

**LOCAL VALUES**  
**in a**  
**NETWORKED**  
**DESIGN WORLD**

ADDED VALUE OF COMPUTER AIDED  
ARCHITECTURAL DESIGN

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## **Urbamedia -**

# **Development of an urban database of fragments of some Argentinean and Latin-American cities using digital technology VRML + CAQDAS Aided Qualitative Data Analysis Software \*).**

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## **Abstract**

The proposal of "**Urbamedia**" is to undertake the development of 3D virtual and interactive models of historical areas of Latin-American cities.

The selected zone is the "Mayo Avenue" including the "Mayo Square", an historical place of the city of Buenos Aires, Argentina; this project is financed by the National Agency of Scientific and Technological Development of Argentina and the University of Buenos Aires.

We are presenting the first experimental model of the "Mayo Square" that has been developed at **ABACUS**, Department of Architecture & Building Aids Computer Unit, University of Strathclyde UK. combined with a system analysis of urban activities using the "Atlas.ti" CAQDAS software.

This particular use of the "Atlas.ti" software is under experimental applications to this type of urban analysis procedures; allowed us the possibility to analysed a set of activities by means of graph theory as result of a series of interviews to the people working in the area.

We are also looking to include historical areas of three cities: Mar del Plata, Rosario and Santa Fe (Argentina) and eventually other cities from Latin América as Rio de Janeiro and Habana.

Due that ABACUS has a strong experience in city modelling plus the powerful software and hardware used there, we must develop a VRML customized menu to be adapted to our low cost PC equipment.

The 3D model will be used mainly in urban design simulation procedures and the idea is to extend to other type of simulations of the environmental parameters.

## **Objectives**

### **General Objectives**

Based on the first works of (Maver 87), (Montagu 87)(2), (Maver, Petric, Ennis, Lindsay 00), (Maver, Ucelli, Conti 01) and some recent investigators (Ripper Koss 98), (Barria Chateau, García Alvarado, Lagos Vergara, Parra Márquez 00), (Gaterman 00), (Dokonal, Martens, Ploesch 01), (Chiu-Shui Chan 01) we propose to organise a database for the development of 3D VRML models for Internet 3D with small files for low cost PCs.

### **Pedagogical objectives**

In the last 18 years (since 1984) there has been pedagogical projects that has been developed at the CAO Center concern with digital educational tools for teachers, investigators and students. There were planned for a long term development procedures for organizing a digital library using the students work at the design studios of the Faculty including the possibility to organize “books, CD and planning the future web sites” (see: [www.datarq.fadu.uba.ar](http://www.datarq.fadu.uba.ar)).

The following projects are characterized to be published in some of the mentioned supports. In addition, they have been financed by the University of Buenos Aires and the National Agency of Scientific and Technological Promotion.

The first project is DATARQ "Data base of Modern and Contemporary Architecture"; (Montagu et.al. 96); the second is ARQUIMEDIA, “an Experimental Pedagogical Vision of the Cultural Integration of Media ". (Montagu et.al.98).

The URBAMEDIA (Montagu et.al 01) is under development and will also be published in some of the mentioned supports.

## **Introduction**

### **The new technologies of information: The Interphases**

The multimedia data bases applicable to different fields of knowledge have already been implemented successful before. Nevertheless, we need to analyze the possibilities that the combined use of tools like Geographical Information Systems (GIS), 2D and 3D, CAD, VR and RVSI offers. For example, a multimedia data base that includes urban 3D models will be able, in an interactive way, to assist to anyone in the processes of decision making from the point of view of the urban-architectonic design and the urban planning.

## **Local Values in a Networked Design World**

### **URBAMEDIA and Collaborative Design**

We have been started from the base that this type work can only be done with

computers since it is based on virtual environments using technology VRML that is international and free.

The work in groups needs organization, systematizing, methodology, order, rules and discipline. If the whole group does not respect these rules, the work fails at some point.

From the point of view of the participants (cad operators, programmers, sociologists, etc), they must adapt to the above mentioned procedure of work and this proves to a bit inconveniently since there can always be many different criteria to realize the same task without necessarily being better than another one. Often these rules are converted into a small manual that the new participants must study before beginning to work and this needs time that normally we don't have. It is definitively always necessary to pass thru this process of adjustment to the work methodology "imposed", but that it is a fundamental condition to work as a successful team.

In our case the information is digitalized from books, magazines, photocopies, Internet and converted into digital 2D and 3D models to be incorporated later into the Urbamedia's data base. Once obtained all the possible information, everything must be corroborated and checked. In case the information is taken from the real world, it is possible to get it with traditional means as the metric tape or in more complex cases with a 3D building scanner. The digital photography is also of great use to reduce the weight of the files being used as textures in 3D models.

## **Global and Local | Local and Global**

The Urbamedia has two approaches, one global and one local. The idea is that local teams contribute to the global data base. The local teams are those that have the information more to hand and direct. Basically the Urbamedia will be like as a digital library full of information in its digital components books. Just like it is possible to take a book from a library and read it, in the Urbamedia we will be able to be enter, navigate and search for city information in its different historical periods. It is a way of exposing the information in another way that it will probably turn out to be more attractive, sensual and challenging for the new generations that are culturally totally immersed in environments 3D.

## **Digital Integration**

### **Democratization of the information**

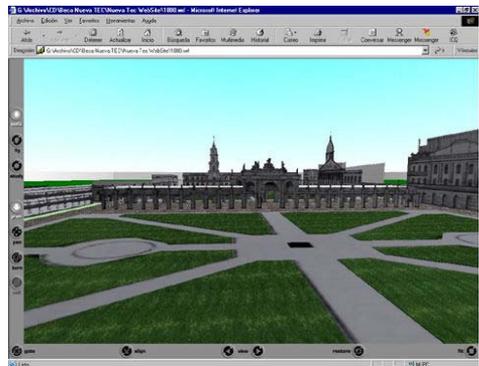
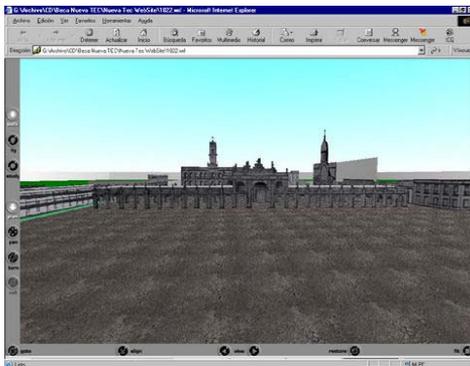
The new technologies of the information (NTI) and the communication are producing a deep change in the form in which we relate with our physical and psychic surroundings. On the other hand, this same technological advance is generating a very important increase of the information volume available for our natural and constructed environment. In the form in which we accede, we interact and we analyze this information will depend a better knowledge on its problematic and therefore one better solution of them.

### **Integration of the digital information**

The creation of computerized data bases allows to operate in a more rational way the use

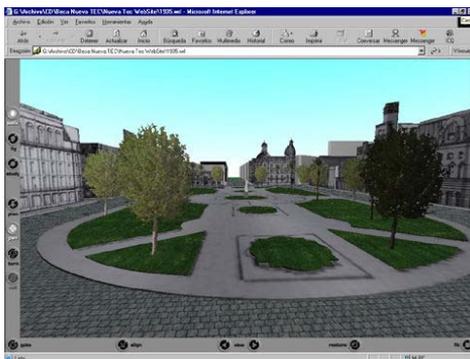
of the information. The publication of these data in multimedia format eases the reading and as well as produces in a gradual form the democratization of the information in as much as it facilitates the access of the massive user to it by the denominated " New Technologies of the Information".

Based on the Geographical Information System developed by the Urban Patrimony Direction of the City of Buenos Aires we are developing a three-dimensional model of the central area of the city of Buenos Aires defined by the axis Av. of Mayo and the Plaza de Mayo in four historical periods: 1820, 1880, 1935, 2002 (Gutierrez, Berjman 95).



Let us consider that the urban 3D models can be navigated in a VRML environment (similar although no equal to the virtual reality, but much more accessible financially speaking ). To this we can add the possibility of the collaborative design through new paradigms of design by the Internet and other already existing Intranets in our country.

This type of interaction between the process of design and urban planning and the integration of the 3D information (extremely fragmented in our media), is one of the more original characteristics that this project presents.



## **Methodology of pedagogical and curricular transference.**

The development of the pedagogical methodology is based on an exhaustive knowledge of a set of computer graphics programs from which it is possible to apply the software of Virtual Reality (non immersive).

Therefore the graduated students or interested in this subject must know:

A vectorial software that allows to make 3D modelling.

A vectorial-pixelar software that allows to operate with three parameters: A system of textures, a system of illumination and a system of animation.

A software that allows the digital hyper textual edition.

From this knowledge base it is possible to use the methodology of representation in "real time" that has developed the Abacus group of the University of Strathclyde, Glasgow, Scotland, in the test and demonstration immersive room of virtual reality in real time. This room is connected with the Vision Laboratory.

Equipment: Reality Centre of three tubes. 150°~160° SGI

The virtual reality laboratory has a semi-immersive system of projection: it is similar to a small theatre of 15-seats of 5 meters by 2 meters high and one curved screen of 160 degrees. It has one of the best graphical motors in the market; a Graphics Silicone of 12 processors Onyx2 - InfiniteReality2 with a ram of 6 GB. It projects hi-res images through three projectors Barco at 25 frames per second. The three images are combined to conform a single image of 5x2 meters that are equivalent to the eye visual cone of the spectators. The system allows a small group of people to share the experience.



## Operative Aspects

The development of a Urban Structures Visualization System using VRML Digital Technology must be adapted to the local and present conditions of Argentina which has determined the necessity to develop a set of customized menus with the VRML system.

This part of the project is being developed and is what it will allow to develop a program for low cost personal computers.

In a second stage and if we can organize the "Semi-immersive visualization laboratory", we will be able to advance to an operative methodology with the most advanced design requirements.



## Immersive Virtual Reality IVR: projectual aspects

The IVR marks the future tendency for the "processes of design verification", the IVR provides a fitted idea of space perception in architecture, urban design or industrial design.

Numerous applications exist such as: simulation of remote and inaccessible places, no existing places, data base of History, Data base of Architecture, Entertainment, Simulations for medicine and Engineering, etc.

## Programs used for VR.

The integration of modelling and render programs uses 3D Max, 3D VIZ, AutoCAD and the Form-Z. The ABACUS Program at Strathclyde University has developed a program in Java to operate in "Java Collaborative Architectural Design Tool VR" (Ucelli, Conti op.cit.). It is a program of virtual reality where it is possible to construct objects in 3D and by avatars we are able to observe other users who also can be constructing objects in real time. It is like a more advanced and interactive version of a 3D Chat.

## VR Systems

Although it is difficult to classified all the VR systems, they could be summarized in three main categories and each category could as well be classified by the sense of immersion or the degree of presence that it provides. The immersion or the presence can be measured on the base of the attention degree that the user reaches.

## **Non Immersives**

Non Immersive systems, as the name suggest, are the fewer immersives of all the VR systems. Using an office PC, the virtual environment is seen across a window using a monitor of high standard resolution. The interaction with the virtual environment can happen with keyboards, mice and Trackball or can be optimized using 3D interaction devices as a SpaceBall or a DataGlove. The non immersive system has the advantage that does not need a special PC or the latest graphic board.

This means that these VR systems allow the use low cost computers that it is also possible to use for other applications. Nevertheless, this low cost means that these systems provide a limited sense of immersion. Besides, they are of the little use where it is important to feel the scale of the objects. Nevertheless, it is possible to see an increase in these VR systems in the nearby future. This is due to the fact that it is expected that the VRML is adopted as standard for the transference of the information 3D and the Internet virtual worlds.

VRML's advantage for the user of PC is that this type of software is executed relatively well in a PC, which not always is the case of other VR programs. Besides, many programmers are incorporating the technology VRML in its programs and are studying the commercial possibilities for the world of home PCs.

## **Semi - Immersive**

The Semi-immersive systems have been based on technologies developed in the field of the flight simulators.

A semi-immersive system requires that the computer can operate properly: a 29'-30', a multimedia projector and multiple broadcasting systems.

These systems are similar to the IMAX (Sony) cinemas, using a wide field of view, increase the sensation of immersion. Nevertheless, the quality of the projected image is an important consideration. It is important to calibrate the geometry of the projected image to prevent distortions and the resolution will determine the quality of the textures, colours and the capacity of the user to read text in the screen. The resolutions of the projection systems go from 1000 - 3000 lines but to reach the highest levels, it is necessary to use multiple projection systems that are more expensive.

The semi-immersives systems therefore provide a greater sense of the presence that the non-immersives and also a greater perception of the scale. In addition, the images that they can be provided are of a greater resolution than the "Head-Mounted Displays" (HMDs). This can have a considerable advantage in educative applications whereas it allows the simultaneous experience of the Virtual Surroundings that are not possible with the immersive systems (HMDs). In addition, the projection of stereo image can be reached, using a certain type of eyeglasses that are synchronized with the graphical system.

## **Immersives: Complete Immersion Visualization Systems**

These systems combine the visualization of the HMDs with a system "track-head-

coupled" that allows a multiple spatial orientation or Omni-Orientation ". The user receives a visual image if he turn his head in any direction.

The completely immersive systems give an immersion sense that cannot be reached by any other system, but the sense of the immersion depends on several parameters including the field of view of the HMD, the resolution, the update index and the contrast and illumination of the image.

One of the first complete immersion systems was "The Cave" (Carolina Cruz-Neira, Gives Sandin, and Tom DeFanti 93), Carolina Cruz-Neira is an outstanding Venezuelan System Engineer who at the moment directs the laboratory of visualization of the Iowa State University.

The CAVE is a virtual projection system developed in the electronic visualization laboratory, of the University of Illinois.

In order to experiment with 3D they equip the users with stereo glasses crystals that also allow to see their "friends" in the CAVE. The stereo projection and the light sources from 4 faces heighten the sense of 3D to the visitor (who receives 30 pictures per second in real time). The interaction and navigation in the CAVE are possible through a three-dimensional mouse.

## Conclusions

### Future laboratory of visualization of the CAO Centre

Combining some of the mentioned characteristics we will organize (when the financial conditions allow it) a combination of the mentioned elements but in a reduced scale. On a wide screen of 3 by 1.50 meters with a concave form, images will be projected by a multimedia using (HMDs) with the possibility of analysing architecture fragments, urban design area.

## References

- \* CAQDAS Software by Dr. Thomas Muhr. Berlin.
- Barría Chateau,H.;García Alvarado,R.;Lagos Vergara,R.;Parra Márquez,J. "Un Modelo Experimental en el Espacio-Tiempo de la Realidad Virtual". IV Congreso SIGRADI, J. Ripper Kós,A.Pessoa Borde and D.Rodriguez Barros,251-253. Río de Janeiro. Septiembre 2000.
- Bustos, G. "Menús Virtuales en VRML. Para la Asistencia del Diseño de Espacios Interiores". 2da.CONVEACA. Iván Burgos, FADLUZ, CONDES,78-87. Maracaibo. Venezuela. Diciembre 2001.
- Chiu-Shui,C. "Design in a Full-scale Immersive Environment" 2da. CONVEACA. Iván Burgos, FADLUZ, CONDES,36-53. Maracaibo.Venezuela. Diciembre 2001.
- Conti, G., Ucelli, C., Maver, T., "JCAD-VR: Collaborative Architectural Design Tool in Virtual Reality". ECAADE 19, Hannu Penttila, 454-459, Helsinki Agosto 2001.
- Cruz Neira, C., Sandin, C., De Fanti, D., "The Cave Automatic Virtual Environment". ACM SIGGRAPH 93, 135-142. 1993.
- Dokonal, W.,Martens, B, Ploesch, R., "On the Borderline, Building a 3-D City Model with

- Students. ECAADE 19, Hannu Penttila, 410-416, Helsinki Agosto 2001.
- Gatermann,H. "From VrmI to Augmented Reality Via Panorama-Integration and Eai-Java". IV Congreso SIGRADI, J.Ripper Kós, A.Pessoa Borde and D.Rodríguez Barros,254-256. Río de Janeiro. Septiembre 2000.
- Gutierrez, R., Berjman, S., "Plaza de Mayo. Escenario de la videa Argentina". Fundación Banco de Boston, Colección Cuadernos del Aguila, Buenos Aires,1995.
- Llavaneras Sánchez,G. "El Diseño de Mundos Virtuales como Proyecto de Titulación de Pregrado en Arquitectura". 2da. CONVEACA, Iván Burgos, FADLUZ, CONDES,166-173. Maracaibo. Venezuela. Diciembre 2001.
- Maver, T., "Modelling the City Scale with Geometry Engines". Computer Aided Design, Vol.19, Nº 4 1987.
- Maver,T.;Petric,J.;Ennis,G.;Lindsay,M. "Visiting the Virtual City". IV Congreso SIGRADI, J.Ripper Kós,A.Pessoa Borde and D.Rodríguez Barros,135-142. Río de Janeiro. Septiembre 2000.
- Maver,T. "Chronicle of the City". V Congreso SIGRADI, G.Guzman Dumont, 322-324. Chile.Noviembre 2001.
- Monedero,J. "Recorrido Interactivo por Escenarios Virtuales de Grandes Dimensiones". V Congreso SIGRADI, G.Guzman Dumont, 165-167. Chile.Noviembre 2001.
- Ripper Kós,J. "Icones Urbanos: A Cidade Revelada a Través de Modelos 3D" V Congreso SIGRADI, G.Guzman Dumont, 19-21. Chile.Noviembre 2001.
- Tosello,M.;Giordano,R. "Un Espacio para la Poesía". IV Congreso SIGRADI, J.Ripper Kós, A.Pessoa Borde and D.Rodríguez Barros,152-154. Río de Janeiro. Septiembre 2000.
- Vélez Jahn, G. "Arquitectura Virtual: Fronteras" IV Congreso SIGRADI, J.Ripper Kós, A. Pessoa Borde and D.Rodríguez Barros,126-131. Río de Janeiro. Septiembre 2000.
- Vélez Jahn,G. "Del Computador en Arquitectura a la Arquitectura en el Computador".2da. Iván Burgos, FADLUZ, CONDES,22-35. Maracaibo.Venezuela.
- Prof. Arq. Cristina Argumedo; Prof. Arq Dora Castañé; Sr. Carlos Tessier; Arq. Claudio Deho; Dis. Federico Palma; Arq. Hernan Shikler. Asesor Prof. Arq. Adrián Barcesat.

