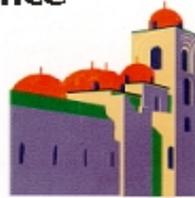


Multimedia and Architectural Disciplines

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A NEW
METHODOLOGY
TO DEVELOP
HYPERMEDIA
SYSTEMS FOR
ARCHITECTURE
HISTORY

Mario Allegra,
Giovanni Fulantelli
and Gianpanco
Mangiarotti

Istituto di
Tecnologie
Didattiche e
Formative Consiglio
Nazionale delle
Ricerche - Palermo,
Italy

"...Non sempre le connessioni tra un elemento e l'altro del racconto risultavano evidenti all'imperatore; gli oggetti potevano voler dire cose diverse Ma ciò che rendeva prezioso a Kublai ogni fatto o notizia riferito al suo inarticolato informatore era lo spazio che restava loro intorno, un vuoto non riempito di parole. Le descrizioni di città visitate da Marco Polo avevano questa dote: che ci si poteva girare in mezzo col pensiero, perdersi, fermarsi a prendere il fresco, o scappare via di corsa..."
(Italo Calvino - *Le città invisibili*)

Abstract

This paper illustrates a research project concerning the analysis of architectural works through a comparative study based on hypermedia tools; by exploring the hypermedia, users can find the main subjects relative to the "method" of architectural planning.

The use of multimedia in architecture allows the integration in a single system of different types of information which are necessary for the description of a work: texts, designs, photos and sounds. In addition, the hypertext information structure allows the direct intervention on analyzed projects, by pointing out the more important themes and their relationships.

Users have the opportunity to immerse themselves in hypermedia and choose the subject to navigate through on each occasion. Our research project aims at developing a prototype concerning two architects: LL.Kahn and F.L. Wright. The development methodology is based on the key role played by the components of architectonic works, thus allowing users to compare them in a simple and correct way.

The methodology used in this work can be extended to other architects or periods, by simply changing the possibility of navigation, i.e. by changing the reading keys.

Introduction

A general survey of multimedia products in Architecture, and more generally in the figurative arts, makes it clear that this technology has been widely used to build information points for museums and personal exhibitions.

In addition, most of the Multimedia products in Architecture are monographic, related to a single author or to a specific architectural work. In particular, there are well known examples of very impressive kiosks in museums, which are mainly aimed at a non specialist public.

Even though the cultural role of these applications in allowing people to get to know the work of architects has been broadly experienced, they should be regarded as popularizing presentations rather than as educational and training tools.

In this paper we present an original multimedia system developed to allow users to read and explore architectural works in an innovative and effective way. The presented system can be regarded as a study tool rather than as a popularizing one. It is based on the hypertext paradigm which avoids fixing a structure on the information. As a consequence, users can navigate freely through the documentation concerning a specific work or a specific architect, and establish their own reading paths by following their interests at the numerous forks they meet during the system navigation. As a consequence, the same opera can be read in different ways by different users, or in other words, the system provides users with a variety of navigational paths regarding the same architectural work.

One of the key points of the system is the hypertext flexibility, which allows the structuring of an open and flexible system.

Finally, the hypermedia system reveals its complete total effectiveness as a learning tool in the architectural field. It is possible to identify and analyze a number of constants among the components of an architectural work and to increase these according to the works analyzed or the accumulated information; in this way the architectural analysis may become more detailed, allowing the elaboration of further interpretation.

To explain in practice how the study works using hypermedia, two examples of modern architecture have been considered, highlighting certain component parts; this demonstrates the potential of the model to make an in depth study and offer a direct learning experience regarding the "architectural problem".

Communicative characteristics of hypermedia systems

Often, traditional graphics-based textbooks are inadequate for explanations concerning visual arts and are unable to incorporate associative links between related subjects/concepts.

Hypertext systems allow users to read the documentation not only in a sequential manner, but also by navigating through conceptually connected information nodes; users can move from one concept to another related one by activating automatic links.

According to the hypertext paradigm, the semantic structure of a specific field of knowledge can be entirely preserved in the representation in a hypertext.

The hypertext author does not need to adapt the original structure to the sequential model forced on him by traditional books; in addition, searches through the hypertextual documentation can be carried out in an efficient way, since the user will find the information presented as it is in the real structural framework rather than in a mediated one; moreover, several "reading keys" at different reading levels can be implemented on the same documentation package. Consequently, the expert user can make an indepth study of specific thematic aspects, make comparisons between different architectural works, add his/her own notes and documentation; on the contrary, the novice user will not be provided with all these functions, since it is assumed that s/he will simply explore the architectural works as in a museum kiosk.

The fusion between a hypertextual information framework and multimedia technology produces extremely effective communication tools.

In a hypermedia system, information nodes are not simply textual, but they can include graphics, drawings, still images as well as movies, animation, sounds, all integrated in to the same hypertextual framework.

The kinetic relationship with architecture, brought about by the introduction of movies inside the hypermedia system, enables the user to explore the architectural space in three dimensions; in fact the user obtains information not only from looking at designs, but from a number of sensations produced by "entering" the architectural space.

The possibility to perform analyses of architectural works through a hypermedia system gives rise to some interesting "*reflections*" about the relationship between Architecture and its representations, which can be thought of as a '*medium*', and represent links between the "architectural idea" and the "implemented work".

Architecture produces polisemantic values, which lead to different interpretations depending on the input received each time by the user.

Hypermedia systems are particularly suitable for representing these many values as they use different media: in this way the critical or analytical study of a work can be carried out totally by hypermedia, because of their flexible structure.

The particular structure of hypermedia allows direct control of the study of architectural work: user participation is directly proportional to his level of interest and knowledge of the work.

He/she may simply go through the various information introduced into the hypermedia, or he/she may add further elements; the architectural components which determine the documentation organization within the hypermedia may be increased during use of the system; furthermore each component may be considered as a "room of knowledge" of variable dimensions; the entrances are supplied to the user at the beginning of his research, but he/she may also change the "entrance" to the room or the level or he/she may change the order of search, passing from one room to another following paths which cross.

The user may introduce information, according to the form that he wants to give the architectural study, enriching the hypertext and adapting each time to the existing cultural condition.

Architectural analysis, using texts and images, in this heterogeneous view that puts together all this information, can be exhaustive; furthermore the user may extend the analysis adding new documentation.

It is possible to identify the following places of use:

- museums
- schools
- universities
- libraries

Users of the system fall roughly into two categories: that of non specialist user who has no competence in architecture, and that of the specialist user who has specific knowledge of architecture.

Whatever the complexity and the knowledge level of the hypermedia, it is easily accessible to all users.

In the case of a non specialist user, for example, a simple representation is sufficient; while for an expert user, further aspects may be considered.

Dynamic aspects of the prototype

We will consider further the dynamic aspects of this hypermedia system, since we retain this component to be one of its most interesting and innovative characteristics.

In fact the dynamic aspects give additional value to the hypermedia version compared to the traditional one. New interpretations may be added at any moment. The hypermedia is to be seen not as a closed and rigid system, but as an open and flexible system.

One of the dynamic aspects consists in the updating function, available only to the specialist user (architect, teacher or university student); he can add new critical documents, as well as his own interpretation or his own notes.

Technically speaking, we can say that the expert user can create documents and links, automatically integrated into the original structure and so immediately available for navigation and search.

Another dynamic aspect regards the creation of links, which means that the expert user, for example a teacher, can establish set paths within the documentation, selecting certain topics, in order to prepare a lesson or an exercise. The student in a later phase, may go back over the path indicated by the teacher as a guide, but he must be left free to follow his own orientation within the system. At the end he may add his own considerations, as requested by the teacher, within the hypermedia.

The need to restrict the navigational possibilities for the student arises when the knowledge base is very wide.

This does not hinder a cognitive and operative approach, but it allows for the identification and the partial limitation of information with respect to the general context.

Description of the prototype

The general advantages of the hypermedia approach may be diminished by poor organization of the documentation. One of the most common problems encountered by hypermedia is the attempt, in the project stage, to adapt the documentation of traditional texts to a hypermedia structure.

In fact the documentation used in building the hypermedia consists of texts, videos, photographs and other material which is suitable for explaining the various topics under consideration: this material must undergo a process of adaptation and be organized according to the various search paths, emphasizing each time the potential of the material and implementing the links between the various components of the documentation.

In the specific case of architecture, where drawings are of fundamental importance it is essential to make a direct connection between the text and the image. The text which describes the various topics under consideration contains key-words which are highlighted and related to further illustrations: the user can select these key-words to pass through the link which leads to the relative image. This operation, which may appear of little use, is in fact of great assistance from an educational point of view in explaining the various topics. We are certain that if a text is accompanied by an illustration the user will remember the concept more easily. Furthermore the hypermedia structure highlights the relationships between different graphic elements.

It is possible to add to the plans colored areas, which are placed on hypothetical 'layers' and highlight the topics under consideration (the static structure, the path, vertical connections, etc). The novelty in the relationship between architecture and the user lies in the possibility within the hypermedia system to study architectural topics using graphic methods.

The prototype consists in information about the biographies of architects, the description of their works and critical texts about them, etc.

The information about architects is linked to the introduction concerning the works and from here the user may approach his study in different ways: he may remain at the simplest level following the pages in sequence with general text and relative graphics, - images, movies and other elements or he may study the works using critical texts connected to specific topics.

The topics which are most often studied and which make up the structure and learning system of the hypermedia are: dimension, geometry of design, access and exit mode, typology, structure, system of distribution, description of dimensional data, description and articulation of path, technology (Argientiero - Maltese 1979).

The dynamic aspect of the prototype makes it possible to increase the number of these topics at any time.

The user may navigate within the hypermedia by means of the key-words and he may explore that part of the knowledge base which interests him.

The interface, also a prototype, has been constructed in the same way for all the individual archives in order to simplify and accelerate the learning stage. In each archive the user immediately may see the key information; for example in a document in an archive regarding the works, the key words are the architect's name, the name of the work, the year of construction, the site and the topic described in the document.

To give a practical illustration we have considered two works of contemporary architecture: Exter Library designed by I. L. Kahn and the Guggenheim Museum designed by F. L. Wright. The reason for choosing these two works is that both clearly represent two architectural components: Kahn's library with its structure and Wright's museum with its path represent two fundamental parts of architecture which coincide with the functional and organizational aspects (Zevi 1979; Giurgola - Mehta 1978).

Kahn uses the structure of Exter library to represent the geometrical rules, the form and construction methods and so the user of the hypermedia can follow paths which cross in order to analyze the various theories regarding this subject (Latour 1986).

In the second example Wright uses the path in the Guggenheim Museum to emphasize the morphological aspect of his work. By studying and comparing the various documents and images the user can understand that the museum route coincides with the exhibition space (Brooks 1993). The viewing of a movie enables the user to move along the museum ramp, the main space of the work.

Learning architecture by hypermedia

The communication characteristics of hypermedia systems make it possible to create new educational tools. According to the most modern learning theories (Maragliano, 1994) the hypermedia paradigm allows the student to play an active role in the construction of knowledge, a role which is considered to be a basic element in the consolidation of acquired notions.

In fact, since he is able to navigate among the information nodes and to move by relationship, the user may determine his own information paths; this possibility together with his previous knowledge and the social environment in which learning takes place leads to the active construction of knowledge.

Furthermore, studies of cognitive psychology have shown the effectiveness of communication using different media integrated into a single interactive system. To be effective, training systems must provide students with integrated media and a high degree of interactivity. The prototype presented in this paper is being developed according to the guidelines which produce effective educational systems. The development of the prototype is based on rational and essential use of various media, with reference each time to well defined educational aims.

For example, photographs are especially needed to represent the completed work, while graphics have a communicative value for a more specialized study of the architectural work. The use of animated graphics is important, because in this way the various phases of the hystorical evolution of a work may be shown; it is possible to document the construction over time of an architectural work, from the project to its realization. To continue with other examples, a movie has a high educational value when it creates the effect of moving through a building (as in the case of Wright's museum), facilitating knowledge by an approach which is certainly direct as it is linked to the visual sphere.

Finally, but of no less importance, animation or movies in general may characterize the hypermedia showing architects or authors of critical studies who, as in a real lesson, explain their works or talk about their studies.

Conclusion

The contribution offered by this paper is not exhaustive with regard to all aspects which make hypermedia particularly suitable for studying architecture.

The use of the hypermedia within a 'discipline' such as the study of architecture strengthens the relationship between architecture itself and man.

From this relationship it is clear that the hypermedia user plays an active role in the organization of data as well as in the learning process. For this reason the structure of hypermedia may be adapted to suit the various level of knowledge of the users.

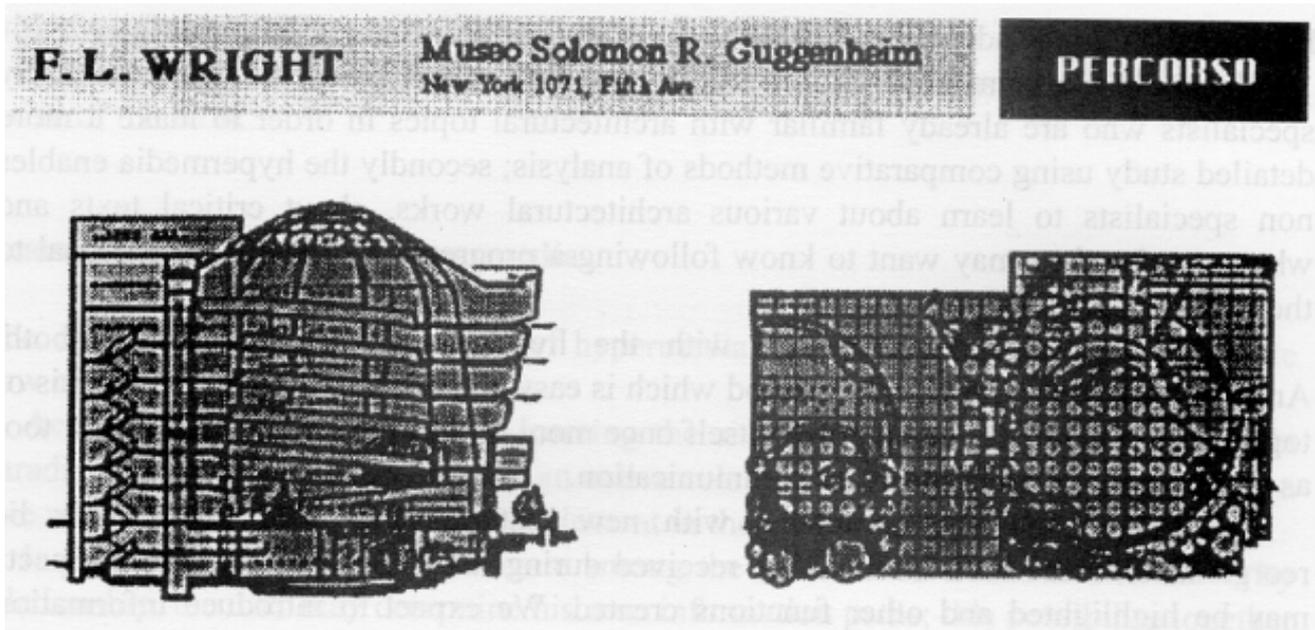
We would like to make two important points: firstly the hypermedia may be used by specialists who are already familiar with architectural topics in order to make a more detailed study using comparative methods of analysis; secondly the hypermedia enables non specialists to learn about various architectural works, about critical texts and whatever else they may want to know following a progression of steps proportional to their level of knowledge.

The association of architecture with the hypermedia is of benefit to both. Architecture gains a new study method which is easy and efficient to use for analysis of topics, while the hypermedia proves itself once more to be an excellent educational tool as well as an intelligent means of communication.

The system may be completed with new material and its structure may be reorganized on the basis of feedback received during its use. Furthermore new aspects may be highlighted and other functions created. We expect to introduce information retrieval functions to speed up certain types of search

Acknowledgement

We would like to thank our colleagues in Istituto di Tecnologie Didattiche e Formative, in particular Marco Arrigo and Daniele Di Giuseppe, for their support in developing the prototype.





L'edificio e' una struttura plastica, il cemento e' modellato in forme curvilinee rinforzate dall'acciaio...

Qui, per la prima volta, l'architettura appare plastica, ogni piano si inserisce nel successivo (piu' come una scultura), non c'e' piu' la sovrapposizione di diversi strati che si tagliano e si appoggiano uno sull'altro con la costruzione a montante e trave. L'intero edificio, ottenuto da colate di cemento, e' come il guscio di un uovo - una forma di grande semplicita' - piu' che una struttura a linee incrociate. (...) L'occhio non si imbatte in subitanei mutamenti di forme

Lo spazio interno
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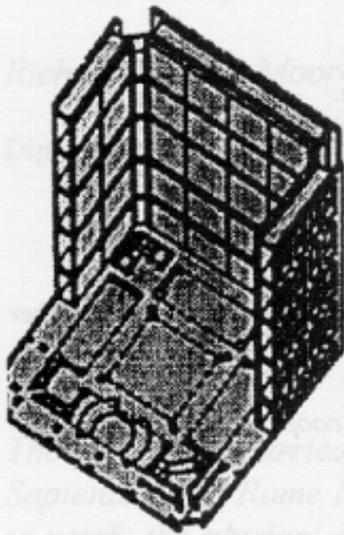


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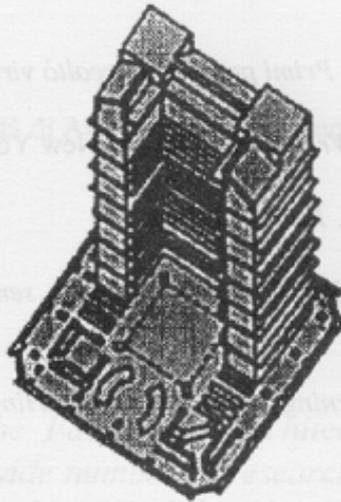


Next

Fig. 1



Lo spessore esterno
Gli spazi di lettura



Lo spessore intermedio
Il deposito libri

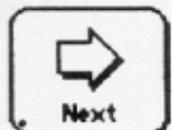
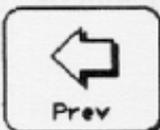
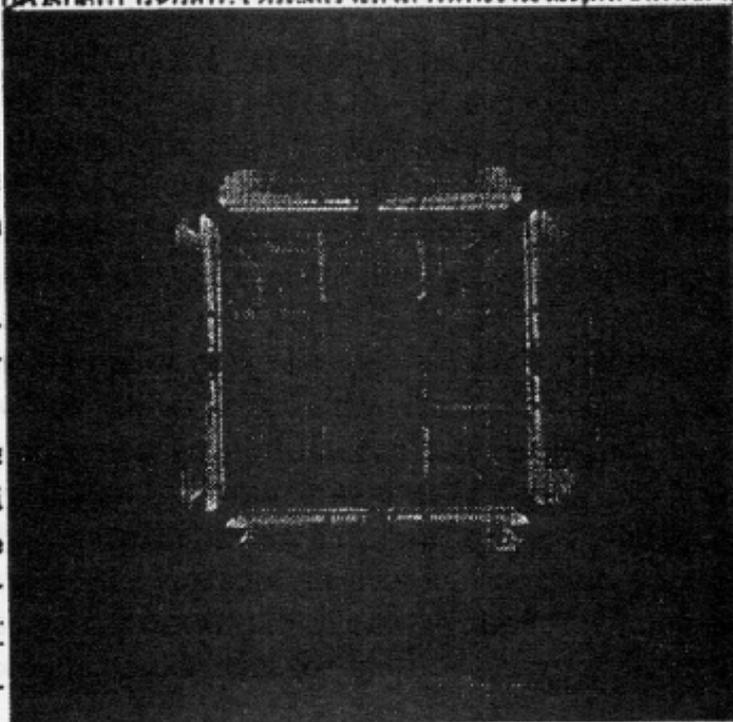


Lo spazio centrale
La 'giacca' coperta



Lo spessore esterno che contiene la successione degli spazi per la lettura, sui quattro lati dell'edificio, è realizzato con una struttura muraria a pettine in laterizio, una specie di traliccio tridimensionale a larghi pilastri di mattoni che caratterizza i quattro prospetti usuali. Questo forte traliccio sovravanza di un piano il volume chiuso che costituisce il coronamento della terra, diventando zoccolo sui quattro spigoli vertice. Questa struttura permette una ulteriore articolazione qui, soprattutto, che l'importanza che, nel progetto, hanno avuto

Il grande ambiente centrale è armato trattato a facci ciascuna una grande visibile, e riassunti in Questo spazio centrale complessa copertura



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