

Architectural hypermedia based on 3D models

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Keywords

Hypermedia, 3D Model, Hypertext, Latin-American Cities, Architecture

Introduction

The World Wide Web gave a new dimension to the terms hypermedia and hypertext. Their distinctions are not very clear and in this paper we will use both with the same meaning. They are usually defined in a very generic way as a revolutionary form of writing. The generalization and glorification of hypertext, however, obscures a clearer view of its real possibilities. Architects will benefit by investigating carefully its resources - and how it can be a powerful tool for the profession, particularly when associated with 3D models.

Hypertext is usually defined in opposition to texts, the latter being linear and sequential.[1] [2] As books or print material are not always linear or sequential (like dictionaries and encyclopedias), this definition is very imprecise. Hypertext can be defined as nodes (information elements, paragraphs, pages, images, sound, and video) with links between these nodes (references, notes, buttons or other elements, which execute the passage from one node to the other). Digital hypertext would be a collection of multinodal information arranged in a network for fast and intuitive navigation.[3]

In 1945, Vannevar Bush, Director of the Office

of Scientific Research and Development in U.S.A., wrote the article **As we may think**. His wish was to afford knowledge produced available to every scientist. The amount of information produced was already enormous. Information should be organized in a different way to provide researchers with what they needed. He proposed a visionary mechanical device, which would act very similarly to hypertexts. This machine, called Memex (memory extender) would help bridge the different disciplines in the specialization process. *"A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory."*[4] All information stored in microfilms would be accessed through association and analogy linkage.

Hypertext concept was first imagined by Bush as a visionary mechanical device. Many decades later it was materialized in a digital format. Hypertext's envisaged system was accomplished through computer's resources, which allowed the retrieval of information in different media (text, images, sound, and videos), through links, which could be easily updated.

Bush envisioned a cross-disciplinary movement of science and it's knowledge which were going in the opposite direction through increasing specialization. Floridi points out how *"a philosophy divided into rigid areas of specialization, done by "experts", seems to be in flat contradiction to the universal and unifying ambitions of a rational reflection which, by its very nature, aims to be the ultimate threshold of theoretical understanding,"* [5] suggesting that books invite vertical specialization while the computer could promote forms of horizontal inter-disciplinarity and multi-disciplinarity as a *"return of the Renaissance mind."*

Text and image in architectural representation

Architects always struggle to transmit all their ideas to people involved in the construction of their projects. During the Ancient World, in Egypt, we have evidence that *"plans and elevations drawings, often used in conjunction, were governed by a central axis line and the rule of bilateral symme-*

try." [6] However, these drawings seem to be incomplete to transmit all the building information. In Greece an example of a very detailed technical text describing a construction seems to have references to drawings which would complement it. Many times, this issue was minimized with the participation of the architect in the construction. [7]

Verbal forms of communication, often oral, were always required in addition to visual aids like drawings and models to convey the complexity of buildings. The intricate aspects of architecture profession were many times confined in architect's minds. *"Drawing and talking are parallel ways of designing, and together make up what I will call the language of designing. The preliminary result reveals that designing is related mostly with visual thinking as the action of decision making and synthesis, while understanding design is related with linguistic faculties. The interaction between verbal and visual conceptualization is indeed complex, and both expressions are generally agreed to be close related. This idea can imply the textual information can assist the analysis for understanding the design rationale."* [8]

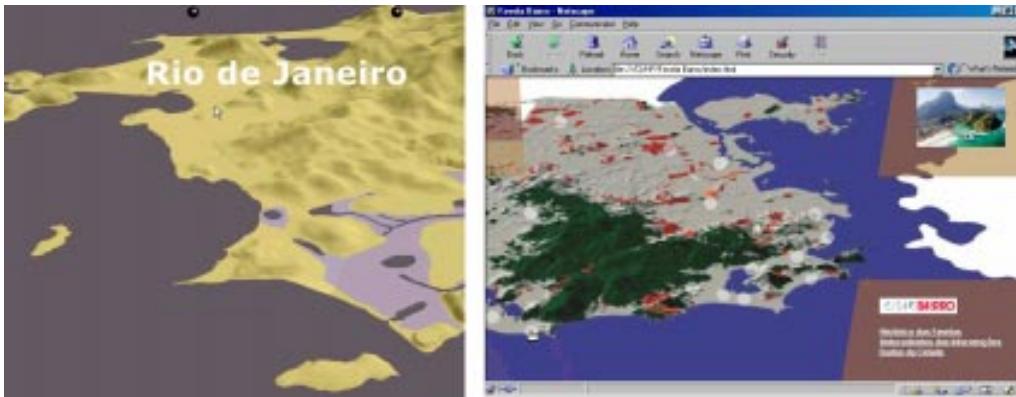


Figure 1:
Rio de Janeiro CD-ROM
and Favela-Bairro Site

Research at the Federal University of Rio de Janeiro

The investigations of these issues related to hypermedia concepts and architectural representation were raised during the investigations developed in PROURB (Graduate Program of Urban Design) at the School of Architecture and Urbanism of the Federal University of Rio de Janeiro, Brazil.

The research group based on LAURD (Laboratory of Urban Analysis and Digital Representation) in PROURB focuses the investigations towards urban and architectural hypermedia analysis. These projects started in 1993 and most of the participants in the groups have been undergraduate architectural students. The main projects are the CD-ROMs of Rio de Janeiro and Havana evolutions and the Ministry of Education Building in Rio and the sites for the Catete Palace in Rio (<http://www.fau.ufrj.br/prourb/catete>) and the Favela-Bairro Program (<http://www.fau.ufrj.br/prourb/cidades/favela>), a Municipality Projects for the slums in Rio.[9] The main objective of most of these projects is not a final product but, rather, an investigation of new forms of digital representation through hypermedia. The investigation is done exploring its characteristics of information retrieval, links through different files format and the importance of images and their relationship to words.

These works are structured in four important phases: the bibliography and iconography research, 3D modeling, storyboard construction and hypermedia editing. Instead of ruling all other phases, storyboard writing is a result of group debate, the 3D modeling process, and the discoveries of the research group.

The rendering excellence of the 3D models is not the main issue in these works. Instead, they are explored by their capacity to organize, search, display and communicate information. They are used as separate layers of information which express intentions, constraints, concepts and techniques in

built environments. These issues are achieved with many different techniques like the use of animations linked to hotwords in a text, superimposing layers of information in 3D models or VRML navigation to understand the relationship of buildings and their site.

Conclusions

The experiments developed at LAURD testify that the use of hypermedia based on 3D models helps to identify the creation of buildings and cities as a complex system of constraints, ideas and decisions. Hypermedia structure allows, through images and text links, comprehension of the whole architectural process. In one piece of representation, it's possible to identify cultural impact, social influence, site constraints, client desires, architect's concept and technical decisions. More than that, one can understand how an architectural project is a result of all these forces acting together.

One can trace an analogy between philosophy and architecture. Architects are still educated as Renaissance master-masons who synthesize in a project their age technique, art and philosophy. Specialization in the building industry have shifted professionals in the other direction. Nevertheless, hypermedia could be a powerful tool of resistance. Its structure allows, through images and text links, a better comprehension of the whole architectural process.

References

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- 3 Lévy, Pierre. *Ibid.*, pp. 44.
- 4 Bush, Vannevar. **As We May Think**. In *The Atlantic Monthly* (1945, July).

- 5 Floridi, Luciano. **Philosophy and computing: an introduction.** (London ; New York: Routledge, 1999), pp 130-131.
- 6 Kostof, Spiro. **The Practice of Architecture in the Ancient World: Egypt and Greece.** In *The Architect* ed. by Spyro Kostof (New York; Oxford: Oxford University Press, 1977), pp. 7.
- 7 Kostof, Spiro. *Ibid.*, pp. 12.
- 8 Ulusoy, Z. as quoted in Wong, Wilson & Kvan, Thomas. **Textual Support of Collaborative design.** In *Media and design process.* Ed. by Osman Ataman & Julio Bermúdez (Philadelphia, Ikon, 199) pp. 170.
- 9 More information about some of these projects can

be found in Kós, José et al.. **The city that doesn't exist: Hypermedia reconstruction of Latin American Cities.** In proceedings of International Conference on Virtual Systems and Multimedia (VSMM'99), pp. 1-10, 1999 or <http://www.fau.ufrj.br/prourb/cidades/vsmm99>.

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