns of databases and solutions will be created, as well as standard programme modules with standard input and output files for use in central and regional information and analytical systems, in order to ensure the functioning of all higher-level databases.

Network development in Ukraine gives the EU countries the opportunity to carry out many joint projects with Ukranian medical specialists, thus enhancing R&D potential.

For a country with a vast territory and in a dramatic economical situation, the creation of consultative telemedical centres is very important. Such centres make it possible to provide the

population, particularly in remote rural areas, with qualified consultative and diagnostic medical aid at low cost.

Thus, the creation of the National Direct Access Computer Network "UkrMedNet" has tremendous medical and social significance for Ukraine and has accelerated the country's integration into the "global information area".

REFERENCES
[1]   V.M. Ponomarenko, O. Yu. Mayorov, The Concept of State Policy in Informatising the Healthcare in Ukraine. *Ukrainian Radiological Journal* 1996, 4(2): 115-118.
[2]   O. Yu. Mayorov, V. M. Ponomarenko , Valentin V. Kalnish Ph.D. and oth. HEALTH TELEMATICS IN UKRAINE: PROBLEMS AND PROSPECTS Medical Informatics Europe '97 .Eds. C. Pappas *et al.* IOS Press, 1997 p.53-57.