15.5 "KAAD: A Didactical Experience"

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Introduction
Students in the last year of their course in Building Engineering in the "La Sapienza" University of Rome study questions of architectural design of considerable complexity, since they are characterised by a marked degree of multi-disciplinary work. In the preceding years, the students acquire specialist notions in the fields of thermal behaviour of buildings, technological equipment, static security, architectural composition, programming and costs, technical and constructional details, and so on. However, there is a need for integration at design level of the disciplines learned.

At the CAAD Laboratory of the Department of Technical Architecture and Town-planning Technique, with the contribution of the National Research Council, a software known as KAAD (Knowledge-based Assistant for Architectural Design) has been devised, with the aim of providing an effective aid to the activity of design.

The KAAD Course
The aim of the course is to equip the students with knowledge of the relations and links which are always present in every stage of architectural design.

KAAD Software, used in the students' own practical work, is based on the techniques appropriate to Knowledge Engineering. The necessary knowledge has been codified by using the formal structure of frames, and implemented by using the Lisp computer language. The whole software programme and the Knowledge Bases have been developed by objects. The implemented Knowledge Base was the one used for Hospital construction.

The Building Object is conceived in unitary terms, as the fusion of the Spatial Domain and the Technological Domain, somewhat akin to the two faces of the same coin. The Knowledge Base of the Spatial Domain concerns the Building Units (Hospital, Patient Department, Diagnostic Department, etc.) and the Space Units (ward, bathroom, operating theatre, corridor, etc). The Knowledge Base of the Technological Domain concerns the Functional Elements (vertical partitions, floor, roof, etc) and the Constructional Elements (window, brick wall, door, etc).

All the objects which form the Knowledge Base are interlinked by "constraints" which are either natural (non-modifiable and automatically activated) or projectual (modifiable, and capable of activation by student).

The software does not carry out changes after the projectional activity is completed, but during it: thus we can speak of effective mutual assistance between the architect and the machine, almost as if in partnership.
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