

23 Information Technologies Within Academic Context

Remote Teamwork - A Challenge For The Future

Bob Martens, Andreas Voigt and Helena Linzer

with contributions of:

Elmar Schmidinger, Wolfgang Schreiner, Manfred Siegl and Hans Peter Walchhofer

Faculty of Architecture, Urban and Regional Planning, University of Technology - Vienna, Austria

“REMOTE TEAMWORK”, i.e. the substance-related cooperation of people over spatial distances in decision-situations relies on “CIVIC” (Computer-Integrated Video-Conferencing - audio-visual communication at spatial distances integrating interactively digital, spatial computer models) and “CISP” (Computer-Integrated Spatial Planning) aiming at the elaboration of suited remote-working structures for research, project transactions and teaching preferably on the basis of “ATM” (a technology of broad band telecommunications). The generation and manipulation of digital spatial models and their virtual transportation within large spatial distances represent the main research objectives.

The efficient use of teaching resources calls for the integration of new teaching possibilities within the framework of „REMOTE TEAMWORK“, e.g. DISTIRBUTED and SHARED MODELING, DISTANT LEARNING and REMOTE TEACHING. The Faculty of Architecture, Urban and Regional Planning therefore is stressing information technologies within academic context.

The following contribution is dedicated to the focal field of research and teaching “REMOTE TEAMWORK” of the Vienna University of Technology. This project is carried out in cooperation with the Institute of Spatial Interaction and Simulation (IRIS-ISIS), Vienna and the Research Institute for Symbolic Computation (RISC Linz-Hagenberg). Teaching experience relevant for „Remote Teamwork“ is derived from various experiments of cooperative teamwork. (see below)

PREFACE

Spatial planning can be defined as permanent evaluating of spatial development possibilities in the context of changing functional and social objectives (identity-image). The required spatial impact analysis results in repeated iteration of checking- and developing procedures throughout the planning process. Simulation and modeling become indispensable in this context and act both on a physio-analogue and virtual-digital level.

In order to advance models in progress effectively planning requires a continuous flow of communication, i.e. the “transportation” of information on planning ideas (e.g. as spatial models) via suitable “media”. Moreover, instant evaluations of the

specific (simulated) state of planning and the generation of possible alternatives called for are only achieved by efficient communication inseparably attached to wholistic perception.

Teamwork has become a basic requirement for spatial planning. Due to the increase of globalization and cross-linkage of problems a globally cross-linked teamwork is called for. Therefore, teamwork over spatial distance has become an essential, actual field of research.

1.0 RESEARCH AND TEACHING PROJECT "REMOTE TEAMWORK"

"REMOTE TEAMWORK", i.e. the substance-related cooperation of people over spatial distances in decision-situations relies on "CIVIC" (Computer-Integrated Video-Conferencing - audio-visual communication at spatial distances integrating interactively digital, spatial computer models) and "CISP" (Computer-Integrated Spatial Planning) aiming at the elaboration of suited remote-working structures for research, teaching and project transactions preferably on the basis of "ATM" (a technology of broad band telecommunications). The generation and manipulation of digital spatial models and their virtual transportation within large spatial distances represent the main research and teaching objectives.

Application of "REMOTE TEAMWORK" is to enhance planning- and modeling processes both in technical and functional terms thus creating a new planning medium.

The current subjects in urban and regional planning and in architecture act as test projects to be defined in the course of the research project in their contents and spatial context and to be represented as digital spatial working models. Special attention is given to the field of planning and design-work concerning building-up as well as of city capacities, affording large-scaled discussion due to their major importance.

"Teamwork" requires repetition and combination of creative- and decision-stimulating working situations. The following working situations of a planning- and design-process are to be developed in a "remote" manner:

Pict 1.: Possible working situations of a planning- and design-process

- Presentation of planning conceptions and variations (presentation)
- Discussion of planning conceptions and variations
- Decision-finding
- Modifications of the model
- Distributed modeling
- Shared modeling
- Additional research matters:
- Moderation and mediation of “remote teamwork”
- Evaluation of the planning process.

The research project is to assist all the necessary “connective and decision stages” of a complete planning process.

The technical-functional challenge mainly consists of coordinating the actions of all participants in the virtual world and their impact thereon in such a way that all participants receive the view of a singular logical (consistent) world (even though, in reality, the world is being simulated in portions by various computers). Apart from several essentially algorithmic problems the limited band widths of long-range computer networks pose the real technological issue (BRUTZMAN et al. 1995).

The findings of the project “REMOTE TEAMWORK” concern both the planning-specific and the EDP-technical field. On the basis of the simulation- and communication structures a meaningful expansion of the method variety in the field of urban and regional planning and in architecture can be expected. Generalizations of research findings will surely affect other fields of research.

The following subjects taken from the fields of urban and regional planning and architecture make up the framework for the execution the present research project:

- Configuring the city capacity („city volume“), ecological utilization of space (The “Sustainable City”)
- Medial dynamization of spatial planning (“Planning in the Age of Communication”)
- Development of an expert system for spatial planning (utilization of design- and planning-assisting techniques).

2.0 EDP-TECHNICAL ASPECTS

Regarding the project-specific equipment "REMOTE TEAMWORK" on the basis of ATM both general network infrastructure and specific terminal units and with their technical equipment have to be dealt with.

The following equipment set-up is required for the research project:

Pict. 2: "Remote Teamwork"- hardware equipment

A	efficient terminal units	graphic workstation
B	periphery of terminal units	audio- and video-system (digital or analogue video-camera)
C	high-speed network interface in the terminal units	ATM-interface
D	network-switch	ATM-switch
E	beam waveguide between terminal units and the network-switch	
F	efficient network structure	glass fiber

Quality requirements regarding the network infrastructure depend on the scope of services expected:

- Each of the (compressed) video-current to be transmitted requires a minimum band width of 25 MBit/s (TV resolution, less resolution calling for accordingly less) at a maximum delay of 250 ms.
- Each of the audio-currents (audio-conferencing quality) requires 32-64 Kbits/s at a maximum delay of 150 ms.
- Transmission of geometric data (world models) calls for band widths of 1-10 MBit/s, transmission of control data allowing for a maximum delay of no more than 10-50 ms.

ATM (Asynchronous Transfer Mode) stands for a standardized transmission method having been specifically developed as a common platform for the transmission of language, video and data. ATM is a broadband telecommunication-technology (B-ISDN - Broadband Integrated Services Digital Network, compare CAVANAUGH-SALO, 1992). ATM is not limited to a specific speed, a variety of of speeds are standardized (e.g.: 155 MBit/s, 622 MBit/s, 1.2 GBit/s). Therefore, ATM lends itself extremely well to the realization of high-speed networks.

Multiple applications in future are scalable. Integration of ATM-networks and Internet (ALLES, 1995) is of utmost importance, this being a substantial basis for the comprehensive utilization of ATM. The manufacturers are advancing swiftly regarding development of ATM-components. Investing into this "new" medium seems quite safe (YENKEE, 1995).

As far as software is concerned basic equipment of terminal units with suited CAD-, simulation- and communication-software will prove useful.

3.0 COOPERATION AND FUTURE PROJECTS

The described project structure "REMOTE TEAMWORK" based on CISP-CIVIC" calls for the strategic interaction of institutes and institutions of the entire university, inter-universitary cooperation and furthermore, the integration of inter-related institutions and cooperation with the economy.

The subject "REMOTE TEAMWORK" is closely connected to the research field Distributed Virtual Reality (DVR): Distributed Virtual Reality (DVR) may be defined as systems where geographically distributed participants connected via networks act and interact in a computer-generated world with one another as if in actual direct contact (ROEHL 1995, LOEFFLER 1995).

4.0 ECONOMIC IMPACT

Positive economic effects of the present research and teaching project are to be expected in following fields:

- Enhancement of quality and efficiency of decisions by "Remote Teamwork" accompanied by economical positive effects;
- Adaptation and development of sophisticated applications for urban and region planning, architecture and related fields, positive effects for software-engineering.
- Adding dynamics to the telecommunication branch, positive effects by acquisition of equipment and expansion of network-infrastructure.

The present project "REMOTE TEAMWORK" is being elaborated as an independent field of research and teaching regarding the applications of "spatial planning" within the scope of urban and regional planning and architecture. The planning medium to be developed represents an essential contribution for well-timed mediation of planning processes and for decision-making taking a globally important issue into account.

Teaching experience derived from various experiments of cooperative teamwork is being continuously integrated into „REMOTE TEAMWORK“.

For further information concerning teaching experience within the framework of „REMOTE TEAMWORK“ please contact:

- <http://fbra.archlab.tuwien.ac.at/~bagaluwi/>
- http://si.kom.tuwien.ac.at/IRIS-ISIS/Aktivitaeten/InVisible_City/InVisible_City-eng.html

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