

Architectural Simulation by Modeling Procedures: The Creation of the Church of Saint-Eustache in Paris

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This paper will present the hypotheses, methodology and results of a research project whose subject is the simulation of historic buildings using computer technology. In the context of this research and for the purposes of the paper, the word "simulation" is defined as the computational representation of visual aspects of any architectural fabric in such a way as to permit one to reason about the manner in which said fabric was conceived and constructed. The objective of the paper is to demonstrate a potentially revolutionary method of simulation able to integrate the intellectual and constructional procedures that actually informed the creation of any given building.

The principal hypothesis of the study is that present computer technology offers possibilities for the simulation of architecture that have been overlooked ever since the moment orthographic drawings were defined and introduced into architectural practice in the Renaissance. Plans, elevations, sections and pictorial drawings, the primary modes of architectural representation, describe buildings as finished products, but they do not tell us how any particular building was produced. The contention of this paper is that, with an appropriate geometry (projective geometry) and a suitable symbolic programming language (functional language) volumetric computer models that encode design parameters (such as proportional systems) and complex building processes (including materials) can be constructed of any building for which sufficient data is available. On the basis of such a model, all images necessary for the study and understanding of the production and/or transformation of the building can be generated. The advantage of this approach for anyone interested in historic monuments is that one is only permitted, but in fact encouraged, to reason and formulate verifiable hypotheses about the way buildings have actually been made or altered.

To illustrate and demonstrate these ideas and their results, the paper concentrate on a single case study: the church of Saint-Eustache in Paris.