

DIGITAL ARCHITECTURE – TOWARDS A NEW DISCOURSE

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Abstract

Discourse in digital architecture has begun to occupy new design concepts related to digital design. Design concepts are now becoming integrated into the general architectural discourse. This research investigated this process, the emergence, migration, and crystallization of a new conceptual content under the influence of digital design. In order to demonstrate this shift, significant projects were selected to represent features of the expression that reflects the changes and evolution of conceptual content that underlie digital design. This analysis was accomplished employing the ICF analytical framework. Our findings demonstrate the change in the conceptual structure in digital architecture. Certain expressions that are related to digital technology have moved up from a low level descriptive level to a significant conceptual role in formulating current ideational content. The methodology findings and the contribution to the definition of the conceptual content of contemporary discourse in digital architecture are described and presented in this paper.

1. Introduction

The evolution of digital design as a unique field of design endeavor, motivated by its own body of theoretical sources, promulgated by a culture of discourse, is currently supported by new technologies. Among the significance of digital design for the design theoretical community is the way that this form of highly mediated design is beginning to evolve unique design methodologies and unique models of design interaction with digital design media. It is this emphasis upon understanding the influence upon design methodology (Oxman, 2004) that characterizes much of the research in digital design and its contributions to this rapidly evolving field. Furthermore, digital design discourse in the past decade has become part of the dominant theoretical discourse of architecture today. Concepts whose theoretical source is in digital design have begun to occupy a central role in current architectural discourse. As a result of this intellectual phenomenon, architecture as a design discipline has become rich in ideas that drive the design process as well as changing ideas that serve as ideational content of the architectural artifact itself. As a result, we are able to define new paradigmatic approaches in architectural design that are based on the cultural impact of digital technology.

In response to current situation some Issues are raised:

Beyond the exploitation of digital media and the employment of new methods and tools has the design process been changed?

Are the relations between digital design and digital thinking creating a new ideational resource for design?

And if so, can we investigate and identify new conceptual content that may explain these unique changes?

The following research reports on the investigation of these changes. We are interested to trace the emergence, dynamic migration, and crystallization of a new conceptual structure developed under the influence of *digital design*. The research presented in this paper examines the emergence of new ideas over the last decade. In the following section we present a brief introduction to the set of phenomena that characterize the emergence of a digital design discourse in the field.

2. Discourse in digital architecture

The evolution of *digital design* as a unique field motivated by its own body of theoretical sources and supported by new technologies has been emerging rapidly in the last decade. To some extent these new directions can already be presented in design practice. By the year 2003 and with the *Non-Standard Architectures* Exhibition at the *Pompidou Center* in Paris (Migayrou, 2002) the concept of the *digital design* had become a

major theoretical focus of this new phenomenon. The rise of a theoretical discourse reflecting the increasing importance of this field became a seminal issue in the 1990's (Spybroek, 1999; Spybroek and Lootsma, 1997; van Berkel and Bos, 1999; Lynn, 1999; Eisenman, 1992; Goulthorpe, 2003; Goulthorpe, 2004). During this period, the theoretical discourse around developments in *digital design* culture became one of the substantive influences upon design theory.

The works of the last decade, the public events of conferences, competitions and exhibitions, and the design production served as catalysts during this period to formulate the theoretical discourse of *digital design*. In architecture, the Guggenheim Museum, Bilbao by Frank Gehry (1992-1997) was the most prominent catalyst of theorizing new formal directions and postulating new design methods.

The aim of this research is to investigate and identify the conceptual changes in architectural discourse in relation to the increased significance of digital technology. In the following section we present the ICF methodology and its contribution to the definition of the conceptual content of the contemporary discourse in *digital architecture*.

3. Methodology

The research presented in this paper is based on conceptual analysis and exploits the ICF framework (Oxman, 1994; 2003). In order to define conceptual structures in digital architecture we conducted an analysis of textual material related to projects that were built during the last decade. The textual material is related to these projects that were considered to be leading and significant in digital architecture. The aim of the analysis was to trace how the relationship of general conceptual content to digital design has changed its structure and meaning during this period. This analysis was accomplished employing the ICF analytical framework. The ICF methodology is briefly presented below.

Conceptual knowledge

By classifying textual material, we were attempting to identify conceptual structures in digital architecture. In

general, the way conceptual knowledge is organized is as important as the amount of knowledge one has. This view emphasizes the notion of structure. One's conceptual structures, or the structure by which one organizes his knowledge of the world, is not something of which we are naturally aware. Language is a case of the natural structural organization characteristic of human thinking is an important source of evidence in the investigation of conceptual structure. One of our main resources for the acquisition of knowledge is through written texts and graphical illustrations, forms in which knowledge is conceptualized and organized in design. Conceptual abstractions derived from any significant project are those which bridge between the conceptual and the physical and thus provide the basis for exploiting the conceptual knowledge of design thinking. In our approach, the *acquisition and the construction of the body of concepts* from these projects were considered as means to demonstrate and facilitate meaningful learning.

Employing the ICF methodology

The ICF methodological framework (Oxman, 1994) was employed as a method in our conceptual analysis. It proposes that by constructing a conceptual structure that reflects one's thinking in a specific domain, we can make explicit the knowledge of this domain. The representations of concepts and their relationships to other concepts are structured and filled with the content of the specific design domain, or design task. These concepts and structures are analyzed according to the following three categories: design issues, design concepts and design forms (I-C-F). The ICF methodology has been applied to various analytical tasks; among these it has been exploited for organizing and representing conceptual maps in architecture (Oxman, 2003). In this research we use the ICF methodology for understanding current conceptual maps related to the field of *digital architecture*.

Selection of relevant projects

We have selected a group of projects which were among those recognized as having a strong impact upon, and

contribution to, architectural discourse during the last decade. This is a period of certain important projects and, a period in which interest and application of digital design increased dramatically. Representative architectural building types that are strongly and directly influenced by the conceptual content of the cultural discourse in architecture were selected to reflect the changes and evolution of conceptual structures that underlie digital design.

Among those projects that were selected are the following: Wexner Center for Visual Art by Peter Eisenman (1989); Carré d'Art by Norman Foster (1993); Milwaukee Art Museum, by Santiago Calatrava (1994); Groninger Museum by Coop Himmelblau (1994), Guggenheim Museum, Bilbao by Frank O. Gehry (1997); Salt-Water Pavillion by Kas Oosterhuis (1997); Hel Volkhof Museum by UN Studio (2000); Ambient Amplifiers Oslo by Ocean North (2000) Contemporary Art Museum "CAC by Zaha Hadid (2003); and the Art Museum in Graz by Cook and Fournier (2004) and more. Relevant textual material was collected and gathered for further analysis.

3.1. ICF content analysis

Employing the ICF methodology we undertook a first step in our ICF Content Analysis (Oxman and Rotenstreich, 2005). Textual expressions that were found meaningful in this domain related to "Issues"; "Concepts" and "Forms" were identified.

For example, we could identify expressions that were found as expressing different meanings in different texts. For example, the term "dynamic" in the work of Contemporary Art Museum, Cincinnati designed by Zaha Hadid is describing a spatial and formal experience, while the same term "dynamic" in the work of Ocean North is related to a diagram employed as an enabling tool to get beyond a fixed scenario and design schemata. This was considered as a higher level thematic content in our research.

Contemporary Art Museum, Cincinnati / Zaha Hadid (Webb, M, out of the box, Architectural Review vol.214 no.1277, July 2003 p.28-65)

"A spatial and formal experience that is dynamic rather than merely useful that announces to all who enter that this is a place for experiment, a place to leave behind assumptions and conventions, a place that lays us open to the surprises and challenges that are necessarily presented by new art... The constant alternation of enclosure and void, the shifts of angle and level, the cutaways that reveal unexpected vistas and the opening in the fifth-floor member's room that reconnect you with the city, all contribute to a feeling of exhilaration few art museums can match."

Ambient Amplifiers, Oslo / Ocean North (<http://www.ocean-north.net/architecture/amplifiers>)

"The computer is used as an engine to produce dynamic generative diagrams which serve to address the mentioned aspects. The dynamic generative diagrams always feeds on contextual matter, but it deforms the fields of forms and forces in a topological animation, which produces series of intermediate steps, articulating and forming both spatial and temporal thresholds. The use of such techniques implies the introduction of an "untamed" set of information. The reason to do this is to resist the obvious "designed" solution, which would only engage in a fixed scenario. The dynamic generative diagram is used as negotiation engines towards context as well as resistance buffers against fixed design schemata."

3.2. Thematic analysis and new categorization

In the thematic analysis, additional stages of analysis and conceptual categorization were made. On the basis of this analysis of textual expressions new categories have emerged. For example, significant terms such as: "dynamic" "interactive" "responsive", "adaptive", "hybrid" "animated", etc., were classified as new

categories. A new organization and classification was made. The focus here was on looking at the relative classification of selected terms within the text. In other words, the focus of this type of analysis was to look for the thematic quality of the term. This way we could identify expressions that were found as expressing different meanings in different projects. Some of low-level expressions in one example were considered as higher level expressions in another, representing the thematic content of digital architecture.

3.3. Chronological analysis

The ICF hierarchical structure was classified to following levels: low level (e.g., describing technical means for modeling and representation); a conceptual-generative level; and a conceptual-thematic level. Digital expressions in this data-base were analyzed according to their classified location in the hierarchies of the ICF structure. The role of this analysis was to determine the different meanings that emerged as a result of this classified location in the ICF structure.

4. Findings

Our findings have demonstrated that certain expressions related to digital technology have moved up from a low-level descriptive function, such as the technical means for modeling and representation, to a significant conceptual role in formulating the design content of the project. This type of finding was implicit in the text itself. For example, the term “dynamic” appears as a concept in architectural projects designed by Zaha Hadid, Himmelblau, etc. It later appears as a new design issue related to the conceptual and theoretical understanding of designing in digital design works such as those designed by Ocean North. Such transformations of meanings were clearly demonstrated by our ICF method.

5. Summary and conclusions

An approach to the analysis of conceptual content in digital design was accomplished employing the ICF framework in the domain of *digital architecture*. Our

research assisted in demonstrating the following findings. We have identified new meaning for concepts that are associated with digital technology such as “dynamic”, “animated”, “interactive” “responsive”, “adaptive”, “hybrid” etc. and new usage of terminology and conceptual structures in digital design projects. Design concepts have emerged as the architectural content of what is defined today as *digital architecture*. Due to the ICF method we were able to demonstrate how selected terms within texts, had changed their meanings from being employed as descriptive content of architectural production to terms that represent the paradigmatic content itself. Another significant finding was that the change of meaning of the same expressions was due to a chronological shift in understanding the conceptual content of *digital architecture*.

The ICF method appears to provide a powerful method to study the evolutionary properties and emphasis in current theoretical and critical formulations in the architectural discourse. Thus it appears to be a means to represent significant conceptual formations in domain discourse as well as to study and represent that elusive form of intellectual change that we might term, the dynamics of discourse.

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