New Interfaces, new scenarios. Vroom n.0: Vroom n.0: The emerging potential of collaborative 3D web platforms

Eduardo Aguirre León
School of Architecture, University of Talca, Chile
eaguirre@utalca.cl / www.vroom.cl

Mauricio Ramirez Molina
School of Architecture, University of Talca, Chile
eramirez@utalca.cl / www.vroom.cl

Abstract. *What sort of interfaces will allow, in the future, to manage the evolution of information and knowledge generation? What new scenarios would emerge in contemporary architecture when the access to a multidimensional architectural database is open and it is written and visited by anyone, anywhere in earth? Internet evolution is fast and unpredictable, propelling deep changes at different levels of our society. Spinoffs, unexpected outcomes are result of those changes, unfolding uncertain, unstable scenarios. This paper discusses the question of what could be the way to organize the process of registering, documenting and online publishing, native digital, three-dimensional content of Architecture, assuming the critical issue of information integration.*

Keywords. *Interfaces, 3d database, 3d datamining, 3d taxonomy, online curatorship.*

Introduction

What sort of interfaces will allow, in the future, to manage the evolution of information and knowledge generation?

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Internet evolution is fast and unpredictable, propelling deep changes at different levels of our society. Spinoffs, unexpected outcomes are result of those changes, unfolding uncertain, unstable scenarios.

In a similar way, the revolution brought by the inclusion of information technologies in design and planning process in Architecture, has changed the discipline, its boundaries and has brought (and will probably bring) unpredictable outcomes at all levels of practice.

Along with changes in practice, IT´s allow to manage an enormous amount of digital information, which is now is natively generated.

Having in mind that in Latin-America there is not a tradition of documentation of architectural production in the way it is possible to find in Europe or North America; the aforementioned scenario opens up new challenges, possibilities and it has embedded an enormous potential for Latin-American archives and collections development in the future.

This is the context for this work, which is part of a research which aims to explore the potential of creating multidimensional architecture databases, its relationships with Web 2.0 and 3.0, and the emergence -out of online architectural 3D models publication - of new scenarios of architectural discourse.

This paper discusses the question of what could be the way to organize the process of registering, documenting and online publishing, native digital, three-dimensional content of Architecture, assuming the critical issue of information integration.

It will be discussed the extent it could have the creation of a complex, self-driven model for reading and writing certain architectural attributes out of the information embedded in 3D models which are part of a collaborative online database.

In the first part, the topic is framed by three issues: the problem of curatorship in relation to IT´s and internet, the specific problem of architectural documentation, and the main components for the research project out of the experience gained through the development of Vroom platform. (www.vroom.cl, online platform for visualization of a collection of 3D models, created and directed by Architect Mauricio Ramírez Molina, since 2004. The collection of models published there was generated within a series of courses of 3D and parametric modeling, given at the School of Architecture in Talca, between 2002 and 2004. Courses were taught by the authors of this paper, and all models created by architecture students. The process of editing and publishing content at the website, was developed by different collaborators. Full list of credits is available at the website).

In the second part, the approach to each one of those components will be explained, followed by a discussion of the critical issues for further developments.

Curatorship

Traditionally, curatorship has been the activity of keeping and organizing a collection of a certain value, as well as the content of it. Contemporary practice of curatorship also include other emphasis, such as the role of it in building a certain knowledge or depicting a specific situation, out of underlying relationships contained in the collection. The curator then, is the one who unveil those relations in a coherent manner, through specialization.

On one hand curatorship aims to preserve, to keep; on the other, it builds a certain discourse related to the collection, by means of defining a strategy for selection and classification. Curatorship implies, in any case, a conscious manipulation of the information contained in the collection, through its contextualization.

The extent of Information technologies and Internet developments, opens whole new scenarios and challenges for curatorship, which are currently in debate.

Part of it affects the management of collections, on issues of information (large amounts of new information, the problem of quality, authenticity, diversity, delocalization, reliability, among others) as well on changing the way curators work, moving from a traditionally individual practice, to a teamwork oriented practice which demands to work collectively, remotely, in association and collaboration.

Nowadays, it is possible to affirm that curatorship has moved its focus from one who relies exclusively on the view of the expert,

specialized curator and a specific collection; to a multiple view, which includes the collection, as well as the audiences and remote connected collections. To obviate the audiences and their preferences, would be to neglect the potential of new interpretations their input conveys.

This get even more critical in the case of curating information and collections on multimedia environments published through internet. Specially when observing the development of collaborative platforms which characterize the so called Web 2.0 .

Thus, the problem of exhibit and publishing collections, is set in the existing tension between the concentrated power of individual based curatorship, and the distributed power of collaborative web 2.0 platforms.

Two cases are explained to depict this polarity, and are relevant for the project presented here:

Philip Johnson, empowered by being the architecture director of The Museum of Modern Art in New York USA, it could be said he wrote twice the history of architecture, by curating two exhibitions which by their content reshaped Architectural theory machines and framed subsequent architectural production: The International Style (1932) y Deconstructivist Architecture (1988).

In other field, lies the case of myspace (http://www.myspace.com), the social networking website, which works with user-submitted content for music, videos and others. Myspace has allowed for hundreds of thousands of musics to make their work known through myspace, for free. Along with other resources it has, somehow, reconfigured musical stage worldwide replacing, or at least moving to a secondary place, the role of discographic companies which formerly were the ones who decided to promote an artist or not; by a distributed power of promotion governed by millions of people and their preferences.

It could be said that any selection, collection or archive which aims to get some relevance nowadays has to face those issues and take a strong position about it.

Latin America, Turning north upside down.

Adding to current curatorship issues state of the art questions on the role of information technologies in Architectural practice (ranging from CAD, to BIM, GIS, CAM and so on), including internet improvements (availability, reliability, interoperability, among others); it raises the problem of the enormous amount of information which is digitally produced for any project, which is easily available, transferrable, it can be replicated and easy to publish by multiple means.

Looking at this problem from Latin-America, this decentralized scenario allows for new challenges and big opportunities for the registry and documentation in Architecture.

Out of this, three questions are posed, which are guidelines for further development of this work:

Is it possible, with the help of digital means for database creation and management and web publishing means to write as a ghost writer does, the history of contemporary architecture from within?

What is the potential of decentralization embedded in a scenario where information is more accessible, and in which way this could influence and reshape contemporary architectural discourse?

Who are going to develop the platforms which will suite better to host, organize, manage and publish the enormous amount of information in Architecture that will be digitally produced in the following decades?

Native digital: Acquiring, organizing, archiving, publishing.

In the process of design, planning, building and management of Architectural projects, large amount of data is created. Such information is diverse in formats, sources, platforms and mostly is generated natively by digital means, progressively since the incorporation of Information Technologies to architectural production.

Counts among the content of information produced, text documents, (e-mails, technical reports, contracts, etc.), three dimensional models, Building Information Models, CAD drawings, diagrams, schemes, pictures, etc.

A critical issue in front of such diversity it is integration. This applies for all stages, from early sketchy design phases, up to post occupancy phases. Part of this problem as well is the necessity to track back information as well as correlate different information for every phase.

Being aware of that situation, four key components of the problem of registering, documenting and publishing digital information in Architecture are defined: The means to organize information, the means to read that information, the means to access it and the means to publish it.

Observing the evolution and current trends on incorporating digital platforms for architectural design and production, ranging from CAD (computer aided drawing) to BIM (Building Information Model), improvements tend to look for ways to integrate diverse information into one platform, pointing towards generating a multidimensional model or even more, a a building virtual prototype.

Such a prototype, which could take the form of a package or a framework, it is the main database for the project, integrating Architecture, Engineering and Construction (AEC), promoting a better workflow, collaborative and interdisciplinary. Nevertheless, differences in programming and encryption of every software package makes difficult at the moment for such an integrated process of design and production to be realized.

Up to now, one of the most successful formats for exchange between different software platforms and interoperability is three dimensional model. It is a geometrical description of forms and shapes (solids, surfaces, lines and their attributes for rendering), and allows to visualize and communicate between parties from the first stage of design on. Currently Drawing Exchange Format (.dxf) is the one which allows better interoperability, and reliability for three dimensional data. Also, the use of 3D modeling has been widely spread both on teaching and architectural practice.

Those facts support the idea that working with three dimensional models to create a first attempt for a system of collection of Digital files online, better suites current technologies. This would allow, within the aims of this research, to frame it, implement and asses a first version in order to get enough feedback to incorporate other parameters in further phases.

From Vroom 1.0 to Vroom n.0

The first version of Vroom, allowed users to visualize and manipulate online 3D models of well known International and Latin American architectural works. The assessment of the experience gathered there, added to the aforementioned topics, makes possible to identify four lines which, interrelated will be approached in further research and will be discussed later:

The creation of an architectural taxonomy, or a parametric system of classification based on the description of some specific attributes of every building, and sameness, families and patterns. This will be the conceptual basis for the design of the 3D models database and further data mining out of it.

The problem scientific 3D visualization, which should improve 3D models online interactivity, and should be the basis to visualize the outcomes of data mining.

The creation of an input/output interface to write and access the database, both for different types of users and editors.

How to read? Informatic curatorship for architecture

A necessary starting point for a curatorship is to read and interpret correctly the information the information contained in the collection or database.

If the amount of information contained in the collection is too big, and increases all the time at a high ratio, it could be possible to create a way to automatize part of the curatorship through the application of some artificial intelligence procedures and data mining. This would allow to obtain suggestions, combinations and other types of results, out of classification and selection of information.

For this automatized curatorship to be able work, it is necessary to instruct a software which has to be able to understand the codes of the specific discipline, in this case Architecture, embedded in any piece which is part of the collection, in this case, 3D models.

The basis for such a software will be programmed using models of architectural critique or architectural interpretation.

Those models are created out of the interpretation of the work of historians and critics like Kenneth Frampton, Aldo Rossi, Rayner Banham, Christopher Alexander, Collin Rowe, Herman Hertzberger, FOA among others. In some cases their work is an explicit attempt to create systems of classification of architectural production through types, morphology, sameness or patterns. In other cases the model underlying their work is is based on “soft” or subjective aspects for historical classification.

For any of their work it is being identified, and isolated, as a procedure, discursive structures, argumentative structures, analytic and descriptive structures. The aim of it is to be able to draw as a model, the following:

- How to start, sustain and finish a complete reading of a building.
- How to identify individual parts, groups, and/or systems in a building, all of them necessary to identify on it some attributes, both objective and subjective.
- How to create an interrelation of those attributes in a way that it is possible to relate the building to a specific line of thought, or trend, or movement in Architecture. In other ways, to inscribe the building in a discursive context.
- How to organize quantitative and qualitative comparison between buildings, between 2 or more study cases.

The adaptability of automatized curatorship models has to be tested and proved. It should be able to react to changes or trends, identifying by sensitivity the prevalence of some views, topics, emphasis or themes on top of others. (politics, climate change, energy, heritage,and so on)

It isn´t clear yet how it should be created, and is not part of the scope of the first part of this research, but audience studies through internet for music, news retail and other fields is a good example of how data mining for public preferences could feed this reactive aspect of the model for curatorship.

Towards a 3D Architectural Taxonomy.

The system of organization of the 3D models database, which is fundamental for management of large amounts of files, will be structured following the logic of taxonomy models, making use of their ability to contain and organize data as well as perform as predictors.

This principle of organization will focus on three levels:

The first is the one of the elements that conform or represent the physical components of a building, which, generally, don´t change for its interpretation or linguistic designation and are usually the starting point for any study, analysis or critique of buildings.

Finding the basic level which allows to define the smallest relevant unit is one of the tasks. The other is to find the upper level of definition for the necessary information to run an automatized curatorship model.

The second level will be the one of taxonomic models, extracting from each one of the 3D models their specific and more relevant qualities. The use of different taxonomic organizations should make active data mining processes guided by each taxonomic model: Taxonomy, phylogeny, morphology, evolutionary morphology, genetics, typology and pattern language.

The third level is the one of operators. It means that systems of relations which could be created out of conceptual sameness between models of classification and their complementarities. (for instance by adding formal attributes with its development in time, within a family of models according to a branch of a genealogy).

The normalizing feature of taxonomic classifications allows a universalization of the parameters to characterize a specie, creating through it some conditions for the stability and immanence of information.

Scientific 3D visualization:

The results of informatic curatorship obtained through this project, will be communicated to users and editors of Vroom n.0 mainly through three-dimensional graphic display and the development of an appropriated interface.

According to current trends of data processing and calculation, both centralized and distributed, the problem of graphic computing associated to the creation of that interface for 3D visualization stands on three key issues:

- The geometric representation of 3D models. By transcoding vector based 3D models to point based polygonal meshes, it would be possible to reduce in about 70% the size of the files, keeping the same definition and quality, and improving the definition for curved or complex shapes. Thus, the amount of time required to display 3D data online decreases.
- Real time process for texture mapping and the setup of libraries of graphic resources for representation of solids, transparency and other properties associated with light in 3D models.
- Real time interactivity with 3D models. It implies the possibility of online manipulation based on movement restrictions, position in space, and others. The main question for this issue is how to develop a way to improve realtime interactivity while keeping the original files safe from downloading when necessary.

Even more important than graphic computing issues, it is the problem of representation of “hidden” information that would be visible through data mining processes. There is an underlying problem of visualization composed by two components:

One is on the realm of scientific visualization. Its main goal, to transform abstract, objective data into images, which can be univocally interpreted.

The second lies on the field of creative visualization. Diagrams, mental maps, visual thesaurus, conceptual maps and other visual machines or representation techniques are part of this realm, which allows to represent subjective, hybrid or “blurred” content. This type of content has to be represented as part of the information necessary to be able to read and review an architectural work as a whole.

Integration of both graphic outputs in the same interface implies a problem of visual communication and is still difficult to predict what will be the result of such integration.

Input and Output: Writing and accessing the 3D data mining system.

The web interface which allows to submit and upload 3D files to the platform (for any type of user) it is required a software programming which is driven by the organizational structure of the database (3D architectural taxonomy).

It is necessary as well for the interface to have different ways of data writing depending on which are the types of files to upload. In the case of 3D models, Drawing Exchange Format (.dxf) has been in use for the first version of Vroom.

In this version, files are manually processed before their upload, which is optimized through organizing separately the components of the 3D model into different files, in the original modeling software. These files are uploaded separately and integrated again in one file, which is visualized through Java engine.

Through improving the base which is realized through open source software this manual process could be optimized towards automatization.

Different types of software has been tested, and this experience shows that it necessary to concentrate in a limited numbers of software platforms, the widespread ones.

Intellectual and industrial rights protection doesn´t make intercommunication between different design platforms, which means a process of 3D model simplification before uploading to the database. It is expected in the future this to be simpler.

Furthermore, there is the issue of the access interface, the output. It has been explained already the general requirements and conditions in the area of graphic computing and visualization, both scientific and creative.

For now it is necessary to give attention to the issues of design of an interface which allows to interact with the models. The issue here is the point in between ideal interactivity versus operative interactivity, due to large amount of data interrelated that has to be displayed depending on current processing capacities both for servers and clients.

Data mining embedded in all this process has to be instructed by predominant 3D information contained in the files. Some of them will probably be natively modeled in BIM platforms, but it is possible that some of the information contained is lost while transcoding to another file format which means that this information has toe be added after file conversion. This lack of reliability could be compensated by designing the interface in such a way that models could be enriched by adding information to some of their parameters by users, in a way a Wiki does. This could take the form of a vehicle for preferences tagging, opinion, reviews and others that could enrich further results of data mining operating for the whole collection.

This should, again, allow to get feedback about architectural works presented, enriching the digital curatorship engine, which is part of the advantages of digital environments.

Phasing

Currently, research is focused on implementing the conceptual basis for the Architectural 3D taxonomy, which is carried on by both researchers at the School of Architecture at Universidad de Talca, Chile, which is supporting the initiative.

This will be followed by a second phase, in which the project will carry on simultaneously all lines of research together by drawing the first design of the whole platform. It will be developed by an interdisciplinary research team which includes Architecture, Bioinformatics engineering, Computing engineering, and web graphic design, all of them part of different units within Universidad de Talca.

It is expected to have a Beta version of the platform by the end of the second phase, which will use as database, an approximate number of 150 3D models all of them generated by students and teachers of the School of Architecture in Talca, since 2002 in a series of courses. Those models were the basis for the first version of Vroom, and were edited to be part of it.

This initiative could be followed by the association with other Latin American architecture schools which could be invited to join the project for collaboration.

Out of the second phase above described, an assessment of the results should allow to draw the main lines to bring the platform to the third phase which would include full functionality, different levels of accessibility, differentiated quality and issues of intellectual property solved.

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