OUR VIEWS ON ACTUAL RESEARCHES OF 3D-MODELLING IN THE ARCHITECTURE
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Abstract
This contribution is devoted to the brief description of the basic directions and tendencies of researches of the laboratory of video systems MARCHI.
In connection with development of hardware-software computer means and their practically absolute, not alternative application in the practice of architectural designing, nowadays (not always is proved) the sphere of application of the former traditional methods of physical modeling and their connection to the endoscopic methods has been narrowed.
We consider some new probable directions of development of scientific and educational work within the framework of activity of our laboratory, allowing a more balanced approach to these problems.

As we have discussed, our theoretical researches and practical works must reassemble an existing non-standard and controversial situation in Russia, such as established substantial intellectual potentials in scientific- and methodological researches within study processes. In addition to that, what we can use are affordable and limited physical and financial recourses and capability for technical development of works for modeling perception in designing architectural and town planning space.

These initiated searches in the field of non-standard thinking, derive from our contacts with EAEA colleagues. Below we will try briefly to explain our basic principles of work development. (To be clear, some time we dismiss references and notes into exact reports from our conferences supposing that interested colleagues may get further and detailed information from already published past events).

1. Broadening research and study projects in fields of “virtual (incl. international) teams”
In global research practice there is a growth of interrelationships among largest multinational universities and institutes (first of all technical and economic, due to their capabilities) in the field of “distance (internet) study” today. With all existing advantages i.e. possibility to involve almost any professor, the realization of these projects should overcome even “prosaic” limits, such as administrative, legal and perhaps, some other marginal, but sensitive difficulties, first of all relevant to identical knowledge control – which is especially crucial in creative disciplines. However, the attraction of applying internet technological applications in the field of “unique” architectural education made us undertake both theoretical and experimental research.

If I am not wrong, a first attempt to use “internet” technology among our EAEA field was demonstrated to us in 1995 in Vienna showing the examples from the Vienna University of Technology and Graz University of Technology. At that time I was quite skeptical about this experiment, considering it a “utopian” attempt. However, I appreciated the Vienna enthusiasts who encouraged me in 1995 to look for optimal and, in my opinion, essential and affordable methods and tools for “internet” interactions in the field of architectural education between the European Union and Russia.

Already it was seen, that organization of a normal video-dialog (in Russia, providing video-conference is possible only for a few organizations) requests completely different expenses for equipment and
connection channels. Being an engineer-physicist, I began to “invent” how to organize “internet” communication – our useful and really feasible dialog with interested teams.

According to the ‘Vienna experience’, we suppose that:
– is it really essential to have very expensive and almost unaffordable for educational organizations real time video during study process for communication between different remote teams?
– perhaps, it is possible to organize relationship as a usual “e-mail dialog” that contains text and visual information (a row of still frames). Is it probable that there is only the problem with transferring master video information for the production of release materials?

We came up to the unavoidable famous “philosophical question” here about correlation of the objective and means, in our case – how much used means justify the achievement of pedagogical objectives. We hope that our proposed materials supported by video materials, which we will show in the end will help you in a certain extend to identify this problem.

For our experiment we have chosen two different works, which have in common only the subject of study – preparation of original materials to 100th anniversary of the famous Russian architect I. Leonidov. We suppose that the shown materials will allow our interested colleagues to orient themselves in the direction of possible future collaboration.

We did the first work in collaboration with the University of Essen. Since our basic experimental work has had special conditions, such as international students’ involvement and limited input of information we decided to dedicate a separate collaborative report to it. (Figure 1.)

The second work was done in collaboration with studio “3D-DESIGN”, Paris. This work pursued another aim – to demonstrate how work in style of an “international virtual team” can broaden the possibilities of video modeling of the perception of architectural projects. In this work Lab of Video System MARCHI got an access to advanced computer system “SILICON GRAPHIC” and video studio “Betakam Digital”. In other words, it was an extension of the Lab in terms of technical capability, and the quality of the built computer model proves it. Our dialog (via e-mail) also included graphic and photo materials exchange with supporting text information. (Figure 2.)

2. Study-methodological MARCHI researches in view of our cooperation with foreign teams

This part is prepared with use of study projects of students I. Varlamov, D. Karelin (under chairing of Prof. V. Orlov, senior lecturers E. Miroshnikova and N. Stasuk, Prof.-consultant M. Matalasov) and their experimental work.

The possibilities of realization WHETHER NO computer OR endoscopic methods, but their application TOGETHER in an optimal correlation during the study process and also an attempt to attract second year students for the realization of complex tasks of video-modeling (it is justified since many MARCHI students entering the institute are already familiarized with CAD) are explored below. The content of the student’s work was chosen with regard to past experiences of international “virtual teams”.

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Figure 1: The exhibition stand with some static illustrations of work « Moscow - Essen »
Figure 2: The exhibition stand with some static illustrations of work « Moscow - Paris»
The Lab of video system MARCHI in collaboration with the Faculty of Fundamental Architectural Design for several years works in research of video-computer technologies at various levels in application study processes. Below some results of the next stage collaborative application of computer and traditional (physical model and its research by method of endoscopes) modeling are presented. In the report there is an attempt to evaluate the advantage of using endoscopes and computer methods to model perception of architectural design from the student’s point of view. The discourse is focused on the most rational and useful combination of these methods, rather than their opposition to each other. (Figure 3, Figure 4)

Implementing study project with the use of the above-mentioned methods, leads to the conclusion that physical modeling in combination with endoscopic methods and computer modeling provide equivalent possibilities for students in learning project design. For the second year students, however, using computer technologies requires substantial and deep knowledge of the relevant software and perfect operational skills (as well as access to modern equipment). The latter is more exceptional rather than a rule for beginners.

As a difference to computer methods, the endoscopic one doesn’t demand any additional technical knowledge and just enriches the traditional process of design, though it requires a certain level of proper model making skills. In students’ opinion, the endoscopes’ visual information is more realistic due to the three-dimensional physical model – which is real (this is extremely important for earliest stages of study, since it involves eyes and hands in the working process). While using computer methods didn’t involve their creative thinking, according to what they said.

The basic idea of the projects has been developed on the basis of our traditional study process’s simplified physical model from the institute’s course of three-dimensional composition. In the process of creating the model of the “Exhibition hall”, the space organization tasks were objects of research, moreover the basic ideas were tested by endoscopes methods. (Figure 5) Then, after the architectural idea is approved, on the basis of detailed physical and computer models further articulated and attentive testing has been done from the different points of view for the next project development. (Figure 6, Figure 7).

In spite of the big difference between computer and physical modeling, both ways, in students’ opinions, provide a very important advantage – to look at the object from future user’s or visitor’s points of view. Both methods are useful in application to different stages of design from the basic space-composition idea through any steps to the final study and presentation of the physical or computer models. The mixture of two methods provides more possibilities for error and mistakes correction as well as for future project presentation. (Figure 8)

After familiarizing with the basic principles of video-computer technologies being applied at our Lab, the students decided to continue an experimental work based upon one of the projects of Russian constructivist Leonidov I.I. The project “Lenin’s Institute” in Moscow has been chosen, as the most appropriate for student researches, since there is a number of digital models that exist for use. After the site has been chosen for the build-in object, students developed a computer model and put it into real video space.
Figure 3: The exhibition stand “Exhibition hall” (author – 2nd year student D. Karelin)
При выполнении проекта выставочный павильон “ВРЕМЯ” использовались эндооскульптурные методы для корректировки макета, затем была создана компьютерная модель, что позволило получить более полное представление о спроектированном объекте.

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Figure 4: The exhibition stand “Exhibition hall” (author – 2nd year student I.Varlamov)
Figure 5: Initial physical 3D-model

Three-dimensional composition (physical model M1:100)

Figure 6: Project D. Karelin. Endo and PC image from identical real points

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Figure 7: Project I. Varlamov. Endo and PC image from identical real points

Figure 8: General views of physical models (M1:100) and PC models
Fig. 9. The educational experiment of the 2nd year students D. Karelin, I. Varlamov. A video computer modeling of the project of the architect I. Leonidov “Institute Lenin”
Conclusion

To conclude our report the following point must be stressed:

1. In our opinion, the work in light of “virtual teams” has been accessible, interesting and useful. To continue this work, we propose to use this experience of collaboration in the future joint study processes with Essen University due to our Agreement of collaboration, as well as with other interested colleagues from Russia and abroad.

2. Our experience has initiated a certain modernization of our Lab, including the completion of our local computer network that provides more flexibility and speed for procurement of the “virtual teams” process.

As our others EAEA colleagues we will continue research in methods and tools for modeling perception in spatial design, focusing first of all on the needs of our study process.