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The Digital City - La ciudad digital

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Topic Area: Computer graphics in design and planning (urban design and urban planning)

Tema: Aplicación de la computadora en la planificación del desarrollo de ciudades y en el diseño urbano.

Abstract

Information-transfer and -management, quality of planning, efficiency in decision-finding and public relations make for the continuous challenges in space-related planning. The integration of the “computer” - an essential tool of modern times - throughout the process of urban and regional planning, particularly regarding city development is a present-day challenge. A “Computer Aided City Development” calls for modular structuring taking the specialized requirements of a up-to-date city development into account as well as integrating suited simulation techniques and media effectively in the planning process in line with the respective state of the art. The present research project was aimed at structuring modular fields of application for “Computer Aided City Development” on the basis of the general framework conditions of regional and urban planning and city development. Paying regard to the “ecological-dynamical” city development the pilot project “The Digital City” puts planning modules of “Computer Aided City Development” to use in a selected transection of the urban area of Vienna (area around UNO-City, Wagramer Straße). By means of a digital, three-dimensional work-as-executed model the urban-spatial development possibilities in variants can be subjected to a spatial discussion throughout workshops making interactive use of a high-speed graphic computer. Furthemore, this pilot project was also dedicated to trying new forms of cooperation between science and administration.

La transmisión y gestión de información, la calidad de planificación, la eficiencia en el proceso de toma de decisiones así como las relaciones públicas son algunos de los retos permanentes de la planificación de espacios. La integración del ordenador, un instrumento fundamental de nuestro tiempo, en el proceso de planificación, especialmente en la planificación del desarrollo de ciudades asistida por computadores ha de ser estructurada modularmente conforme a las exigencias técnicas para una planificación moderna de desarrollo de ciudades, y debe integrar de una forma racional técnicas de simulación y medios correspondientes al estado actual de la técnica. En el marco del proyecto de investigación discutido se ha probado estructurar el campo de aplicación modular basándose en las condiciones generales de la planificación de espacios y el desarrollo de ciudades y, tomando en cuenta una planificación ecológica dinámica, aplicarlo en un sector escogido del area urbana de Viena (alrededor de la ONU, calle Wagramerstr.). Usando un modelo digital tridimensional de trabajo se han podido y se pueden explorar de forma tridimensional las posibilidades de desarrollo de ciudades con todas sus variaciones (p.e. en el marco de un taller) usando una computadora gráfica de alta velocidad. Con este proyecto piloto se han experimentado además nuevas formas de cooperación entre ciencia y administración.

Preamble

The development of our living space has to be directed towards a *sustainable utilization of space* in times of increasing interlacing of space-related problem situations and their intensification in space and time. Thus an integration of issues of ecology, economy and social matters is to be achieved.

The dynamics of present-day urban development planning results from an area of multiple tensions: recording and definition of *priorities for preservation or changes* in the urban zones, the necessary mediation between (rather short-term motivated) *project development* and (rather long-term planned) *urban structure planning*, the required interlinking of matters concerning *urban ecology* and *urban design*. Securing and creative advancements in development of ”*urban and building-up volume* resp.” (in terms of long-term planned, three-dimensional referential frame for object planning and architecture of the specific time) seem an effective concept in the described flashpointing area.

Mediation of planning ideas (in its broadest meaning) connected with the according up-to-date forms of civic information and participation has been constantly gaining in importance. Acceptance of planning ideas is closely connected with their clearness and thus their comprehensibility. The active

and fair dialogue among all those involved in planning - whether concerned with planning, interested or actively participating citizens, political decision-makers, planning administration, specific departments of planning, the sciences, etc. - all play a major role. Methods and techniques of a *simulation-aided, space-related planning* are to be regarded as indispensable within this working context: due to the multitude and complexity of data and applications required the vast possibilities of digital computer technology are to be put to use and to be cultivated according to the factual spatial-planning requirements.

Digital Cities

In dealing with present-day and future problem situations of spatial planning space-related *analysis and synthesis processes* are called for. They make for the efficient recording, aggregated representation and interlacing of the essential space-related stock data as well as for the development of frame conditions and objectives referring to space and moreover, for the representation and conveyance of planning variants. Due to the growing complexity of these problem situations these processes preferably are to be made available in computer-assisted, digital form: thus the ”*Digital City*” (in its broadest term) is to be used, in order to design and develop the real city of tomorrow in the optimum way and manner.

”Digital Cities” may act as ”*information-marketplaces*” or ”information-turntables”, where communities - cities or municipalities - offer citizen- and user relevant information (e.g. in form of citizen- or tourist information systems etc.). On the other hand ”Digital Cities” also lend themselves to ”*working models for the city of the future*”. Both concepts are being developed with great dynamics - preferably in larger cities, but also in medium-sized cities and smaller communities and regions.

Area planning, particularly an up-to date urban development planning requires suited space-related simulation environments, assisting both the analytical as well as the synthetic, design-visual and communicative-moderating aspect of urban development planning.

- Regarding analysis GIS-Systems (Geographical Information Systems) have already proved very useful in setting up space-related databases and further development is steadily being achieved.
- CAD-Systems (Computer Aided Design / Drafting) with supplementary software packages (e.g. computer animation, virtual reality- / VR-environments) are available for the design-visual field. Again partly quick progress is being made, digital city models being elaborated.
- With regard to the communicative-moderating area the most deficits are to be noticed: an intensive interlacing of the above mentioned technologies (GIS+CAD) would be required, this area, however, requiring the availability of the correct information at the right time at the right spot with the correct dimensioning (neither expecting too much or too little from the viewer, in line with the possibilities of human perception, etc.) and the development of expedient man-machine interfaces.

For the required space-related simulation principally the sofar available media and techniques (e.g. *physical-analogue* models) as well as the new possibilities (e.g. *virtual-digital* models) are well-suited.

Effective combinations living up to the specific problem situation and stage of planning are to be developed. Possibilities already being used in the physical-analogue modeling world may lend themselves to efficient digital reproduction (e.g. rapid production of spatial models and modifications thereof by shifting, rotation, adding etc. / concept ”Lego”, combination of the stock of present models with implementation models of planning variants etc.) as well as figuring out the specifically new possibilities of digital information and cultivating them for the planning process.

Present Trends and Challenges

Regarding usefulness and implementations of digitally assisted space-related simulation environments the following requirements are being increasingly demanded:

- ”Electronic Sketching”: Integration of the ”computer” at earlier stages of the spatial planning processes or the architectural planning process (from visualizing of planning findings based on handwritten, dimensioned ”input graphics” to digitally aided ”sketching” of spatial ideas and concepts, i.e. ”electronic sketching”);
- ”Spatial Interaction”: Increased interaction with information and planning assistance systems: e.g by navigation in digital city models (free choice of viewing points by the user, ”moving” in space, i.e. digital drives and digital camera rides, resp.) in real time; spatial interaction / modification of the digital model (by moving, shifting, rotating, scaling, texturing etc. of CAD-objects);

- VR- simulation environments - new designing of user-interfaces: Overcoming the ”obstacle” monitor by real time interaction with digital models (cyber-worlds) putting suited bio-adapters (glasses, data glove, data suits, etc. and real time simulation to use; combination with spatial interaction possibilities - as described above (e.g. by utilizing the VR-environment CAVE - ”space with three-dimensional image projections: space where a make-belief of a three-dimensional virtual world (virtual reality) by projection of images to floor and walls is produced. The visitors of this space wear so-called stereoscopic glasses, the sensors of which transfer the head movements to highly efficient computers which can adjust the perspectives of the projected images accordingly”. Internet Dictionary, http.//www.networds.de/).

Amongst the variety of recent trends in the field of EDP the following seem of major importance for the area of research investigated:

- networking: exponentially increasing of networking of computers and information (by means of e.g. company- or department-based Intranet-approaches as well as via the global Internet);
- geodata: growing availability of comprehensive geodata (part. also supported by methods of remote sensing);
- development of hardware: rapid advancement of storage techniques (storing-and administration of larger quantities of data) as well as processor performance of hardware;
- development of software: tendency of dovetailing of GIS- and CAD-software techniques

In combining the above mentioned some of the present-day challenges for the scope ”Digital Cities” can be specified as follows:

1. Space Databases: Setting-up of multi-functionally useable space databases with the following minimum contents: geoinformation for spatial analyses, furthermore 3D-data for the generation of 3D-city models (main purposes: visualizing of planning and projects, possibility for spatial interaction with the model and for spatial synthesis).
2. Urban Space Monitoring: ”Online-monitoring” of up-dated urban constructional indices (such as base area index, area index of storeys, and cubage index of residential occupancies of a building), outfit indices (e.g. social economical and technical infrastructure) and other relevant geoinformation and utilization information (e.g. real utilization data, urban ecological and city energy indices).
3. Civic Participation: New configuration of the municipal information and communication management and the civic participation.
4. Planning Assistance Systems, Expert Systems: Development of ”planning assistance systems and expert systems”) supporting the entire planning process (spatial analysis, deducing of frame conditions of planning, designing and elaboration of variants, spatial impact analysis and spatial synthesis - so required with subsequent producing of variants, supporting the measures to be taken as well as the public relations work and civic participation).
5. ”Remote Teamwork” (”Telecooperation”): The growing complexity of problem situation in urban and regional planning and urban construction work is increasingly calling for the development of working structures making for a continuous cooperation throughout (larger) geographic distances. The possibilities of high-performance networks (e.g. via ATM – Asynchronous Transfer Mode) are to be put to full use.
6. City Experimental Lab (CEL): Setting up and operating a digital ”City Experimental Lab” (e.g. for work sessions of planning- or design councils, expert hearings etc. and for the continuous information of citizens on present planning work at the various degrees of concreteness and commitment, etc.. Such Experimental City Lab could and should act as an ”expert system” in the preliminary stages of decision-finding, making available all particulars regarding decisions to the politicians, the planning administration, outside advisors and particularly to the citizens concerned in the suited present-day manner. Thus those possibilities are to be enhanced which turn the present city configuration into a virtual experience by integrating visions, utopias and the future developments.

Digital City Vienna – Pilotproject

The research project “Digital City Vienna – Pilotproject” was aimed at structuring modular fields of application for “Computer Aided City Development” on the basis of the general framework conditions of regional and urban planning and city development. Paying regard to the “ecological-dynamical” city development the pilot project puts planning modules of “Computer Aided City Development” to use in a selected transection of the urban area of Vienna (area around UNO-City, Wagramer Straße). By means of a digital, three-dimensional work-as-executed model the urban-spatial development

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Pictures:

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