VISUALIZING ARCHITECTURAL THEORY: A CASE-STUDY ON DIGITAL REPRESENTATION

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Abstract. This paper aims to analyze interactive multimedia and visualization techniques for architectural theory publications. Unfortunately, the available literature about multimedia, visualization, hypertext and related systems in this area is not consistent. The paper reviews the features of a research project outcome, which investigates an iconic building of the late 1930’s in Brazil. It examines the differences and similarities between a hypertext/multimedia system – a CD-ROM – with a comparable non-hypertext or non-computer product – a book – that deals with a specific subject: Architectural Theory.

1. Introduction

This analysis of interactive multimedia and visualization techniques for architectural theory publication was raised during the development of a research project, which investigates a late 1930’s iconic building in Rio de Janeiro, Brazil. The outcome of the research is both a book and a CD-ROM. Although they have some mutual dependence, they could be considered autonomous documents dealing with the same subject.

We have found that the available literature about multimedia, visualization, hypertext and related systems is, unfortunately, not consistent. The majority of articles present descriptions of ideas, designs, and prototype or working systems claimed to be advantageous on the basis of the author’s intuition and lacking useful evaluation on their utility and ease of use for their intended users.

Given this state of affairs, we have chosen to review the features of the two main result formats. In other words, we have favored to examine the differences and similarities between a hypertext/multimedia system with a
comparable non-hypertext or non-computer product that deals with a specific subject: Architectural Theory.

2. Multimedia and Architectural Theory

Digital technologies have had a significant impact on the practice and theory of architectural productions. Within the broad area of design practice, those new technologies have significantly changed the manner whereby architectural design and documentation are undertaken. At the level of architectural theory, contemporary thinkers in the discipline of architecture have engaged with theorists in philosophy and cultural theory, in order to present something of a new horizon for considering the architectural phenomena. In fact, developments in technologies of virtual reality have opened a new domain of spatiality for architectural thinking.

Books and interactive multimedia hold specific characteristics. For most people, computer screens are not the best instruments for reading long texts. On the other side, there are always limitations to include images in books. Besides being seductive, visualization techniques offer a broad range of possibilities to illustrate a tectonic analysis, for example, that would be much more difficult with a photograph of the existing building. In addition to that, one can navigate through panoramas or VRML models while accessing information linked to hotspots. Both can display analytical notes connected to specific places in the user’s experience of the building. Furthermore, 3D models can present the building disassembled or illustrate the evolution of the project focusing on the architects’ decisions. In spite of that, visualization techniques need to be thoroughly explored in order to be successful in clarifying the building and its analysis understanding. Otherwise, its result could be attractive, but superficial.

Figure 1. Photographs and panoramas demonstrate different aspects of the building analysis.
Visualization of real and imaginary space through different modes of representation has been traditionally a strong point of architectural education and practice. Even when architectural design is removed from the influence of the visual arts, the architect makes extensive and intensive use of visual methods and techniques. For example, in the development of a composition, the specification of a design artifact, the communication of more abstract concepts, the analysis of design ideas and the critical analysis of historical cases. As a result, our knowledge of world architecture stems more from published images, photographs and drawings than from personal experience. The emphasis on the visual in architecture is not accidental. Human interaction with the natural and built environment is predominantly visual. In fact, a wide spectrum of human activities, including aesthetic appreciation, depends on visual experience.

Visualization has been a significant aid to the understanding and controlling of various complex processes. The unifying element for visualization is form and space, subjects’ matters of architecture. It is therefore surprising that architectural theory have invested little effort in explorations of the limitations in current representational approaches.

The advantage of an interactive multimedia presentation is the possibility to use several resources connected to each other engaging the user into the theoretical experience. One must consider that, the effectiveness of moving and navigating through a multimedia hypertext document will depend on the desired goal of the user. Nevertheless, there is a demand for navigation studies of user behavior strategies for basic browsing or searching functions: finding a path, searching, ‘bookmarking’, going forward and backward commands. It seems that users will find more options and open new paths when searching, with the aid of simple database systems, for specific information than when casually browsing through visually sophisticated multimedia presentations.

3. Investigating architectural icons

In the current case, both the book and the CD-ROM present the study of the acclaimed building of the Ministry of Education in Downtown Rio de Janeiro. In fact, they are intended to resume the investigation of an important component of Rio de Janeiro’s urban history through one of its most important icons in the XX Century (Kos, 2003).

Two significant investigations were important precedents, which influenced this project. The first was developed by the important thinkers of the past century Walter Benjamin (1999). The leading architect Rem Koolhaas (1994) developed the other one more recently. The former explored the culture of Paris while the latter investigated New York’s culture, both through the analysis of their architectural artifacts.
3.1. THE ‘TRADITIONAL’ PRINTED OUTPUT

The book observes a basic and usual structure: it is linear and follows an overall chronological scheme. However, in order to cover different aspects of the building itself and the spatial, historical and cultural context in which the building was shaped, it has to be divided in an extensive number of chapters. Some of these chapters address the subject from a broad point of view while others are specific, detailing particular aspects.

While books are considered more “academic” by many theoreticians, we found out that information for the CD-ROM needed to be much more precise. The association of 3D models, drawings, photographs and texts required an accuracy of each piece in order to provide a correct match. The book’s text, on the other hand, could be more flexible. When there was no precise information, the text’s subject could be diverted to other directions. That move, for example, was much more laborious when modeling a historical project.

The book’s essay format gave more flexibility to its chronological and linear structure, resembling and being influenced by the CD-ROM’s structure. The essays could, in theory, be read without following an order. The CD-ROM’s dynamism of association between different content pieces, however, is much more difficult to achieve.

3.2. THE DIGITAL VERSION

Considering the CD-ROM, several interdependent modules compose the Ministry Building hyperdocument. These modules, similarly to the book, also intend to exhibit the building within its context and the cultural ‘forces’ that shaped it.

3D models were extensively applied. Their animations or still images are often compared to photographs and movie clips of the actual building. Our focus, however, is towards its diagrammatic qualities associated to the three-dimensionality. They allow one to highlight design decisions, construction methods or composition schemes. Therefore, the model is not only a traditional diagram, but it positions diagram features within space. This is a powerful process to elucidate an architectural artifact’s analysis. In addition to that, it is possible to review the design process through models of preliminary versions. Those models provide a base to compare projects that are registered in documents of different nature. From those models, one can evaluate the evolution of thoughts or external imprints in the designers work. Another noteworthy issue is that while modeling designs that were not built, it is possible to simulate a “reality” that could have existed if those buildings had been constructed. The complexity of the Ministry of Education’s design process not only illustrates the various decisions taken by the architects to
organize such building’s program. It also “exposes the sedimentation process of the Brazilian Modernity”. (Kos, 2003)

Figure 2. 3D model images which facilitate the understanding of the building concept.

The building is also analyzed through its conceptual and tectonic aspects. In terms of tectonics 3D models reveal the structural and constructive elements and its integration. Conceptual aspects are unveiled through several images and texts under “symbolic” headings (transparency, fluidity, lightness, monumentality, and so on) that facilitate the comprehension of revolutionary aspects of that particular design.

As a matter of fact, multimedia documents should be nonlinear and make possible “dives” in multiple scales: the purpose is to break them up into small units or modules which are organized and linked to a variety of topics or information categories within a database. The interface should stimulate users to move about freely and structure their own use of the material. In this particular case hyperlinks and spatial digital models used in multiple scales facilitate the connections among the several parts, which exhibit the forces that shaped the building.

The changes in scale facilitated by computers may have a greater impact in the communication of the architectural object. If the designer during the design process already imagines those scale changes, it presents new potentiality for the understanding of an architectural object to others that did not take part in the design process. Those who examine a digital representation seeking for information that would allow a better understanding of an architectural artifact may have a better apprehension of the building through the changing scales ease.
4. Contributions to future projects

We conclude this paper with some suggestions for functions and features for research investigation and multimedia presentations as potential enhancements to next-generation of CD-ROMs. They are based on the Ministry of Education CD-ROM’s analysis. However, we believe that those suggestions can contribute to similar projects which investigate significant architectural buildings.

The first suggestion is the creation of a navigation system based on a simple menu with easy access for the user. That menu should facilitate the constant movement by the user, through the different “scales” or “depths” of the digital analysis. The possibility to move from a building detail to the social context, for example, is one of the strength of digital analysis. That strength is particularly benefic to architectural analysis and should be constantly explored by the system’s authors.

Another important issue is to stimulate crossings through historical and contextual information. When the object of analysis is not a contemporary building, one need to understand the culture and minds that brought fourth that artifact. Crossing different types of historical information is very important for the understanding of a strange culture to the reader. A building’s project should be understood in that context and not as an isolated fact. Therefore, a digital document that aims to unravel a building’s project should never disregard a cautious analysis of the historical context from the society that originated it.

At last, we would like to conclude emphasizing the importance of the “zoom paradigm” of digital documents. Those tools offer a unique possibility to explore changes in the users’ points of view. This concept is clearly illustrated in the work of Jef Raskin. He is a user interface consultant who proposes new directions for designing interactive systems. Raskin talks of the difficulty in conventional navigation schemes, and proposes a general user interface for navigation, which he calls “Zoom World”. This interface is conceptually similar to a large surface, where different types of documents are placed together. This new paradigm provides techniques for zooming in to achieve greater detail of information. Raskin has developed a prototype of this general interface (Raskin, 2005) that could be used to access any kind of information. Through his simple system, Raskin could synthesize a great contribution of digital systems as a research communication tool for many different areas, including the theory of architecture.
Figure 3. Two screen-shots of Raskin’s “Zoom World” demo.

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