Architectural Information Modelling

Pieter Pauwels

Supervisor(s): prof. dr. Ronald De Meyer, prof. dr. ir. Jan Van Campenhout

I. INTRODUCTION

During the past decades, information and communication technology (ICT) has shown an increasing impact on architectural design processes [1]. This influence of ICT is mainly concentrated in the final, 'measurable' construction phase and is less prevailing in the first, preliminary design phase. One technology that has for instance gained great interest during the last few years is building information modelling (BIM) [2], that makes it possible to three-dimensionnally describe every 'measurable' component of a building and attach all required information to it. However, a lot of advantages could be emerging when ICT techniques would be used in the first design stage as well.

II. OBJECTIVES

This article presents an 'architectural information modelling (AIM)' research project. This project aims to investigate how existing work methods in the first architectural design stage and the seemingly shortcoming digital interaction with related AEC domains can be improved with existing ICT technologies.

Possible improvements to current design methods and to the lack of integrated workflows between separate design aspects will be analysed, further elaborated and tested in combination with available information and communication technology. This will result in a new, conceptual, integrated 'Framework for Ar-

P. Pauwels is with the Department of Architecture & Urban Planning (A&S), Ghent University (UGent), Gent, Belgium. E-mail: pipauwel.pauwels@ugent.be .

chitectural Information Modelling (AIM)'. In this framework, it will be possible to start and elaborate an architectural design project in a preliminary design phase, using conceptual and more abstract terms (e.g. taxonomy, typology, theory, etc.) to build up a central architectural information model.

These conceptual and abstract terms oppose the more concrete, components-based information (i.e. walls, windows, floors, etc.) of today's building information modelling (BIM) framework [2], that is gaining great interest in the actual construction industry or the final architectural design phase.
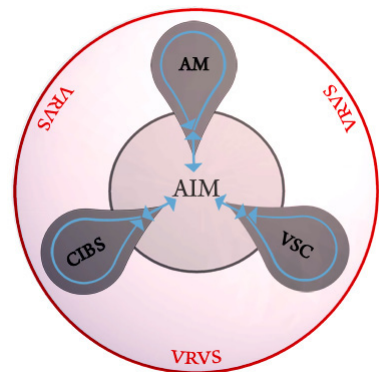

Figure 1. The conceptual AIM Framework

III. THE CONCEPTUAL FRAMEWORK

The proposed AIM framework (fig. 1) will be developed in close connection to the following ICT components. These components have evolved through previous research [3].

A. Architectural Memory - AM

The first ICT component to which the central architectural information model is linked to, is an architectural memory (AM). This architectural memory should be understood as a great repository of knowledge about architecture as a whole [4]. The explicitation of references to this knowledge source effectuates an introduction of extra, related information into the design environment through a clear, overviewable structure.

B. Virtual Simulation and Calculation - VSC

Secondly, the central AIM model is connected to an ICT component for virtual simulation and calculation (VSC). This component is aiming at tools for simulation and calculation in a first, preliminary design phase. Starting from the AIM model, only the needed data or information should be exported and imported to the different applications, depending on the kind of simulation or calculation that has to be done.

C. Computer Integrated Building Systems - CIBS

The third component (CIBS computer integrated building systems) relates the architectural information model to other design environments, dedicated to for instance structural modelling, components-based modelling, HVAC modelling, etc. By making this connection explicitly available, the AIM framework aims to generate as much viewpoints to the design as possible. By doing so, the designer receives a wide perspective on the design solutions or alternatives at hand. This is considered as a solid basis on which desirable, 'correct' design decisions can be made[3].

IV. VIRTUAL REALITY VISUAL SIMULATION - VRVS

The medium through which the designer interacts with the AIM Framework is of capital importance. An interactive tool is necessary for the designer's work processes and methods; a tool that can think along with the architect; a tool that can for example simultaneously perform calculations and simulations through the VSC component, while the designer adjusts the design according to information from the AM component. In order to answer these demands of interaction and multiplicity in visualisation, research will be done to the application of virtual reality and computer vision techniques for the development of the AIM interface.

V. CONCLUSIONS

In this paper a new, conceptual, integrated 'Framework for Architectural Information Modelling' is presented for the preliminary architectural design phase. This AIM framework will be developed in direct and close relation to three ICT components: an architectural memory (AM), a virtual simulation and calculation component (VSC) and a computer integrated building systems component (CIBS). Every part of information in this framework will be accessible for the user through an interactive virtual reality interface. This interface will be treated as a fourth, separate ICT component: a virtual reality visual simulation component (VRVS).

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