



# A knowledge-based system for house layout selection<sup>☆</sup>

Ana González-Uriel<sup>a,b</sup>, Eugenio Roanes-Lozano<sup>a,\*</sup>

<sup>a</sup> *Departamento de Algebra, Facultad de Educación Universidad Complutense de Madrid,  
c Rector Royo Villanova s/n, Madrid E-28040, Spain*

<sup>b</sup> *Departamento de Ideación Gráfica Arquitectónica, E.T.S. de Arquitectura, Universidad Politécnica de Madrid,  
Avenida Juan de Herrera s/n; Madrid E-28040, Spain*

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## Abstract

Automatic reasoning is applied to building design problems with a large number of standardized conditions, such as normal housing. Industrialized home building can provide quick-to-build low-cost dwellings, but these buildings often are not as appropriate for the local climate, building site or to the occupant needs as tailor-made homes. In this article we present a knowledge-based system (KBS) that combines advantages from both methods. It considers the data corresponding to the building site (dimensions, local building codes, . . .), the climate and the purchaser (budget, family size, . . .) and recommends a particular design.

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## 1. Introduction

One of the greatest architectural obsessions of the XXth century was industrialized home building. Both in North America and Europe, this cause has had earnest proselytisers; several studies in design and production were carried out and there were some encouraging experiences, proving that industrialized building could provide good houses at a good price and in less time than other methods.

But, apart from a number of isolated achievements or some particular public planning policies, industrialized housing is having a low impact on large-scale building operations, and people still tend to relate “prefabricated” to “low quality”, considering prefabricated to be rigid and unadaptable, very homogeneous and to have poor environmental standards. [1,2]. This work tries to show how this situation can

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\* Corresponding author. Tel.: +34-91-394-6248; fax: +34-91-394-6248.

*E-mail addresses:* [aguriel@edu.ucm.es](mailto:aguriel@edu.ucm.es), [eroanes@mat.ucm.es](mailto:eroanes@mat.ucm.es) (E. Roanes-Lozano).

be improved, giving the average dweller the opportunity to be involved in the design process, with no additional cost.

In this first proposal, our target subject is the single-family dwellings, meaning detached or semi-detached houses.

## 2. Architectural preliminaries: a historical overview

During the XIXth century, and closely related to the industrialization level the United States had achieved, *balloon framing* turned traditional timber frame building techniques into an industry (Fig. 1). The old, expensive and complicated wooden joints were replaced by factory-made nails, so that on site skilled labor was not necessary any more. The complete house came in pieces, numbered and ready to be assembled. This new system spread quickly and became a standard for detached house construction. Had not this type of construction been used, cities as Chicago or San Francisco could not have experienced the rapid growth they did in really short periods.

A popular antecedent to modular housing can also be found in *mobile homes*, from the Wild West caravan wagons to nowadays sophisticated recreational vehicles. Now the house left the factory completely built—and on wheels, ready to cross the country or settle down anywhere. Its dimensions, both in width and height (and even in length), were severely constrained by road regulations. Nevertheless, e.g. the maximum width grew from 8 to 12 ft and even more in some states (nevertheless 12 ft wide models usually require a special permit in order to move from one place to another) [3].

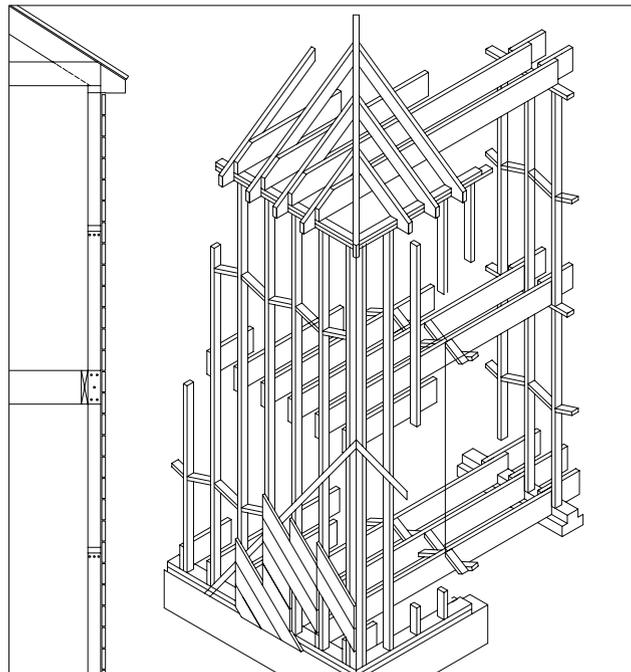


Fig. 1. Balloon framing building (XIXth century).

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