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Paradox in Digital Architectures

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Digital architectures are complex objects to analyse and for which any attempt of classification collides with the wealth and the disparity of their productions. In this article we try, at first, to identify and clarify the characteristics of the complexity of such analysis: the reuse of architectural concepts, on the one hand, and digital concepts, on the other hand, in the "twosome" Digital Architectures, leads to diversions of meaning and purpose, sometimes totally unusual. Secondly, we propose some original elements of analysis, through notions borrowed from the philosophy and the theory of art, in order to propose a classification, revealing sometimes a paradoxical situation.

Keywords: digital architectures, morphogenesis, virtual space, symbolic systems, paradox

1 Introduction

1.1 Ordinary definition of digital architectures

The title of this article uses the plural term "digital architectures." One could of course speak of "Digital Architecture" (at singular) and attempt a somewhat simplistic definition such as "Digital architecture is the architecture that wanders in computers limbo ... waiting probably for better." But in this sense, the term "Digital Architecture" seems to subsume digital productions of diverse and differentiated objects whose only link would be the more or less relevant use of digital technologies. What about the term "architecture"? Is it justified, justifiable? Can we try to identify a common thread between different objects covered by these technologies, to detect a continuity in the variation of their characteristics?

These are the questions we try to answer, by proposing, at first, a rough classification of these digital architectures.

1.2 Rough classification of digital architectures

The agency has a computer, so it must be used

It was (we can probably use the past) the reality principle to which the architect faced in these first reports with digital. There were two very separate worlds: on one side, the traditional architectural design, on the other side the machine. And the machine was used once the architectural project was defined. It was a matter of translate analogous documents into their digital versions (with more or less ease and respect of the original). When this translation was not imposed by the design offices, its aim was only to establish a

"high-tech" communication with other project stakeholders (in particular, it could be the guarantor of some technicality).

This is a category where the two terms "architecture" and "digital" are juxtaposed without rapprochement that can significantly affect the object or process of architectural design.

The digital model is a communication hub between project stakeholders

The digital object is at the heart of the communication of project information. It concerns, ideally, all stakeholders of the project. In its developed form, this approach has adopted a name: BIM for Building Information M, where the letter "M" can be declined in Model (digital model), Modelling (modelling process) and Management (managing building information). It means a significant change in the working methods of the architect, causing deep modification in the design process. BIM and its implementation, is the subject of many international studies. We do not develop here these studies, the interested reader may refer to [14], [10] and [5].

This is a category where the two terms "architecture" and "digital "are more closely related. However, if the BIM significantly affects the architecture description process, it seems more or less neutral with respect to the architectural object: one can elaborate the BIM of an historical monument.

Digital tools deploy new opportunities in the exploration of forms

We are here in a category that will be developed in the rest of this paper. The tools and numerical methods profoundly affect the design process and the architectural object itself. There is a clear determination to reuse mathematical and numerical tools (some of which have been developed a long time ago for the clarification of geometric and topological concepts) in the specific context of architectural forms generation. This reuse is not neutral or innocent, it affects in the highest degree the object produced, to the point that it is sometimes difficult to say if this object belongs to architecture or to the resolution of a geometric (topologic) problem. These new design techniques can deliver strange and unusual architectures (shown later in this article).

This is a category where the two terms "architecture" and "digital" are completely intertwined: the process and the purpose of the architectural design are deeply affected. We will try to analyse it in a later chapter.

Social networks sometimes dream of virtual architectures

We will not detail the functioning of social network sites (on this last point, one can refer to [11]). We simply venture to point out that some unprecedented space organizations (often qualified of virtual architectures) tend to develop in these purely digital spaces. This may be the foreshadowing of an Internet where (two-dimensional) websites will be replaced by space organizations (three-dimensional and digital), and where one can stroll in virtual buildings (or virtual urbanity) to access information. We will discuss the justification of the term "architecture" in a later chapter (a justification sometimes difficult to establish).

This is a category where the term "digital" is totally dominant and where the term "architecture" can be invoked through an analogy more or less relevant. If the design process seems clearly affected by this type of digital architectures, this is not always the case for the produced object, as we shall see later.

2 The attempted justification of the term "Architecture"

2.1 Disparate categories

In the previous rough classification, it seems clear that, as regards the words "architecture" and "digital", we do not always talk about the same thing (for an analysis of the complexity of relations between the two terms, one can refer to [4]). The "digital object" is, as the case, considered as a simple and separated device, or, conversely, complex, structured, and located in the heart of the process. It also sometimes exceeds the tool status and interferes with notions of space, culture and society. If the term "architecture" does not seem to be a problem in our first two categories (The agency has a computer, so it must be used, and, The digital model is a communication hub between project stakeholders), its use seems more problematic in the past two categories (Digital tools deploy new opportunities in the exploration of forms, and, Social networks sometimes dream of virtual architectures). We will examine the justification of this term in the next two chapters.

2.2 Revolution in architectural forms?

A quick analysis (and still a little bit rough) allows us to define three categories for the digital architectures exploring new possibilities of forms:

- Reuse of geometric or topological concepts
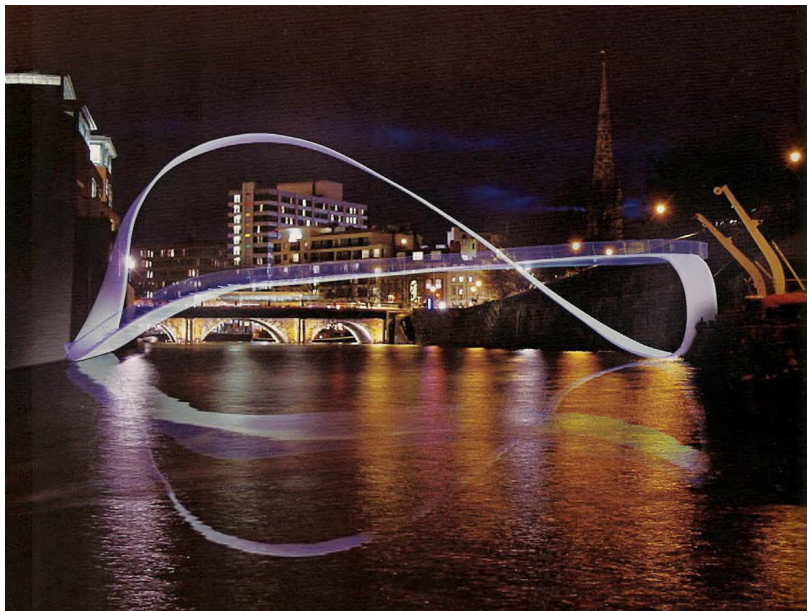
Figure 1 Pont Möbius, Hakes Associates, Bristol, UK [1]

- Reuse of geometric or topological concepts

Figure 2 Botanical tower 2 for Barcelona, D. Dollens / Exodesic [17]

- Parametric architecture and "free" forms

Figure 3 Busan Metropolitan City, Hernan Diaz Alonso / Xefirotarchi, Busan, South Korea [17]
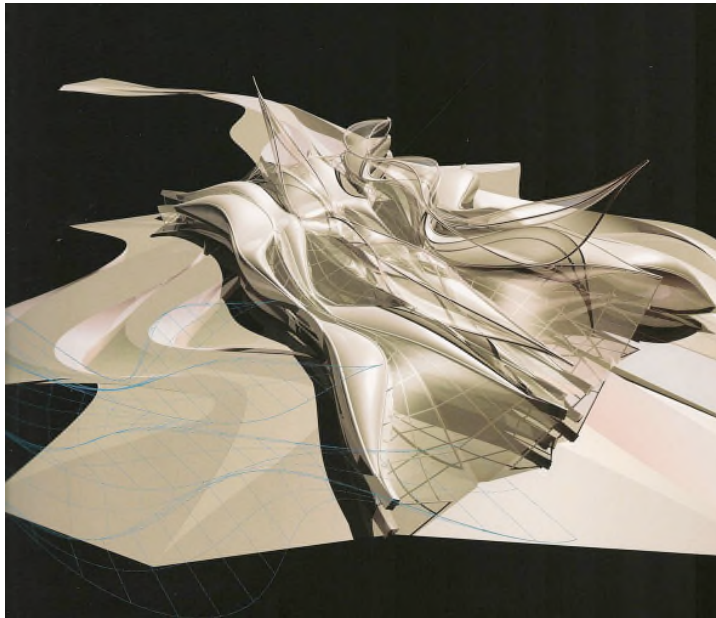
Figure 4 Museum of prehistory, Gyeonggi-do Jeongok, Qua'Virarch, South Korea [17]

Figure 5 New urban center in Istanbul, Zaha Hadid Architects, 2009 [21]

Figure 6 New urban center in Istanbul, Zaha Hadid Architects, 2009 [16]

In the first two cases (Figures 1 and 2), the term "architecture" seems to be reasonably justifiable: topological notions are subjected to buildings typologies, and if the resulting shape is complex, the building remains legible in its organization. In the second case (Figure 2), one could refer to a "natural" architecture (although this concept could offend some theoreticians of architecture), which implements growth processes of living organisms, in a totally different context (with or without using genetic algorithms, for more details, refer to [9]).

The third case, the parametric architecture and the free forms, is more problematic (Figures 3, 4, 5 and 6). Sometimes it's hard not to feel some discomfort at the sight of the produced images: do they really belong to architecture (or to sculpture)? What about the scale of the building? How is it decomposed? Do we really lost any reference to architectural elements (vocabulary of architecture and building typologies [8], [12])?

For designers of these objects, the traditional elements and typologies are obsolete, backward-looking (this attitude seems to sound like the leitmotif of some theorists of modern architecture…). Now we should design the architecture facing a complex society, "globalized", where the notions of fluidity, fold ([3], a recurrent theme in the literature of digital architectures designers), of "customization" and parameterization must replace the traditional (and archaic) notions of stability, differentiation and standardization [2], [13], [16], [18], [19].

Without underestimating these considerations, we can see that the design methods for these architectures seems comply with the procedures of computational geometry. Mathematical and computational methods for generating forms (though guided by the will of listen to contemporary societal changes) fully take precedence over conventional practices of the architectural project. In this case, the numerical and computational concepts upset the process and the object (in its form, its purpose, its operation, its aesthetics) of architectural design.

2.3 The virtualization of architecture?

A well-known and very representative example of the virtual architecture is the Guggenheim Virtual Museum Project of Asymptote Architects:
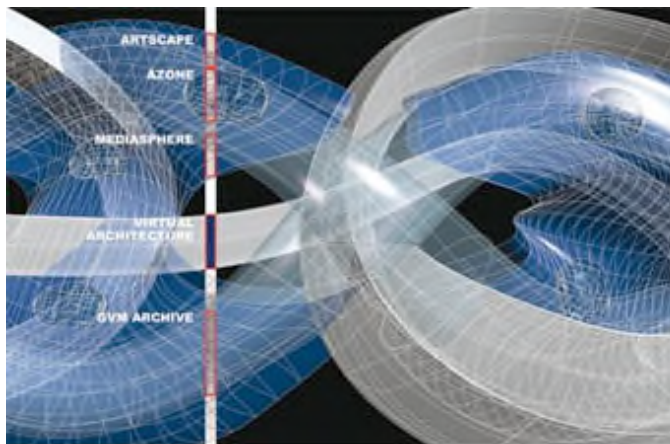
Figure 7 Guggenheim Virtual Museum, Asymptote Architects [22]

The justification of the term "architecture" can be attempted through an analogy of the produced object with a more traditional building: to show works of art along a pathway organized according to different themes (although, in this case, the pathway take place in a space with very different properties). Another type of justification (of the term "Architecture") is much more radical: it consists in the reuse of formal characteristics of an existing building. In this case, it is not a matter of reference, but of mimicry. Unlike the previous chapter, justification (of the term "Architecture") depends on a rigorous reuse of the elements and typologies of traditional architecture.

Figure 8 Farnsworth House, Mies Van Der Rohe, Second Life [23]

Figure 9 The Palace of Versailles, Second Life [23]

3 Proposal for analysing the digital architectures

It seems rather complicated to define principles for recognizing a certain continuity between these digital architectures (while allowing for differentiation between them, and to suggest a more satisfactory classification). However, we will attempt to do so by relying on two concepts. The first comes from the work of Nelson Goodman and Catherine Elgin on symbolic systems (syntactic differentiation / syntactic densification) [6]. The second was investigated by the theorist of modern art Philippe Junod (Transparency and Opacity) [7]. These two notions seem reveal a somewhat paradoxical situation. Figure 10 clarifies these concepts.

Digital Architectures

Physical
Notational system (Differentiation)
Transparency

Virtual
Pictorial system (Densification)
Opacity

Farnsworth House, Mies Van der Rohe [23]

Guggenheim Virtual Museum, Asymptote Architects [22]

Kunsthaus Graz, Cook & Fournier [24]

Museum of prehistory, Qua'Virar [4]
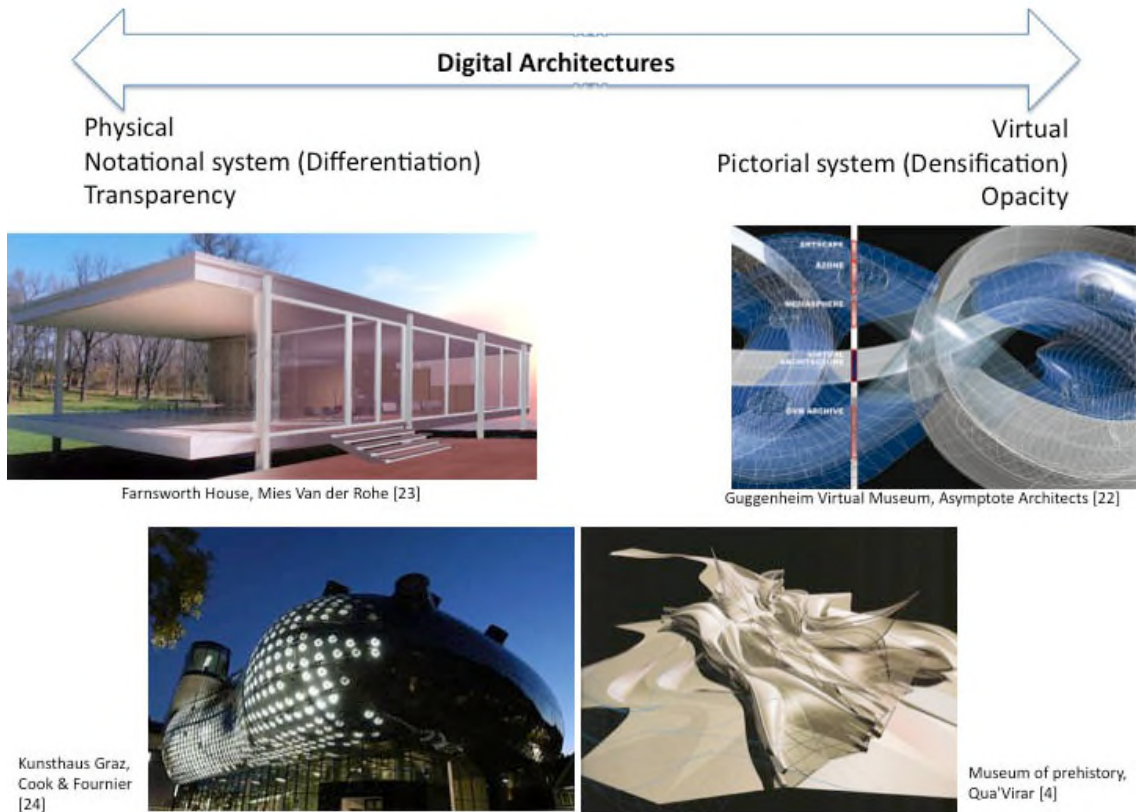
Figure 10 Proposal for analysing the digital architectures

3.1 Syntactic Differentiation / Syntactic Densification

The work of Nelson Goodman and Elgin Catherine investigates, among others, the syntactic characteristics of symbolic systems. Among these systems, some are syntactically differentiated: these are the notational systems (privileged example: the musical score) and the linguistic systems. In the latter two systems, the characteristics of the physical marks used (the size of the notes on a score, size or the font in a text) are not meaningful (or have little meaning as the case), unlike pictorial systems (syntactically dense) where the slightest touch of colour and the smallest stroke of pencil are constitutive of the work. The notational and linguistic systems allow copying (reproduction) without alteration of the work (underlying), while pictorial systems equate copying and falsification.

The conventional documents of architecture (plans, sections, etc.) clearly belong to the notational systems (the colour of the lines has generally little meaning). They are syntactically differentiated: they represent elements of architecture, construction, and implementation, according to the standards and codifications from a set of well-differentiated elements (to avoid any misinterpretation). What about the documents of digital architectures? If one refers to the image of the virtual museum of the previous figure, it seems that

we are dealing with a pictorial system: all the physical characteristics (visual) are significant and constitutive of the work. Digital architectures seem to be distributed between these two extremes (notational documents / pictorial systems): if some remain firmly in the notational, others borrow the principles of syntactic densification of the virtual. This would mean that, in its shift from conventional (analogue) to digital (digital), architecture acquires some syntactic densification characteristics. This is a paradox! This paradox can perhaps be explained by the fact that digital documents allow to define complex shapes more easily (curves, folded but continuous) than conventional documents. The paradox (from a point of view that could be called epistemological) remains: the information technology (the realm of discrete and discontinuous data) seems to foster and encourage the syntactic densification of the architectural forms.

3.2 Transparency and Opacity

By analysing the transition from representational art to abstract art ("Transparency of the mimesis" vs. "Opacity of the poïesis"), Philippe Junod gives us a second criterion of digital architectures analysis: the conventional documents of the architect are transparent (they denote physical elements), the representation of the virtual museum is totally opaque (it refers to itself). Again, the digital architectures seem to be distributed between these two extremes. Some digital architectures have opacity characteristics: in the image of the museum of prehistory, it is very complex to analyse the building, its decomposition in functional elements. Architecture becomes an image of itself.

This can be a paradox: the computer, contemporary medium (or meta-medium) par excellence, seems to hold captive in its digital world some elements of information and representation (probably like a black hole). Regarding digital architectures, the computer screen sometimes becomes opaque (which, in a sense, is perhaps the most normal function for a screen).

4 Conclusions

First, we observed that a classification of digital architectures is somewhat complex: different concepts intertwine, and the words "architecture" and "digital" do not always mean the same thing. The productions are quite disparate, and one can even find virtual objects totally identical to representations of physical objects, or representations of unprecedented physical objects making a clean sweep of the "traditional" vocabulary and typologies. In the realm of digital architectures, the different reuses of concepts related to architecture, on the one hand, and of concepts related to digital, on the other hand, can give birth to unprecedented objects or to unusual design methods.

In an attempt to shed some light on the digital architectures, we borrow two concepts, one from philosophy (more accurately, semiotics: syntactic Differentiation / syntactic Densification), and the other concept from the theory of art (Transparency and Opacity). These two concepts complement each other to analyse the digital architectures. They allowed us to identify what may seem a paradox: the more the digital aspect is emphasized, the more these architectures acquire syntactic density and opacity.

Acknowledgment

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