BIM.BON . A BIM system for architectural practice in Brazil

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Abstract. This article discusses the difficulties faced by the BIM (Building Information Modeling) systems to be widely adopted among most part of architecture and engineering professionals in Brazil. A revision of the issue and investigation of possibilities for improving the practice of architecture were made by creating a new model of BIM software addressed to a wider audience. It lists the main critical points in the usability of BIM software, based on a survey made with 300 professionals. The analysis is followed by a study of a new BIM software that could reach a wider audience of architects by implementing a tool that directly links the users to the construction materials market, also including a tool for easy budgetary calculations.

Keywords. BIM Software; Architectural design; Architecture in Brazil; ICT; Collaborative design.

INTRODUCTION

There are two main obstacles to a wider acceptance of BIM systems among Brazilian architects. The first one concerns the inner logic of the main commercial systems available on the market, made to work with projects in advanced design stage. Most BIM systems are not focused in the conception stage of a project. On the contrary, their basic workflow allows the user to draw 3D models of preconceived projects that lately becomes the source for generating technical drawings, material lists and budget calculations. Therefore the system is considered poorly suited for being used in the preliminary stages of the design process, when design changes are quite often and desirable.

The second obstacle, which mainly falls on medium and small offices, concerns the difficulty of acquiring data, as well as updated prices for construction materials. Since the BIM software users are always in charge of data acquiring and updating instead of the software itself, the prices of construction components demands a major effort, often incompatible with the workflow of small architecture offices. However, in large offices and construction companies, it is possible to have a professional specifically focused in the database updating.

It should yet be stressed the fact that the majority of BIM software data base employs patterns of constructive systems widely used among different countries in North America, Europe and Asia, but, in some aspects, distant from the construction ways used in Brazil. Adapting the data bases to the local constructive reality also constitutes an issue and a drawback for the utilization of BIM software in projects in countries such as Brazil.
HYPOTHESIS

In Brazil, where construction is still fairly based on handmade process, BIM-type software slowly begins to be adopted in architecture offices. At the same time, modeling software for faster and easier modeling such as Google Sketchup, are widely spread among designers. A survey of over 300 professionals in 20 Brazilian cities found that 80% of them uses the Google Sketchup in their projects.

On the other hand, Brazil already has large retailers using e-commerce, providing a growing supply of building material data, including updated prices. That data can be useful for immediate price quotes and to offer designers the complete framework of materials available on the market.

This paper comprises the hypothesis of the connection between the two previously discussed matters: (1) the Sketchup software and its usability advantages; (2) databases of building materials provided by retail online stores. Together, they could result in a new kind of software, with friendly interface and easy access to an accomplished database. Our bet is that software with such features could help to spread the using of BIM systems in Brazil and, in consequence, contribute to the improvement of professional practice.

The intuitive and easy modeling process of Google Sketchup would be replicated on the use of the tool: applying the information over the 3d model and generating a report. It is believed that, with an easy and computerized modeling process, the use of BIM software on the preliminary steps of the project would be graced, becoming in this way an auxiliary tool for decision taking on the project. A tool that, more than offering the final price of the executive project, would offer parameters that could assist the designers on the choices of form, materials and constructive solutions.

THE SOFTWARE

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Acquiring data

In order to test the proposed hypothesis - combining building materials information available on the internet with a simple and intuitive interface inside Google SketchUp software - it was necessary, at first, to develop an online application focused in data acquiring, generically known as crawler.

Initially, a list of building materials retailers that have e-commerce stores on the Brazilian market...
was produced. In order to determine the relevance of their data, a preliminary analysis of each vendor was performed, considering: 1 - amount of items on retail; 2 - items categorization (basic materials, finishing materials, decorative objects, etc.); and 3 - price relevance and whether the e-commerce website structure allows or not the access of data by a crawler application.

After that, the technical development of the crawler began. Due to its operation mode it was necessary to build a crawler application for each chosen supplier. The data collected were stored in an indexed database, which maximum index amount reached 40,000.

To reach the current version, it was necessary to process a large amount of acquired data from retailer websites and organize them into general categories in order to calculate their total costs. For instance, this arrangement allows the user to, by inserting a brick, have the total cost of all complementary components necessary for the construction of that wall, such as cement, sand, manpower, etc.

Data processing

Once owning a large amount of retailers’ database, each one containing information such as product name, price, technical description, category, image, etc., the following challenges were faced: 1 - Which items were ambiguous? i.e., Which products represented the same items but had different names among different suppliers; 2 - Which items had equivalent geometry, so they could be represented by the same 3D product, and 3 - How to index a specific brand product and match it to a generic products used in budget / price composition, i.e., for purposes of automated algorithmic calculation, trade-marked products like “Kitchen Faucet with Aerator - Chrome C23 1158 - Brand Forusi” should be treated only as “Kitchen Faucet”.

At this point, it became clear that it would be unviable, to build a software intelligence to address all these issues. Thereby, human intervention to process and organize all the data acquired was inevitable, resulting in 2 months of work conducted by a team of architects and architecture students.

The outcome was a new database, indexed in three layers: raw data, common / usual products and groups of 3D models. The index of each layer was respectively 40,000, 4,000 and 1,200 items.

Interface

It was also a challenge to build a friendly software interface by using intuitive features and easy navigability, resembling the Google Sketchup interface itself. The plug-in works in just one window, divided into three tabs: Products, Materials and Report. The first allows access to ready-made products, whose 3D models can be downloaded by the user through software interface; the second tab contains a list of materials that can be applied, as properties, in a constructive / construction element modeled by the
user, and at last, the report tab gives access to the worksheet of items included in the model.

In the ‘Products Tab’, the user can search and download industrialized products in a database of four thousand items. The elements catalogue is kept constantly updated and expanding through the data acquiring operation often performed by the crawler system. The ‘Materials Tab’, which includes features associated with the application of properties in non-industrialized building blocks, has a list of XXX standard items, such as wall, roof, floor, glass, etc. The calculation method is based on computing the area of the face element multiplied by the price of associated material.

In both, Products and Materials tabs, the user can create new custom items, using the functions “Create Product” and “Create Material. Features that resemble the conventional BIM software, where the user is in charge of entering information and associate it with the modeled geometry. Thus, it is ensured a freedom of use that allows the user to expand the database offered by the software through the addition of materials and customized products, or unavailable in the original database.

In the ‘Reports Tab’, the user has a complete list of the items included in his model. Each topic in the report contains an updated price checked on the internet by the Bim.bon crawler, finally delivering a budget spreadsheet with a margin of error within 15%.

**DISCUSSION**

The research highlights the large distance between the major BIM software frameworks in the market and the reality of most architectural offices in the country, also considering the operational problems in its usability. The proposed system has as its focal point...
point the improvement of the usability on BIM systems, attracting less skilled users and smaller offices. In Brazil, most architects work in small companies, and yet most BIM software's are not suited for that reality. One possible reason for the success of Google Sketchup software in the country regards to the low investment needed to start learning it.

Besides the ease of use, another project highlight is the access to information. Considering that the internet has an increasing volume of construction data available, we have to work absorbing, processing and delivering the filtered data to the users. The software offers an important contribution to the field of architecture, because it processes a large database of about 40,000 items and makes it easily available to the user in a simple interface. It can lead to a less time consuming and effective design practice by delivering a larger volume of information and data into design process workflow.

Another feature that is worth mentioning is that the proposed system works as a plug-in integrated with the Google SketchUp software, which is very often used as a tool for architectural design in the preliminary stages of a project. Thus, the Bim.Bon software allows the designer to try many possibilities of changes in his project rather than only being an architectural budget system. The ‘Report Tab’ reflects the model changes in real-time, offering instant results that can be used for taking designing decisions.

Finally, we believe that major transformations in architectural process could result from a change in the methodological steps that improve access to information and aid decision-making. The article concludes by arguing that other relevant information could be retrieved on the internet and also be available on the software. It considers the possibility that the Bim.Bon software can also provide information on thermal, acoustic, structural, electrical, hydraulic and energy systems by attaching relevant information from thousands of components to its database and by delivering to designers simple calculation methods to instigate the investigation in architectural projects.

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REFERENCES