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Interactive urban design using integrated planning requirements control

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Abstract

Urban planning and urban design are separated disciplines. As a consequence, there is hardly any feedback from the urban design process to the urban planning process. To improve interaction between these two, an interactive urban design (IUD) tool has been developed. The tool is implemented in a Desk-Cave allowing for direct manipulation of masses and with immediate feedback on the urban planning programme performance. In a small-scale experiment, the tool proved to improve compliance of the urban design with the planning requirements without obstructing the design process.

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1. Introduction

Urban planning and urban design are strictly separated disciplines, which causes a time-consuming feedback loop when plans are translated into masses and spaces. Urban planners work on the city level or regional level making calculations about the number of households per square meter, the demand for schools, shops, etc. and a global design of the traffic infrastructure. Urban designers start from these requirements and they have to comply with building regulations when developing solutions for allocating

the houses, shops, road, parks, etc. To evaluate the spatial consequences of design and plans, scale models of cardboard, wood or foam are used. Not until then, interaction between plan and design becomes visible and accessible not only for the experts but also for potential buyers, citizens, etc. This often leads to revision of the urban plan. It is therefore desirable to already assess in the urban planning phase the potential spatial impact of decisions in terms of the relationships between densities, general building height guidelines, public/private space proportions and so forth. In collaboration with the municipality of a medium large city, we have developed a tool that will feed back such urban design aspects into the planning phase.

Planners and designers both developed their own tools, in particular CAD systems and GIS systems. In

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research, examples can be found to encourage citizen participation [1], to support urban design evaluation [2] and to link VR to GIS [3]. Unlike CAD systems, our system offers a very limited, but dedicated set of tools for the design of urban plans. Unlike GIS systems, our system offers no geographical data and analyses tools, but just those data that determine the requirements for the urban plan and a control mechanism to test the limits. In this way, the tool should offer for urban planners a fast and easy possibility to quickly check the spatial feasibility of a plan without going into any detailed urban design activity.

Our research focuses on closing the planning–designing gap in an innovative system allowing for immediate feedback from a planner on design solutions and vice versa. Closing the gap will reduce the time of design evaluation and thus increase the number of plan alternatives that can be studied.

2. Urban planning and design

In urban planning and design, requirements from environmental planning studies are translated into spatial components. Although there are some dimensional conditions from national standards to comply with, the design of the building blocks, the open spaces and the infrastructure is a typically ill-defined problem that demands a lot of creativity. Evaluation of urban design solutions is often a very subjective process, which sometimes is performed in cooperation with the present or potential citizens.

Traditionally, urban planning and urban designing are two separated disciplines, each with their own methods, techniques and tools.

2.1. Urban planning

Urban planners make 2D maps and attach additional data to the components. Nowadays, this process is supported by geographical information systems (GIS). Governmental institutes are responsible for collecting data and maintaining the GIS systems. Current situations can be analyzed by urban planners using statistical methods and new plans can be evaluated. Political, economical and environmental strategies are integrated and transformed into one

plan. Finally, an urban planning programme is produced that depicts a vision and describes how this vision can be realized. The vision is expressed with maps and tables describing which and how many building types (e.g. houses, schools, etc.) and spatial components (e.g. parks, parking lots) should be developed in a specific area of the plan [4].

2.2. Urban design

Starting from the urban planning programme, the urban designer will make mass studies using mass models and sketches. He/she designs the locations and the global dimensions of the buildings and of the infrastructure. The traditional means are foam, wood and paper. Sometimes, 3D modeling tools are used, but to our knowledge they are not very popular among urban designers. A possible explanation for this might be that the traditional means like paper and pencil are unbeatable in regard to interactivity between the designer and the model. In practice, this means that checking the design against the urban planning programme is a manual procedure. Urban designers usually will first generate alternative solutions and then select the one they like best to be tested against the original requirements.

2.3. Closing the gap

Organizations such as municipalities experience the separation of the urban planning and the urban design disciplines as an obstruction for a fluent planning and design process. There is hardly any feedback from the design process to the planning process. The assumption of this research is that closing the urban planning and design gap will:

- Improve interaction between planning and design strategies.
- Encourage communication between planners and designers.
- Reduce time and cost.

3. Interactive urban design

A visual tool for urban planning and design will provide the required interaction between the designer

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