Networking Environment For Learning Technologies Implementation

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Preface

The improvement of training specialists and research development is impeded without a close information interaction both inside the national scientific and educational community and with the colleagues in various countries of the world. The level of teaching and training is depended on development and availability of information and communication technologies. All these facts underline the importance of providing the scientific and educational institutions with the modern networking service. The development of network and networking services for science and education is tightly connected with the current needs of the education process perfection, new learning technologies introduction and with the wide implementation of the modern learning systems and educational resources.

At the same time new approaches to the usage of distant education, organization of the interactive interaction in the educational process, the suitable presentation of the educational information depends in essence on the available development level of the networking technologies and infrastructure. To promote the process of national scale scientific-educational communication infrastructure implementation the Academy of Sciences (ASM) and some universities of Moldova founded a networking association RENAM (Research and Educational Networking Association of Moldova), which aim is to unite the technical basis and know-how experience, to elaborate technical decisions for implementation and maintaining communication highways, access points, nodes and multi-user servers. The Association is open for every scientific and educational body in Moldova, which is interested in obtaining networking resources. The scientific and educational network of Moldova RENAM now unites the main universities campuses and many scientific institutions LANs and provides technical basis and communication facilities for different types of information systems deployment, which are devoted to support scientific research and educational activities [[1], [2]. RENAM backbone comprises now 7 nodes (points of presence), which are employing for connection with scientific institutions and universities campus sub-networks (see fig. 1).

1 RENAM networking resources and services

At the very beginning of new networking infrastructure designing and implementation the main tasks for solving and directions of its resources utilization were formulated. RENAM Intranet structure has to provide:

– creation and distribution electronic distance learning and training courses for Universities and colleges students, postgraduate students, school pupils;

- creation bibliography information exchange, electronic publication availability for all members of scientific-educational community of Moldova;
- distributed information systems implementation for scientific and educational institutions management;
- applied scientific databases creation and exploitation;
- joint projects realization, information project support, establishing necessary contacts with industry and governmental organizations.

RENAM network external connectivity is oriented on the solution of the following tasks:

- collaboration in joint scientific and technological projects realization. More then 150 joint research projects are developing by the Moldavian scientists together with the colleagues from more than 20 foreign countries; bibliographical information exchange, which includes electronic form of the Moldavian scientific journals availability for Internet users;
- full access to wold wide Internet services for scientific-educational community of Moldova, including operative access to scientific publications, applied databases, new technological and scientific information.

Created networking infrastructure is used for national scientific and educational content development, accumulation and dissemination within scientific-educational community of Moldova, and providing access to these resources for partners all around the world. Academic institutions of Moldova possess and permanently produce new valuable scientific results and educational knowledge. The realization of national scale informational and communication infrastructure, implementation and provision modern services allowed members of scientific-educational community to obtain needed instrumental and communication support for productive activity in information content creation and development.

Initially the network infrastructure was created only to provide traditional networking services: www navigation, e-mail, ftp, Telnet, IRC, etc. and global Internet access. During its practical exploitation accumulated experience allowed to outline and systemize users' demands. The most of new educational software users multimedia and online interactions. Content designers and content providers want to get sufficient network response time and data flow rate capacity for processing new applications. The problem arise to customize network parameters for coinciding these requirements. Telemetric investigations have shown all narrow points within existing infrastructure. Due to real resources restrictions traditional approaches can't be applied to fit users requirements at all networking segments. During investigation of this problem some special approaches and recommendations were elaborated and begin implementing. They can be grouped in the following two directions of activity:

- increasing communication lines bandwidth and utilization of traditional networking QoS support facilities;
- resolving the problem by using special solutions based on precise configuration procedures of the existing communication means, utilizing the experience of examination of available parameters changes influence on traffic throughput capacity.

These measures helped to ensure a necessary quality of service only for some dedicated set of system interactions, so future investigations, recommendations elaboration and practical solutions are needed to satisfy permanently developing the network users' climes. The proposed solutions and recommendations were summarized in the new project of the RENAM network infrastructure development. The nearest goals of the project are:

- Transfer of communication highways of the Kishinev backbone to the usage of a new fiber optic media and productive technologies of data transmission (e.g. ATM technologies), modernization of the equipment in nodal points of the network backbone for utilization a high-speed data transferring media and modern communication technologies;
- Creation of presence nodes in new peripheral points on Moldova territory, where research and educational centers and organizations located;
- Including into the RENAM networking infrastructure additionally 5 state universities of Moldova and also about twenty principal colleges;

Improvement of Internet connectivity on the base of the capacity increasing of the existing channels and creation new external links.

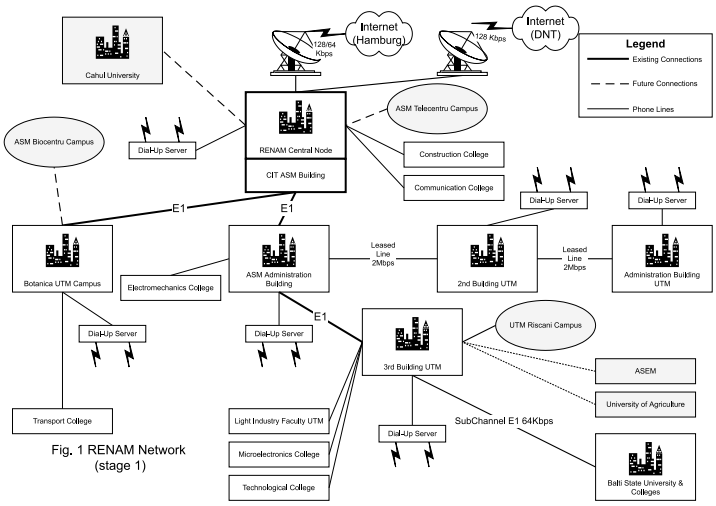

Fig. 1 RENAM Network (stage 1)

Figure. 1: RENAM Network (stage1)

2 RENAM informational resources

Real progress is observed now in information systems designing, construction and deployment for distance learning, computer based curricula production and distribution, bibliography databases implementation, electron form of scientific publications and journals

preparation, collection and dissemination. RENAM network became now the focal element for scientific and educational information resources development.

Basic networking informational resources for science and education in Moldova can be systemized as the following:

- Web-sites of leading scientific and educational institutions, which provide necessary navigation and information access facilities;
- Factographic database "Scientific publications in Moldova", containing annotations, abstracts of papers and full texts of some of them;
- Annotated catalogue of Moldova periodicals;
- Hypertext database "Conferences, seminars, meetings and other scientific events, taking place in Moldova";
- Electronic versions of some journals, published in ASM and universities of Moldova;
- Methodical materials and computerized curricula, including for distant education;
- Systematized information for access to databases, generated by the largest libraries and information centers of Moldova, provision of information exchange and access to information systems of these scientific libraries.

Educational content now comprises ability for access to distance learning courses, which are devoted to different groups of customers. The first educational content collection was directed on general population education and retraining in the field of modern computer utilization, communication and networking technology backgrounds. The development of this educational direction has started in 1998 due to support of STACCIS (Support of Telematics Applications Co-operation with the Commonwealth of Independent States) project and more then 20 different curricula collected, an information about it available for all registered RENAM users and they can be distributed among RENAM Association members.

The second direction is oriented on retraining purposes in rather narrow field of telecommunication technologies. Specialists of the Technical University of Moldova in conjunction with Moldavian Telecom Company representatives have elaborated developed content for distance training employers from distributed Telecom centers of Moldova on the subjects of setting up and administer TCP/IP digital networks, Windows NT administrator's handbook, LAN and WAN topologies, communication equipment.

The most developed is collection of computerized curricula created by universities and scientific center specialists for teaching students. These courses are elaborated and implemented for various subjects at different universities' faculties and departments and its copyright belongs to appropriate developing teams. General information about the course properties and characteristics is available for RENAM news servers' subscribers and RENAM Association members.

Now it becomes important to work out a strategy of the further development of educational information basis. Typical information system structure for educational content collection, storage and retrieval elaborated and proposed for implementation as basic information center, included in RENAM network. The system concept is grounded on instrumental and

software toolkit, which subdivides on three levels of information processing: searching engines and navigation means; collection, storage and retrieval program tools and interfaces; structured information blocks and databases management systems.

One of the most important directions for supporting educational content development is establishing methodical centers, which specializing on computer based learning courses preparation and presentation for different subjects. The system of a distant learning and training, based on the networking technology, is accepted as a principal one in these centers. The created facilities of the network offer users wide and free access to the educational content and other information resources.

3 Prospects of information structure development

During joint work on educational content development actual results were obtained and a certain experience was accumulated. At this stage it's necessary to work out a program of the further development of educational information basis. We envisage the following direction of this activity promotion:

- Involving in joint work new interested participants in order to develop educational content, including their technologies, proposals and projects;
- Establishing and deepening mutually beneficial contacts with foreign centers and organizations, possessing experience in creation and employment of the applied educational content.
- Broadening of the educational content development project zone.

The first direction is connected with the further accumulation of experience of scientific and educational community potential in Moldova. The second direction determines interrelations with foreign partners to ensure the possibility of using their rich experience. As a basis for organization of such cooperation may be a mutual exchange of the applied educational content, participation in joint elaboration of training systems, development of the existing and probated systems. This direction is connected with and bases on the successful accumulation of the national educational content and solving of the problems of such information availability for the interested foreign partners. The third direction is connected with working out new projects - satellites, forming new proposals and projects, involving the state and international financial support for development of the created information basis, cooperation for elaboration of national and multinational projects in the sphere of telematics, information and communication technologies.

References

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