Abstract: New technologies like Computer Aided Design and network facilities are affecting the building procurement, design and construction processes very rapidly, in the education, design studio teaching as well as in the practice. Network technologies are giving us a variety of possibilities: quick and simple access to information, quick and easy communication, exchange of data in different formats (texts, data, drawings, images, animations, hypertext or multimedia products, etc.) or access to differently located computer and work on it. As the result the communication or collaboration in a design and construction process and management could be used not only in the CAD based design studio but, what is more important, between geographically dispersed members of design teams (dispersed in different places, towns, regions, countries or even continents). There is a lot of advantages: quick and easy communication and exchange of information, free choice of a team, easy revisions of a documentation, collaborative work on the same drawings, costs savings in travelling, issuing, copying and shipping, etc. On the other hand the long-distance education on an international base appears like a modern teaching tool. Paper reflects the experiences from International collaborative studio work via computer network, Internet and World Wide Web.

1. Design Studios and local network

In 1990 the Computer Aided Architectural Design and students studio works started at the Faculty of Architecture, Slovak Technical University, Bratislava. In the same year had been founded the Department of Computer Aided Architectural Design which focused namely the use of computers as a tool in architectural design. In comparison with the early beginning when only a few students passed their education in CAAD these days we can say that every student has got at least the basic education in the use of computers and that their interest is far beyond the capacities of the department.

The top CAAD based studio works nowadays presents very high quality standard. Best and most experienced students are using computer tools not only for drafting, modelling and rendering but for the highest quality presentation of their
ideas and final studio work.

To support such trends as much as possible our department organised competition and exhibition „The Best CAAD Studio Work“, where quality, complexity and graphical presentation has been most important. The competition was supported by software dealers (Autodesk, Archicad, Bentley and Nemetschek). There were about 20 excellent works submitted to the competition.

Best studio works are presented on our web page:

http://www.fa.stuba.sk/katedry/dcaad/galeria.htm

The idea to arrange such competition in Europe might be very interesting and a good motivation for students from different universities. ECAADE and EAAE are proper organisations which could initiate and support such competition.

In the year 1992 the Faculty of Architecture STU was connected to the university network. During next few years Faculty was connected to Internet and a local network has been constructed. Today all departments and offices are connected to the faculty network and Internet and all computer studios are connected to a department network. Most of CAAD applications (AutoCAD, ArchiCAD, Microstation, etc.) are running on Windows NT like a network versions.

The network supports education and teaching, sharing of data, databases, software and libraries. As usual students are much more familiar with network applications as teachers. However, network connection is used not only for teaching and to common studio work but for the international collaboration and educational and research projects.

As the reflection of good skills and experiences and a proper technology students at the Faculty of Architecture STU have initiated a student project „COUNTRY“.

The idea is to create a 3D virtual medieval world with a different CAAD based designs of ancient objects like e.g. gothic cloister, medieval village, landscape architecture, woods, hills, rivers, caves, rocks, etc. For the building of the country students plans to use their own studio works.

Graphical interpretation of the country and landscape will be presented from different viewpoints like plan view, normal horizon view, axonometrical or perspective views.

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In the interior and exterior elements of the landscape image will be placed semi-interactive informations about the architecture, images, texts and links to different web pages.

In the virtual country it will be possible to meet other people connected to the same server. Via messages they will be able to communicate and discuss the problems of that part of the country they will be currently in. This is a base for the virtual discussions and sessions.

Project is currently started in Slovak language but it is opened for all interested.
This project will be running on a special server: http://147.175.32.21/

Contact person: Ivancak@www.fa.stuba.sk

2. International Collaboration and Design Studios

As the initiative of the teachers from four different universities - Faculty of Design and Technology, University of Luton, United Kingdom, Technische Universität, Graz, Austria, Technische Universität, Wien, Austria and Faculty of Architecture, STU Bratislava, Slovakia several international design studios were created from 1995 till 1998.

The project was inspired by presentation made at the 1994 ECAADE Conference in Glasgow, which described collaborative work by students at a number of schools of architecture who were using Internet as a form of virtual studio.

There were several collaborative projects:

i/ BRAGRALU (Bratislava-Graz-Luton) 1995-96 "CAAD International Virtual Studio via Internet", a joint educational design project and international collaborative student design work: „The conversion of Disused Bailey Hill Water Tower in Luton"

ii/ BRAGRALUWI (Bratislava-Graz-Luton-Wien), 1996-97, a joint educational design project and international collaborative student design work via Internet: „Four Gasometers in Vienna-Semmering"

iii/ BAGALUWI 1997/98: „Reflections, Rotations and Revolutions"

Projects were successful in achieving completed design proposals at each participating institution. The fact that the students did not all have easy, open access to the relevant electronic communication media, and that much of the information exchange was carried out through the teaching staff, prevented the project from functioning precisely in the way that was originally foreseen. The forum for continuous debate between the students, which it was intended to create, did not really develop. Efforts are underway to ensure that when the next collaborative studio project commences all the students taking part will have open access to EMAIL, FTP and WWW browsers.

In educational terms the project was beneficial in developing the awareness of the students on issues connected with collaborative working, differing architectural cultures and the potential of electronic communication in design. All the participants, particularly the teaching staff, learnt a great deal about the possibilities and difficulties of using the Internet as a collaborative working tool. Unfortunately, the mechanics of achieving the data transfer tended to take up time which could have been better spent exploring more fully the architectural, educational and cultural aspects of the project. This is a weakness which will have to be amended in future collaborative projects.

Next problem of such common projects is purely academic. Students at different universities have to finish and present their studio work at different times. This caused critical moments in collaboration on the same design as students at one university were just in the middle of semester but student of participating school were just before the end.

The greatest gain to the students was in raising their knowledge of the ways in which CAAD and electronic communication technologies could be integrated to form a powerful tool, which could have great benefits in terms of education and international architectural practice.

This is once again an area where EAAE and eCAADe could take some initiative and arrange some similar projects on
multilateral base.

At the 1997 eCAADe Conference in Vienna presented student form Italy their experiences Virtual Studios of Design and Technology on Internet. Presenting on-line videoconference and discussion on the same design by three participating places (Austria, Italy, France) they confirmed that with proper technology, experiences and skills could virtual studios act a very important role in teaching an architectural practice.

The technology will be more and more powerful and user friendly. Universities and collaborative projects are the right place where to find proper methods how to use them.

3. **International research projects and Internet**

As the very important part of the research work at universities is an collaboration with different institutions and partners, quite often on international base. A really wide international collaboration was initiated by ECAADÉ.

At 1994 ECAADE Conference „The Virtual Studio“ was presented a proposal for a collaborative venture in compilation of an Interactive Multi-Media Archive of Great European Architecture (P. Mirabelli, A. Fortuzzi, J. Petric, T. Mayer) - IMAGE A.; later IMAGE ABC: (Architecture, Buildings and Cities). This idea was adopted by a number of participants of the conference - representatives of the universities and institutes all over the Europe.

As a reflection to this a Slovak pilot project called "SLOVAK MODERN ARCHITECTURE - 20th Century", interactive multimedia archive and presentation system (Authors: Matus DULLA, Igor KOSCO) was initiated in early 1995. The project was successful - it was contributed by a PRO SLOVAKIA State Cultural Fund, private architectural and design office AUP MEDIA, Bratislava and two educational and research institutes: Faculty of Architecture, Slovak Technical University and Department of Architecture, Institute of Construction and Architecture, Slovak Academy of Science, Bratislava.

This system or virtual publication presents the basic information and characteristics of works, building, movement and the dates of construction. To each building are related text and visual information such as photographs, drawings, sketches, schemes or historical documents form archives together with all important links and bibliography. The system contents the authors register which introduce most important architects and authors of this period with a short characteristics of their work and biography.

The project is based on a simply Hypertext files. Although it can not deliver the functionality which the concept of the IMAGE IBC: pilot project demands, it works even in a modest technical conditions of CEE countries (institutes as well as individuals) and is globally distributed via INTERNET. It is accessible via Slovak Academic Network SANET at the WWW server of the Faculty of Architecture, Bratislava. (http://www.fa.stuba.sk/modarch/uvodstr/ma20s-uk.htm)

The IMAGE ABC: initiative is quite important challenge of the European Schools of Architecture. I think it is necessary to develop the system, to try to find some financial resources globally for the whole project but even partially by the participating institutes and to use the contacts and links via ECAADÉ and EAAE to build the system more complex.

Different types of research activities are international projects based on EU schemes like TEMPUS. Quite important for me was project REGAMTER - "Planification Regional et Aménagement du Territoire", Joint European Project TEMPUS, No.: S-JEP-07490-94 Bratislava - Grenoble -Newcastle), 1994-1996.

A project orientated to planning gained together different experts and teachers from different countries.
There was a great interest to use electronic media for the communication and data exchange. Electronic mail, FTP and Internet became standard tools for the project although the exchange of staff (teachers) and students were more preferred by participants. The network technology was used namely for email purposes - although some participants tried to persuade others to use Internet like most suitable communication media, the result in use had been very weak. This has been caused namely by the small experiences of teachers and students participated in project.

On the other hand, thanks to the participants from Grenoble and Newcastle a video conferencing were used for long distance communication. However it was not possible to connect Bratislava as there were no ISDN lines available and the transfer of data via Internet has been too slow but the technology has been presented and proposed to use in the future.

Based on some experiences from Tempus REGAMTER joint European project a team of teachers and experts from Grenoble prepared new project with several European schools of architecture participating in it. Programme TELEREGION, an international research project aimed to create a virtual region in Europe to work on common problems in planning via electronic visual media like video conferencing, electronic white boards, etc. and to find proper methods and tools for such work.

Next very interesting initiative and a proposal for European collaboration was PLATFORMAD - "Plate-forme de Formation Multimedia a Distance", an international project for developing, experimenting and validating a platform for distant multimedia training, coordinator Université de Grenoble, France.

Long distance education will be quite important method in the future but even today it is the way how to be in personal touch in real time with a student, teacher or another professional. The technology exists or will be available in a short time. It is very important to be prepared to use it as soon as possible.

This project was rejected for EU funding. However, with the support of EAAE and ECAADE it could be successful and the results will be very useful for architectural education.

Based on the Tempus - REGAMTER and on the collaboration between Bratislava and Grenoble is running current project TEMPRA. There are regular exchanges of students from both sides where they are dealing with local problems. For example three students from France are working on following thesis:

- Vanessa DUBUISSON, Ecole d'Architecture de Lyon: "Une cite universitaire pour les etudiants etrangers dans le centre de Bratislava (Kollarovo nam.)"

- Marie POIROT, Institut d'Urbanisme, Université Pierre Mendes, Grenoble: "La place de la femme et l’enfant dans la ville"

- Anabelle ORANGE, Institut d'Urbanisme, Université Pierre Mendes, Grenoble: "La gestion du parc de logement a Bratislava (Republique Slovaque) dans le contexte de la transition politique et economique".

The main target of the project is not computer aided design or the use of the network or Internet as it was in some of the previous project. As a surprise this group of students under the supervising of lecturers from Bratislava and Grenoble started to use all electronic media as a tool for their work, from CAAD software, text processors to local network, WWW libraries and archives, email and Internet.

As the result the working Web pages has been created as a source of the presentation of the partial work in Bratislava for their teachers and colleagues in Grenoble. Web pages are used for the consulting and contribution of their lectors. So
- we are finally around the table on the net.

4. **Internet Forums**

There are a lot of ways how to communicate via Internet. There exists special discussion boards, group sessions, electronic whiteboards or virtual conferences. Internet forum might be a very productive way to get professionals closer together.

From my point of view EAAE workshops could be enriched by electronic discussion for those who has been not able to participate or who would like to contribute the workshop.

ECAADE Forum was created for such purposes this year.

ECAADE (Education in Computer Aided Architectural Design in Europe) is an international association of individuals and institutions with a common interest in promoting good practice and sharing information in relation to the use of computers in the education of architects and other related professions.

ECAADE Forum is established in support of ECAADE goals. Forum is envisaged as the medium for establishing contacts, discussion or expression and facilitating quick exchange of ideas related to CAAD and/or eCAADe topics.

Its initial host is the Faculty of Architecture, the University of Belgrade which is responsible for publishing and maintaining the Forum site. ECAADE Forum Editor is Ivan Petrovic (aivan@eunet.yu).

All students, teachers and researchers in architecture and related professions to join in and contribute to the discussion are welcomed. It is highly appreciated any contribution as long as it is relevant, innovative, interesting and promises to add some useful knowledge to the theory and practice of CAAD. Subscription to all Forum manifestations is free and open to ECAADE members and non-members alike.

The Forum has the following parts: the Discussion List and Insights.

Contributors to the Discussion List e-mail messages to the Forum where they are forwarded automatically to all subscribers on the list. The messages may relate to on-going subjects or propose a new one.

Insights is a moderated discussion place on the selected interesting subjects from the List. Each subject has the corresponding moderator.

6. **Conclusion**

Our own experiences, with CAD based design projects linking students or professionals at different centres via Internet, have shown us that this form of collaborative work can be effective and rewarding. The available electronic communication currently limits the type of interaction which can take place, particularly in the area of synchronous working. However, progress in this area is very rapid.
Access via electronic networks to shared design frameworks in which changes by one specialist are reflected in the design database of another, would enable more effective collaboration between construction professionals. Use of the Internet as a communication tool will increase as professionals receive more of their technical data and information from on-line sources, and become more familiar with this type of technology. Electronic communication technologies offer the possibility of more frequent and direct interaction between design team members, and savings in time and travel. Practices with an international portfolio of work can use the new technologies to maintain closer contact with their local advisors, and design and procurement teams can be selected on the basis of their suitability for projects, with the economics of geography being relatively unimportant. The most cost-effective talents could be utilised. For example, there are many architects with good CAD skills in countries in Eastern Europe and Asia, where labour rates are lower than in the western economies.

A logical extension of the use of electronic networks would be the provision of links to the construction site. The quality of design would be improved, with fewer urgent decisions being taken on site without design team input, and a quicker response time allowing better feedback from the construction team regarding decisions by the design team. Network connections will make communication between designers and builders more sophisticated and efficient.

Building design and procurement is a multi-disciplinary process, and the more frequent and flexible interaction between specialists offered by the new technologies will result in improved design quality. Advances in collaborative working will come through the integration of virtual reality techniques and electronic networking.

Building, architectural, urban or landscape design is always a multi-disciplinary process, and the more frequent and flexible interaction between specialists offered by new technologies should result in improved design quality. Great advances in collaborative design working will come through the integration of human knowledge and creativity, modern tools and technologies, electronic networking and long distance communication and education. New technologies are being currently tested at the universities, academic and research institutions but they are immediately implemented into the practice

7. Acknowledgements, bibliography and references


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