THE UNIVERSITY OF HONG KONG

DEPARTMENT OF CIVIL ENGINEERING

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Evaluation of building design variants in early phases on the basis of adaptive detailing strategies Data-driven evaluation of design variants

Mr. Ata Zahedi
Research Associate at the Chair of Architectural Informatics
The Technical University of Munich
Germany

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The University of Hong Kong

Abstract
The architectural design process is a decision-making process within which a choice is made between at least two variants (possible actions). When evaluating variants, the ACTUAL properties of individual solution-variants are compared with corresponding TARGET properties (objectives of the client, architects, legal framework, etc.). As a result, the quality of a solution can be determined as a degree of target-attainment, and a decision regarding subsequent further development or rejection can be made. The assessment is carried out both qualitatively (verbally descriptive) and quantitatively (alpha-numerical data). This process is currently lacking comprehensive documentation. An initial research aspect of the present proposal focuses on the development of a methodology for the digital documentation of qualitative (descriptive) decisions. Documenting of quantitative decisions was the subject of the first funding period. The aim is to record and document variant selection decisions, including the reasoning behind decisions made, in order to ensure future traceability and to improve knowledge transferability to other projects. For the textual documentation of the design process and decision-making, established procedures such as the use of "design stories" will be investigated, technical vocabulary with regards to spatio-functional, constructive, and energy-related aspects derived, and interrelationships between building components and their parameters within semantic building models identified. In addition to a keyword-based assessment, new conceptual methods for visual qualitative assessments will be developed, prototypically implemented and evaluated in user-studies. A second facet of the project is the evaluation of variants based on references and the use of (partial) aspects for the further design development. The use of references from already built or designed buildings is an established method to evaluate variants as well as to show the potential in further variant development. To provide the overall similarity, interactive user-controlled weighting methods are developed. For the evaluation of the potential of variants in further development, including solutions in design branches of similar references, existing calculation and visualization methods are extended by imperfection (uncertainty, vagueness, inaccuracy) and evaluated exemplarily in the context of energy efficiency and environmental impacts. Prototypical implementations and a partial evaluation with the other sub-projects demonstrate the viability of the concept.

About the Speaker

Ata Zahedi is an accomplished professional and experienced researcher in diverse fields such as BIM, architectural informatics, agile project management, software development, e-commerce, B2B marketing, and electrical engineering. He holds an M.Sc. Degree in Advanced Construction and Building Technology from TU Munich, where he is currently a PhD candidate and research associate in the chair of Architectural Informatics. He also has another M.Sc. in Industrial Marketing & e-Commerce from Lulea Technical University in Sweden and a B.Sc. in Electrical Engineering, Electronics from Iran University of Science & Technology.

At TUM's School of Engineering & Design, Ata led part-project-3 in the Early-BIM research group for two peer-reviewed phases, a total of six years. He designed, led and co-implemented around 30 software products, including Revit plugins and full-stack applications for design-process documentation, -decision support, and -knowledge search using NLP and Subgraph-matching techniques. He also taught M.Sc. courses and supervised over 40 M.Sc. & B.Sc. Theses, Interdisciplinary Projects, Guided Research & Workshops. Ata authored, published, and presented 20+ papers in peer-reviewed scientific journals and conferences.

Before joining TUM, Ata managed a construction company in Iran as a Concrete Plant Manager and was involved in research for concrete for special purposes. Prior to that, he worked as a B2B marketing strategist and sales expert for Iran Khodro Rail Industries, managing B2B partnerships and projects and planning the ERP implementation in this company. Ata is fluent in German, English, and Persian, with basic communication skills in Arabic.

- ALL ARE WELCOME -