Virtual Architecture as Representation for Creative Design Process - Through Collaborative eDesign Studio.

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Abstract. *Using Virtual Architecture (VA) as a general scheme for representations to sustain the reflection activities involved in the design process can help students to initiate creative design ideas. Because of its implicit abstract nature, VA can be used, to represent original ideas or processes, or well-known architectural theories to articulate design ideas. Furthermore, VA as a mean of expression, turn out to be a source of inspiration for students who perceive it as medium with very few limits with which to develop, explore and express their design intuitions. A recent collaborative edesign studio experience is reported to illustrate the benefit observed. Using three examples out of ten student projects, we show how designs and design process have been characterized by those virtual representations.*
In fall semester 2004, the edesign studio took place between the Schools of Architecture of Toulouse and Université Laval in Québec. VA was both an academic and a studio topic at Laval while the other school students had a traditional design task to tackle, namely the rehabilitation of Chapou University Residences for students in Toulouse. Students from both schools composed each edesign team. In addition, three common architectural themes were web-documented and introduced to both classes: room, as defined by Louis Kahn: "a space which knows what it wants to be is a room"; color, as an architectural medium in dialectic with structure; and body-space relationships, as articulated by Gilles Deleuze and its projection to cyberspace.
From the edesign studio results, we are arguing that virtual architecture should be looked at not only as new domain to be investigated by architects and taught in academic studios but also as a new medium of design to develop and explore design intuitions through virtual representations.

Keywords. *Virtual Architecture; Virtual Representations; Medium; eDesign; Design by Collaboration.*

Introduction

In this paper, the ontological nature of Virtual Architecture (VA) is explored and discussed based on findings from compared student projects and from which we are arguing that VA is particularly well suited as a medium for developing design ideas for early architectural concepts. The paper is developed in four parts. First, the expression "virtual architecture" is defined in relation with the standpoint adopted, namely a clear distinction is made with Digital Architecture (DA), and its medium nature is specified. Second, the teaching medium aspect of VA is described. Third, three VA student projects are presented as examples to identify critical characteristics of VA for design. Finally, a discussion from finding cross comparisons is made.

Virtual architecture as medium

Traditionally, VA has often been used to include all architectural productions and designs done by computer, but as such the expression Digital Architecture (DA) seems to be more accurate since the purpose for which the design will be realized and used (and not outputted) does matter, that is, it should be physically built and inhabited. In that line of reasoning, VA becomes a subset of DA. VA is also viewed as a new domain for architectural practice and academic teaching, in particular, in its capability as analogy to physical architectures: the place, the office, the studio (Lau and Maher 1999, Maher et al 2000). As such, it has been used also as a design space for architectural metaphors (Huang and Schroepfer 2002, Oxman 2003). However through out this paper, VA will be reserved to specify architectures intended to be never physically built. That has historical implications and roots (as for the term "virtuality" itself), since all utopias may fall in that category. That as well has ontological implications, since now, the category of architecture, its nature, gives a new way to think

about it and opens new directions to develop and design it, it is an opportunity (Papanikolaou 2001, Rashid and Couture 2002, Marques et al 2003). Indeed, because of its implicit abstract nature (ontological), it can be used to represent either genuine new design ideas and processes, or well-known architectural theories or theoretical models to help articulate, develop and mature design ideas. That is also, an effort to reintroduce the notion of creativity in the design process as well as in interdisciplinary collaborations (Goulette and Léglise 2003) that characterize now well-used VDS.

Hence, using VA as a general scheme for representation, interaction, transformation, communication and diffusion, i.e. as a medium, to sustain, nourish and boost cognitive activities involved in the design process, could facilitate the emergence of intuitions (unconscious thinking) as well as design ideas (conscious thinking), or so it is argued.

Representation. In regard to the paper topic that is certainly the most significant capability of the new medium, as it is possible with VA "to get closer" and hence to get a better perception of the train of thoughts (ideas) emerging along a design process, by allowing its external representation (visualization) and thus making the whole process more self-aware. But, it is also the most difficult to capture and report since it is a multi-referential concept, referring to internal (mental image) as well as external representations (image) of any cognitive processes, as design might be.

Interaction. VA is medium where we can interact with others, e.g. through avatar identifications (3D representations of ourselves in a virtual world), or interact with the space itself or objects contained within. Thus it is a tool through which expressions can take place (Jung 2005).

Transformation. "… [T]he medium in which architecture is conceived… " (Coyne 2001; www.caad.ed.ac.uk/~richard/DevCAD/: May 2005). Implicit to the technology that sustains it, VA is also a medium as it could allow for real time transformations of objects and space geometries composing

the virtuality as well as the information transiting in it.

Communication and diffusion. VA is well adapted as a medium of communication. Being able to interact within, one can also communicate architectural concepts between concerned participants (professionals, clients, or users), again in real time through out the Web. As well and for the same reasons, VA is by itself a very good medium of diffusion either on the Web or CD.

Virtual architecture as teaching medium tool for architectural design exploration

VA as a mean of expression turns out to be a real source of inspiration for students who perceive it as medium with very few limits with which to develop, explore and mediate their intuitions and design ideas. They express a strong perception of VA as a new and more important a unique tool to work on and develop conceptual and abstract elements of design. The fact that VA is not a built architecture but a represented one, makes it potentially possible to take into account all aspects of its complexity, but the constraints linked to its physical construction. Indeed, this is the only type of architectural projects that students can systematically realize still in school. For that reason, students feel (and we think they are right) that 3D space representations seem to be the only limit, and since it is conceptually infinite, there is potentially no limit…

The non physical character of cyberspace – and thus VA – should be understood as the essence of this new medium, as a potential to redefine architecture by exhibiting all characteristics of what has been called "anti-architecture" which has no context, (hence) no place, is infinite, and has no metric or "geography", etc. (Campbell, 1996). Designing architecture in that type of space, we are forced to reconsider all our learning and understanding of architecture and that is what students

feel and express working with VA. That conceptual distance between physical architecture and VA makes it a truly powerful teaching tool where there is no evidence or commonplace to rely on. For students, all must be articulated and comprehended "bit by bit".

Another basic characteristic of traditional design that is not always well conscious to students, is the implicit project constraints from which most of design decisions can be drawn, namely: context, history, geography, physic, etc. As previously said, VA bypasses all those aspects forcing students to completely rethink and restructure their design process. Here too, those are great opportunities for teaching.

In other respects, in a not too far future, VA will merge within virtual reality (VR) and its represented virtual space will then be inhabited and thus will have to become a "place" with meaningful spatial information to people who will virtually be there.

Collaborative edesign studio

The edesign studio reported took place between the Schools of Architecture of Toulouse (EAT) and of Université Laval in Québec (EAUL), during Fall semester 2004. A previous one occurred during Fall of 2003 (Côté and Léglise 2005). Virtual architecture was both an academic and a studio topic in Québec while at l'École d'architecture de Toulouse, the students had a traditional design task to tackle, namely the rehabilitation of Chapou, a university residential building for students. Students from both schools composed all the edesign teams. In addition, three common architectural themes were web-documented and introduced: room, as defined by Louis Isidore Kahn: "a space which knows what it wants to be is a room" (cited in Norbert-Schulz 1979, p. 37); color, as an architectural medium in dialectic with structure; and body-space relationships, as articulated by Gilles Deleuze and its projection and confrontation to cyberspace (Buydens 2003, p. 134; Deleuze and

Guattari 1980, pp. 592-625; Villani 2003). Each team had to develop its project using at least one of the three themes.

Framework description. The common analysis and design pedagogical exercises that were carried out in the collaborative edesign studio, associated one or two student(s) of EAT with one student of EAUL. During eight consecutive weeks, on a weekly basis of six hours minimum within two days, those exercises could be done in line on a synchronous mode, and ended by a synchronous joint jury carried out inline and real time from Québec and Toulouse. These pedagogical practices engage each student's team to prepare a remote and synchronous presentation, which is an atypical way of doing that turns out to be, however, a rigorous training for students in formalization and cooperation.

The composition and distribution of material and human resources makes it possible for both groups of students to fully benefit from the local as well as the distant settings (Toulouse: http://www.toulouse.archi.fr/li2a/ac/: April 2005; Québec: http://limableu1/av_a2004/pages/accueil.htm: April 2005).

Technically, the 3D synchronous and real time communication relies on VNC protocol (Virtual Network Computing; http://www.realvnc.com/what.html: April 2005) that basically allows viewing and interacting with one remote computer on a peer-to-peer basis anywhere on the Internet using any pieces of software.

Finally, this pedagogical framework configuration is said to be a Multi-Cultural, Collaborative and Synchronous context – MCCS (George et al. 2004; http://isdm.univ-tln.fr/PDF/isdm18/30-georges-prevot-amgar-pierson.pdf: May 2005).

Three student projects study

The only way to insure a genuine understanding of VA is to interact in real time with one instance. With this real limitation in mind, this section tries in words and few illustrations to translate and express VA characteristics. Using three examples out of ten student projects, we want to illustrate how their designs and design processes were characterized by VA representations. The first teamwork reported elaborates on the theme of body-space relationship while focusing on the collaboration process and its aspects, namely, its necessity for a common language. For that purpose, they used as precedent Alexander's pattern language (1977) to "negotiate" between themselves and through virtual pattern representations, all dimensions of their edesign process. The second project is also about body-space relationship, but intimately tide to "intuitions driven process" based on virtual representations that become clues, means of exchange for design reflections. Finally, the last project explores the meaning of body-space relationships articulated through the concept of space "openings" using VA to drive the integration process of both concepts.

First project: "Space language"

In this project, the pairs of students developed a preoccupation for the design process as strong as for the design (project) itself. For that purpose, they articulated their work on the identification and study of a language to communicate and to collaborate together using AV as a medium of communication. As a precedent, they used Christopher Alexander's pattern language (1977). From the context of the Chapou project, they developed a unique and specific conceptual network of patterns that singularly characterizes it. They developed it using both, the network represented by virtual "artifacts" linked to each others based on the already identified patterns network, and the hierarchy that took place and was identified while visualizing those representations. And hence, it was that evolving complex representation that seeds and nourishes the Chapou Project.

Hence, each student's work can evolve in parallel with its own medium and space of represen-

Figure 1. Space language, by Nathalie Héroux and Vincent Candau.

tations. A common language describes, explains and builds them, but mainly, bonded them.

Indeed, the great coherence and effectiveness of the work produced by this pairs can mostly be explained by the very careful attention that they paid to reflections, clarifications and discussions, preliminary for their project production. They devoted the majority of their time to seek, find and adopt a sufficiently solid theoretical model – a pattern language – that would support their collaborative activities targeting the selected topic, namely characterizing the room spatial constituents. Once this theoretical structure established and shared (based on the network analysis of patterns), the exchanges and work were greatly facilitated and also became coherent. In fig.1, the left picture shows a graph of retained patterns as the room constituents. The one in the center shows a room

application of students' flow chart. And the right one illustrates a VA representation of complex network of room constituents.

Second project: "VA, intuition, and design process"

In this second project where three students were involved, one in Québec and two in Toulouse, three objectives guide and structure the overall process:

1.   Collaboration based on an empirical approach to the design process taken advantage of AV as a medium to articulate it

2.   Body-space relationship investigation through manipulation of the light

3.   The final Chapou project that must be well articulated from the synthesis of intuition sequences developed through AV.

Figure2. VA, intuition, and design process, by Olivier Jacques, Cecile Cambresy and Caroline Cholet .

The hypothesis made by the students of this team was that "intuitions as seeds for design process, expressed by VA, could sustain and even establish an empirical problem solving method".

In fig. 2, the left picture describes the rule principles of the collaborative game conceived by the students. The idea is to look at initial common and shared design principles and constraints from two different points of view. One that is intuitive having not all the information about the project and force to use imagination to "compensate", and the other, more systematic and analytic based on all available documentation in hand. Hence, similar to the game of "cadavre exquis" (exquisite corpse)[1], a work routine is established by communication, in a manner of back and forth exchanges of design and precedent object fragments produced and revisited over and over again by each partner – these fragments were called "clues" (see in fig. 2, the picture in the center). The Produced VRML world is a rather illustrative step of their collaborative design process which consists of an organized pictorial collection of various clues of intentions to be designed, namely a "mascarade" by which students had to question and discuss further in order to explore and grasp meaningful meanings, represented here by the structures that appear behind the masques (see in fig. 2, the right picture).

Third project: "Body-space relationship through openings"

In this last project where three students were also involved, the body-space relationship was explored through the concept of "opening". This notion allows for exploration of spatial interrelations such as juxtaposition and interpenetration of space and by extension of the body within the space. Stressing the body autonomy in regard to the space continuity and pregnance, a full range of ambiances and sensations can be elaborated and created thereafter.

Hence, for the students, openings became a source of "ways" and spatial circuits, from point of view to point of view, with the light playing and nourishing the space.

This teamwork was qualified by the jury to be a good illustration and demonstration of a very strong design collaborative process.

For that team, their collaborative process of communication evolved in negotiations between students where topics of study accumulated, because no one in the team wants to give up one selected topic. Thus, the body of questions and problems without answers that was accumulating

Figure 3. Body-space relationship through openings, by Valérie Dubé, Sarah Broggio and Marion Cassignol .

[1] This game is played by several people, each one would write a phrase on a sheet of paper, fold the paper and pass it on to the next player for his contribution. The name itself comes from the first playing by the surrealists: "Le cadavre exquis boira le vin nouveau" (The exquisite corpse will drink the young wine).

became multiple: body-space relation meanings, openings in real or virtual architecture differences, color and light contributions, identification of precedents, etc. … Hence, to manage to hold that diversity of interests, the tasks of each collaborator was precisely identified and standardized in order to present equivalent reflections for each selected topic — in particular, at the graphical level. Thus here, the result looks as a juxtaposition of approaches that produces because of the rigor of the team organization and planning, an effect of complementarities and unity that was also gained by the use and exchanges of VA representations.

Discussion

From the three previous VA projects, there are common and proper aspects that can be pinpointed for each of them that make statements about VA as a medium. We discuss it in the following.

In the first project "Space language", VA is used primary as pattern and pattern network representations and as aided to design the pattern language of Chapou project. It also plays a key role as medium of communication within the team. Here, it is VA flexibility and power of representation that comes into play, namely to create dynamic illustrations of identified abstract patterns of the room constituents.

In the second project "VA, intuition, and design process", VA was used as a medium of representation in particular for early design intuitions and interpretations of what was perceived from the project initial context data. That had a direct consequence to initiate a fruitful design process between both sides of the Atlantic. That dynamic process used those representations to make each student design intuitions and intentions understandable and acceptable through "negotiation".

The third project "Body-space relationship through openings" exploited VA as a medium for expression (interactions and transformations), diffusion and communication. As each students

wants to keep the original topic of study that each one had selected, they had to focus on producing representations that would make sense out of this blending. And for that purpose, VA was flexible enough for capturing individual viewpoints mixed with common concepts that would be sharable and make consensus.

All projects have used VA as a medium of communication and diffusion for the jury to make their proposition understandable and acceptable as a genuine design solution. The presentations were performed inline in real-time in VRML.

Furthermore, the three projects which are quite different in content, process and resulting design had VA to contribute in many ways to enhance those differences that were also sought as pedagogical objectives.

Namely, second and third grade students in architecture, if they are allowed to work on their project without a too tide agenda of constraints and rules to follow, either in their process or design goals, tend to produce genuine personalize projects. They are able to imprint their own signature and point of view in valuable propositions. VA as a medium has fostered that aspect of personalized dimension in projects and this is a good illustration that it is a true medium of expression, which could enhance creativity. For us, in the context of international VDS and from an ecological and humanitarian standpoint, the diversities of cultural and individual backgrounds are values that need to be defended and promoted for good design solutions and therefore any media or techniques that can sustained those goals ought to be used and studied for that purpose.

Conclusion and Future Works

From VA edesign studio findings, we are arguing that virtual architecture should be looked at not only as a new domain of practice and pedagogy to be investigated by architects and taught in academic studios but also as a new medium of

creation to develop and explore design intuitions through virtual representations.

The three reported students works are not so much remarkable by their design quality as for the richness and rightness of their design answer to the design topic at stake and we have shown that it is largely due to the understanding and use of VA as a medium for architectural design.

VA as a medium can be expended further in all type of designs and design processes, since it integrates itself very well in the early stage for search of design intuitions, after, to exchange those intuitions by representations, and later, to communicate and diffuse design solutions and propositions. As such, the possibilities of using and integrating VA are all most endless, and we are planning other VA edesign studio in other design context challenges, such as: adding more nodes to the edesign studio, always making students working in team from each location; combining VA with even more practical and traditional design topics as construction, engineering; and dedicating design topics to a strict VA subject, such as emuseum.

Acknowledgements

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