THE EFFECTIVE USE OF MULTIMEDIA AND TELEMATICS IN PLANNING AND DESIGN

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Abstract

Provided multimedia is regarded as the connection of various media for achieving specific goals, the objectives are to be defined very precisely. In architecture, urban and regional planning any confrontation with information in terms of graphics predominantly tends to be represented by visual communication. Thus complex spatial accounts of the facts calling for universally understood representations are conveyed. Despite the fact that presentations have so far mostly appeared as "mixed media" in computer-assisted spatial planning the initial fascination has somewhat faded away. This contribution is to issue concrete working experience with (inter-)national video- conferences via Internet and distributed modelling. Finally, definite solution approaches for the integration of video-conferencing in a simulation- and computer- assisted planning process utilizing multimedia are demonstrated.

Introduction

Planning may be regarded as the permanent assessment of spatial development possibilities within changing objectives. The spatial impact analysis in its functional suitability necessitates the repeated iteration of checking- and development processes in the course of planning. Simulation and modelling thus become inevitable both concerning the physical-analogue and the virtual-digital levels. In order to advance the specific models effectively, planning calls for a continuous communication flow, i.e. the "transport of information" via suitable "media". Furthermore, rapid evaluation of the specific (simulated) planning stage and the generation of possible alternatives taking the aspects of social requirements into account are to be considered, this all requiring efficient communication being inherently imbedded in a wholistic perception.
At certain stages within the planning process a vast range of differing variants and alternative

possibilities for solutions prove useful for decision-taking. To achieve a uniform project solution prior to realization an integration of individual (partial) model configuration is called for as following through with continuing advancement of a wide range of solution variants up to the final stage cannot be effective. Thus adjustments not only concerning the communication on ideas but also regarding the work to be individually performed are to be achieved and to be integrated into the entire model. Therefore, various "transport possibilities" for the idea conceived seem feasible, this applying both to the physical model (unique) and the multiple reproduceable digital model (duplicate).
The following (paradoxical) combinations can be differentiated:

1. physical transport of individuals to a physical or virtual model (e.g. congresses and conferences, workshops) ;
2. physical transport of a physical model (limitations by size and number dominating, e.g. complicated singular specimen);
3. physical transport of a virtual model (depending on size the appropriate data medium is selected, e.g. a 3.5"-disk);
4. virtual transport of a physical model (e.g. transfer of an image via network, e.g. Internet) ;
5. virtual "transport" of a virtual model (e.g. "object sharing" via network).

The choice of the simulation techniques and media, resp., depend on the planning stage and the degree of efficiency within the planning process. In order to grant successful communication three elements are to be connected effectively: transmitter, message and addressee. Mutual advancing and expansion, resp. might become possible by meaningful integration of various media ("multimedia), i.e. referring to computer- assisted, interactively accessible information- and expert systems connecting and integrating various media (text, sound, graphics, images, motion pictures, etc.). Multimedia-suitability of the "message" can be based on the following theses:

- The full-scale implementation of (computer-assisted) simulation- and modelling techniques is absolutely necessary considering the performance of complex planning- and design work (aspect of accomplishment);
- the availability of high-performance telematics structures is a prerequisite for the acceleration and intensification of the communication process (aspect of transport and of transfer, resp. and of interaction);
- the permanent availability of a vast range of conceptual potential is to grant for continuity in working, in order to make for integration and adjustment of simulations and models by means of communication processes (aspect of overcoming distances in space and time).

At the threshold to the 3rd millennium a number of problems are skyrocketing (population bomb, urban agglomeration, urban sprawl, exploitation of resources, increase in traffic etc.). Handling such problematic issues calls for more than the conventional planning- and design methods. The degree of complexity of these issues, apart from the quantitative aspects, necessitates the implementation of simulation and modelling techniques as indispensable working tools. The ethical-moralistic aspects of planning and building are also to be covered by democratic means throughout the entire process without leading to a lethargy. Finally, the provocation of development requires a satisfactory participation in the planning process in terms of teamwork and assembly of the critical public. This would make for utilization of idle working potential and for synergetical effects.

Aspects of Communication: Wholistic Perception

Teaching and research work at the academic level is closely connected to the want for exchange regarding the developed activities. When considering communication forms the issue of active participation is of major importance. Are we dealing with a one-way communication line ("monologue") or are more connection lines involved ("polylogue"). The necessity of physical assembly is clearly demonstrated by the need of conferences. Bifurcation points are made available and a fertile soil for the development of cooperations is provided. The accompanying event-program is

aimed at "total communication", i.e.. the depth of communication is increased. All in all, the specific window can be expanded e.g. by integration of additional topics.
Such considerations are important inasmuch as if and to which extent telematical structures - particularly video-conferencing - may furnish comparable results. One way or the other the focus is on transfer and exchange of information. Visual communication (the image as source of information with the highest density of information) ranges at the top next to acoustical and haptic phenomena.
The frame conditions and criteria of communication, resp., include amongst others:

- efficiency (the relation between effort and gains)
- reliability and redundancy (does the message reach the addressee?)
- intensity and quality of communication
- development of a "critical public" (participation of at least 2 participants)
- "connection" physical (hard- and software) and formal (address, name etc.)
- "connection" psycho-cultural (conversational ability and communicational culture)
- want for communication (predisposition)

Furthermore, the purpose of communication can be regarded according to relative aspects ranging from "communication for fun" to the essential educational assignment and requirement, resp.. Getting used to existing forms of communication and the appropriate media means that communication as such is not to be considered as a value- neutral issue.

Aspects of Telecommunication and Telematics: Do-It-Yourself

First the question of bridging of space and time and the present technical prerequisites for the utilization of telematics structures are to be dealt with. As the field of telematics naturally is very complex this contribution concentrates on video-conferencing, briefly VIC, which represents a new advancement resulting from the rapid Internet developments. Different than with the picturephone VIC uses Internet as transport medium. Announcement of an Internet-video-conference is normally done via the Internet-reservation lists. Interested parties can choose to join and may also only watch the video-conference via Internet without participating actively. Due to the so-called "Mbone-concept" everyone (at least theoretically) can communicate with everyone, what was not possible with the existing connection modes (only connections from A-to B and vice-versa).
Regarding the required hardware-equipment we principally differentiate the general infrastructure and specific end user installations. Relying on the presence of adequate high-performance terminals the terminal unit will possibly only have to be extended with a network-interface. Furthermore, the network structure, preferentially glass fiber, is mostly existing. The exposure-periphery (videocamera technology) logically would have to be a fixed installation. A major investment, the so-called ATM-switch might prove wise. If one does without wide-band communication an ethernet-switch may be used (video-conferencing light). In summary, the following technical equipment is required for performing a video-conference:

. High-performance terminal units
B. Videosystem - periphery of terminal units
C. High-speed network-interface in the terminal units
D. Network-switch and Internet-connection
E. Beam waveguide between the terminal units and the network-switch.

Though this all sounds very simple there, doubtlessly, might be some problems regarding participation. Transfer speed might be considered a major obstacle. The network structure as such and the communication records might be considered as limitation. The required network expansion calls for adequate network management. The constantly quoted "data highway" deems more like a bumpy and trail to some users. Analogously to the developments in traffic (cf. the bottleneck situations in the Internet) questions arise such as if an extension e.g. of highways does not only make for an addition in

traffic load and if "unnecessary" traffic should not be avoided.
And the costs angle is not to be neglected: are the costs accrued borne by the community, are tolls introduced or are only few paying participants admitted by efficient restriction regulations.

Present Trends

The following presentation only aims at pointing at some trends without attempting to be complete. Associations to the television field always act inspiring for video- conferencing. Adding more transparency to the involved physical individual as to their background and surroundings would certainly be interesting. A rather wholistic virtual presence is possible and not only the transmission of the specific detail. So required "messages" prepared via talk could be inserted. Platform-independent HTML- and VRML-models can be used in addition as information media.
In the field of video-conferencing the following developments should be mentioned amongst others: a whiteboard (WB) can be defined as a medium to set up various sources for discussion and dialogue. Integrated video-conferencing tools (VAT, WB) might also be considered in this context.
A utilization concept based on agents represents a recent development deviating from the present "status of ownership", i.e. a model not being physically connected to a (my) computer, but "migrating" from computer to computer. Depending on where work is just being performed on the model the "agent" can be localized. The optimum utilization of ways and information sources in the network thus could prove very useful. To which extent this might develop an own individuality cannot be foreseen at this stage.

Practical Utilizations at the Vienna University of Technology

Implementation of video-conferencing and distributed modelling is to represent innovative means of instruction of planning- and modelling processes both in the technical and functional respect. Future test projects are based on present topics within the fields of urban and regional planning and architecture at the Vienna University of Technology:

. Simulation-aided spatial planning (using design-assisting techniques);
B. Adding ecological dynamics to the urban development planning (The Sustainable City);
C. Development of an expert system for spatial planning (adding medial dynamics to the city development planning).

Some practical experience within the fields video-conferencing, distributed modelling and the installation of a VRML-WWW-Server at the Vienna University of Technology are briefly introduced as follows:

** Video-conferencing: Examples Vienna-Linz and Vienna-Stuttgart-Leuven*

The first attempt relates to a connection between Linz and Vienna approaching intermediate findings as to the topic "New Aspects in Building-up Planning". Thereafter a triangular connection between Leuven (Belgium), Stuttgart (Germany) and Vienna was utilized in terms of a thematic structuring of a European research platform. Though the efforts still rather exceed the gains there seem some promising perspectives for future academic cooperations. Topical subjects in teaching and research, such as Cybercity and Intelligent City/building qualify as test projects.

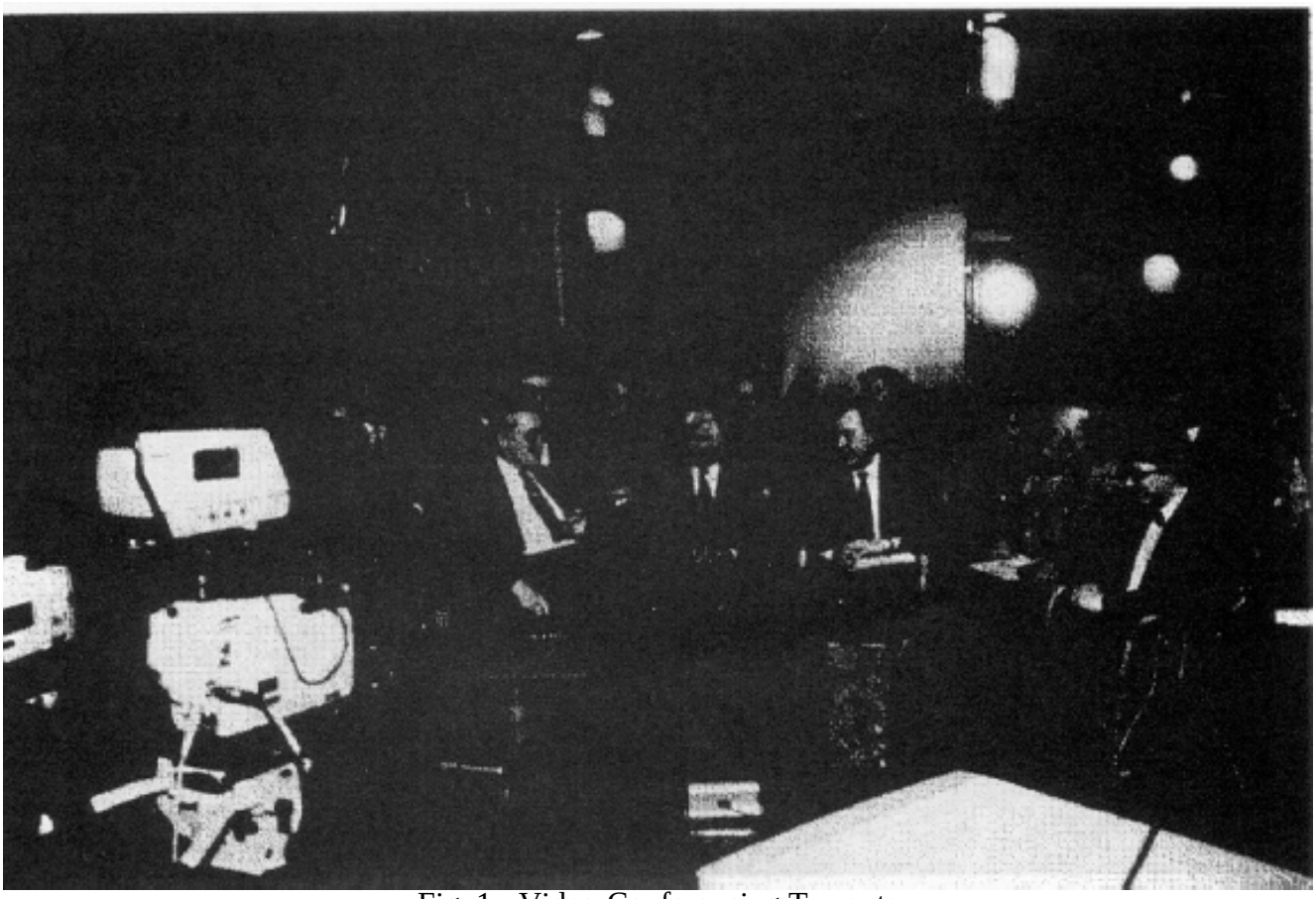

Fig. 1 - Video-Conferencing Try-outs

** EAEA '95, WORKSHOP Aspern: Distributed Modelling & Multimedia*

A complex urban-design concept acting as the starting point for experience with various perceptive and interpretative approaches was developed in the framework of the 2nd Conference of the European Architectural Endoscopy Association (EAEA). The master project for the "Altes Flugfeld" (old airfield) in Aspern (Vienna) lends itself extremely well to this purpose - being - at first sight – an irregular urban development area for 20,000 people hardly to be matched by any other international project. Originating with the master project of the Viennese architect Rudiger Lainer careful studies of this urban development took place at different educational centers.
The digital resp. physical model served as a basis subject to individual activities to be performed. This led to an interesting comparison of various design approaches accompanied by the simulation techniques used. Based on the finding an analysis of the advantages and shortcomings of the specific simulation procedure put to use could be demonstrated clearly. Furthermore, the findings of the international workshop "The (In)Visible City" are to be investigated critically with regard to multimedia aspects. Based on the present masterplan for the new city quarter "Old Airfield Aspern" in Vienna several universities issued their individual attempts using either computer-assisted or endoscopy-assisted simulations. Whether the reaction to the presented key projects was to furnish partial additions or section-wise details or even diverging measures was left to the individual designer. Accompanying design work, however, should authentically make use of the digital and/or physical model. This procedure was to make for a comparison of differing approaches of design being accompanied by the implementation of simulation techniques.
The evaluation of results will be performed in the course of autumn 1995 and will presented on the respective homepage (see references).

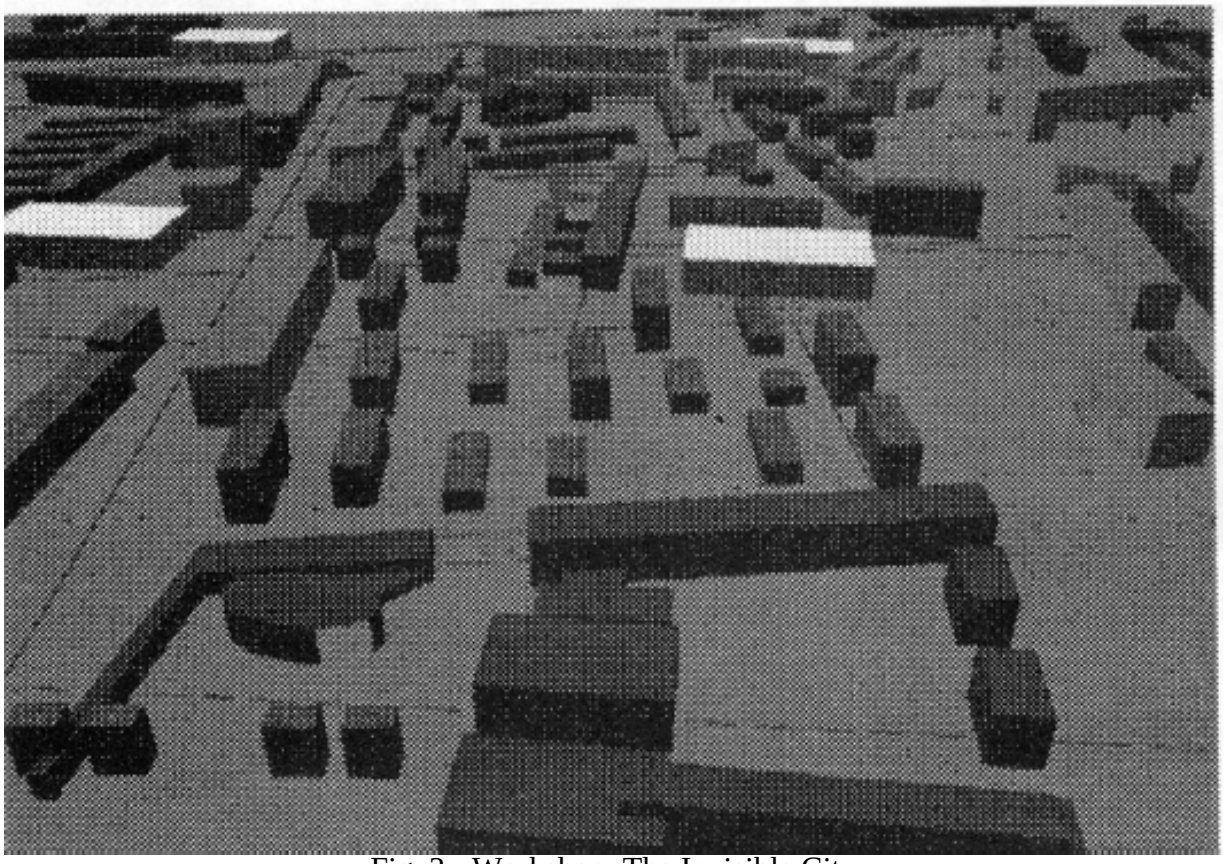

Fig. 2 - Workshop: The Invisible City

- *VRML-WWW-Server, Faculty of Urban and Regional Planning and Architecture, Vienna*

The first WWW-Server based on VRML at the Vienna University of Technology was installed informing on the current projects in the field of urban and regional planning and architecture (cf. references).

Conclusions

Apart from the basic activities concerning video-conferencing special attention should be given to computer-integrated video-conferencing (CIVIC) as an additional means of communication between the parties involved in a project over a longer period of time. This, however, calls for the addition of the method model/object sharing to distributed modelling. Contrary to the current working modes joint project work then does not rely on serial sequences. Wide-band application also provides for a more rapid and interactive, resp., transfer of comprehensive models, such as entire urban sections. Interactive work regarding three-dimensional components could then be achieved via VRML. The evaluation of possible implementations of three-dimensional VRML- operations in spatial design- and planning work will certainly have to be studied thoroughly. Possible effects for the planning- and design process and for the specific outcome, the impact on the sender, the correlations between the parties involved and the aspects regarding possible changes in working habits and planning culture require careful insight. Remote teaching, already well-established at other universities would also gain in importance and could lead to intensifying of exchange activities.
On the basis of optimized communication structures a meaningful extension of the range of methods in the fields of urban and regional planning and architecture can be expected. Following several years of storm and stress professionalizing regarding technical and functional aspects is called for, i.e. an integral implementation of simulation techniques, multimedia and telematics. What is next on the agenda is:

- developing prerequisites for infrastructures both at the joints and the edges of telecommunication and telematics, resp.
- determining suited projects in the fields of urban and regional planning and architecture

justifying the implementation of the described structures;

- execution of national and international projects enabling the technical integration of the mentioned tools.

Only a concentrated procedure will result in effectivity regarding the available possibilities in the fields multimedia and telematics making for meaningful assessment. Abuse and security problems require critical insight. Last but not least information thresholds are to be granted (erveryone wants to work in peace once in a while).

Glossary

Mbone a live audio and video multicast virtual network on top of Internet
VIC Videoconferencing
VRML Virtual Reality Modeling Language

Some Internet Tools for Videoconferencing:

Collage Whiteboard-Applikation (Component) from NCSA to Mosaic (World-Wide-Web)
CU-SeeMe Macintosh-Applikation for Video and Audio
NV Network video tool
SD Session Directory conference coordination tool
VAT Visual Audio Tool
WB Shared whiteboard tool

References

Further information on research work of the mentioned projects and activities is available under:

- http://info.archlab.tuwien.ac.at
- http://indycad.archlab.tuwien.ac.at/model.html
- http://si.kom.tuwien.ac.at/IRIS-ISIS/Aktivitaeten/InVisible_City/InVisible_City-eng.html
- http://info.tuwien.ac.at

Linzer, H., Martens, B., Voigt, A. 1994. "The Integration of Virtual and Full Scale Modelling", Proceedings ECAADE-Conference Glasgow.

Martens, B. l992. "Tools for Visual Simulation of Space and their Use by Students." Architecture & Behaviour vol. 8, no. 3:175-187.