

3D CITY MODEL TO ENABLE BOGOTA AS A TOURIST CITY

Luz Angela Rocha Salamanca

Universidad Distrital F.J.C
E-mail: lrocha@udistrital.edu.co

Fabián Ricardo Mejía Ospina

Universidad Distrital F.J.C
E-mail: mejiafabian@udistrital.edu.co

Gina Nathalia Alfonso Vargas

Universidad Distrital F.J.C
E-mail: nachalys16@msn.com

Summary

Bogotá, capital of Colombia, in the past decade has improved its digital city status, by the increasing use of information technology and communications, in both administrative and technical processes inside the city. The result of this process was a new model of the city, where spatial information is an important element in the decision –making process.

At the same time has been converted, in the country's main tourist destination because it has cultural activities, scientific and academic events, and hosting the important cultural international events. The city also offers a wide variety of restaurants of national and international food, entertainment venues, clubs, parks, museums and shopping centers.

This paper is the result of the research, which aim is to determine which planning practices could be applying on a new model of an informational city, based on the digital city and information society concepts, showing the city's progress in the implementation of Information Technology and Communications (ITC), inside the local administration using a prototype application that shows how the 3D city model techniques, support planning activities in order to enable Bogota as a tourist city, not only for national visitors but also for foreigners.

INTRODUCTION

At the beginning of the XXI century was generated a movement called the "information age" whose foundation was the introduction of new technologies such as information technology and microelectronics, which generated changes in the economic structure and therefore in the social structure by the new form of procurement and distribution of information (Gaja, Fernando 2003, p. 4).

This new city model called "Informational", is based on the use of information technology and telecommunications and networking and networked information systems. In the digital

city, economy and production system based on industry is replaced by the information economy where technological innovation is supported by the processes of research and development (R & D).

The purpose of this paper is to showing the Bogotá city's progress in the implementation of ITC, inside the local administration using a prototype application that shows how the 3D city model techniques, support planning activities in order to enable Bogota as a tourist city.

NEW MODEL FOR PLANNING THE BOGOTÁ DIGITAL CITY

Bogota in the late nineties as a planning tool determined the Strategic Plan "Bogota 2000", which one in 1998, was the foundation, to the Territorial Ordering Plan (POT). From these strategic plan still is preserved the concept, but not the essential form, because in the city has been applied strategic projects, together with other planning tools such as POT.

During 2008-2012 the local administration of Bogotá does not establish a strategic plan, its actions focuses in the economic, social, environmental and public works, "positive Bogota: to live better" plan, which includes elements such as democratic participation of its groups of actors, improving the quality of life and equity. Also establishes principles of public policy that are based on equality, solidarity, human development, sustainability and economic development among others. (Concejo de Bogotá, 2008).

The model of Bogotá as dense and compact city, begins by the historical trend and evolution of the city in the eighties and nineties, where the population density was 210 people per ha, with a population of 6,700,000 inhabitants. This densification was virtually silent, which caused the deterioration of environmental areas, the disappearance of public spaces and increased traffic congestion and hence mobility. (Salazar, J. & Roa, F. 2008).

For these reason planning tools proposed in the POT, for planning activities of the city, consist primarily of plans on three levels. The instruments considered are:

First level: Citywide

- Master Plans

Second level: in specific areas of the city

- Partial Plans

- Plans order zonal and zonal

- Zonal Planning Units (UPZ)

Third level: in the reduced areas

- Implementation Plans

- Plans regularization

- Morphological recovery plans

As digital city, in Bogota the spatial information in the last decade has been considered as an important element in the development of it. As an alternative strategy for determining national and local policies for the management of spatial information, in Bogota was created the Spatial Data Infrastructure for the Capital District (IDECA). The IDECA is established with the primary aim to integrate the resources, standards, technologies,

policies, legal frameworks, administrative and organizational, necessary for the effective creation, collection, management, access, distribution, exchange and use of spatial data in the Capital District of Bogotá for sustainable development of the city (UAECD, 2012).

The proposed conceptual model of Bogota digital, is overlooking the city with another approach, because it is based on the concepts of the digital city, and the application of information technology and communications in the District Administration focused to the tourism development.

Tourism in Bogotá

Bogotá city collects many visitors because it offers a wide variety of activities to do at the cultural, sports and all kinds of events. Also has a number of international restaurants and recreation sites specially at night, parks, museums, shopping malls and architecture. The Colombian capital has about 8 million between Bogota citizens and strangers, is became an important worldwide region, ready for change, innovation, watching the progress of humanity and technology. According to the latest ranking published by ICCA “country and city with the highest perform global events”, Bogotá turned into the first city in the country with the largest number of events held in the world. It is located within the first 50 cities, ranking at No. 47, up 32 places in the world rankings in just one year.

The District Tourism Policy in Bogota achieved in the POT includes the City Tourism Master Plan in order to arrange actions to manage from the tourist perspective, urban land and rural town, preserving the regional balance, social, economic and environmental.

3D PROTOTYPE MODEL

To test the model a prototype of a 3D model application (Mejía F.;Alfonso N. 2012). framed in the tourism master plan of the city was created with proposed elements regarding the planning model for digital Bogota.

The system is based on a model of servers consisting of an application server that is responsible for making available to clients the visualization layers (interfaces) and a server that handles the presentation of geographic and alphanumeric data and performing the geo-processing activities.

The based data used for the 3D model was the number of floors of the constructions and the heights. The extrusion of the buildings was created, using the information on the number of floors of the constructions, generating a new geometry shaped by the union of two polygons with the same shape and size separated by a predetermined distance and connected in each of its edges on the other side. The separation distance between the upper and lower face of the model is defined by: $h = n * c$; where:

h:Height (spacing between the upper and lower faces)

n:Number of floors

c:Approximate height of one floor

To make the three-dimensional geographic data communication between the server and client, we use the Open GIS GML encoding format, which increases the functionality of standard WFS (Web Feature Service), defined by the OGC (Open Geospatial Consortium). This procedure was to facilitate the deployment of the geometries in a native format for the Google Earth API engine which serving as geographic deployment of the system.

The Web application is deployed on a single sheet composed of a top banner containing basic information, a sidebar of tools access to each of the functions identified as functional requirements of the system, and finally a container that is displayed spatial information.

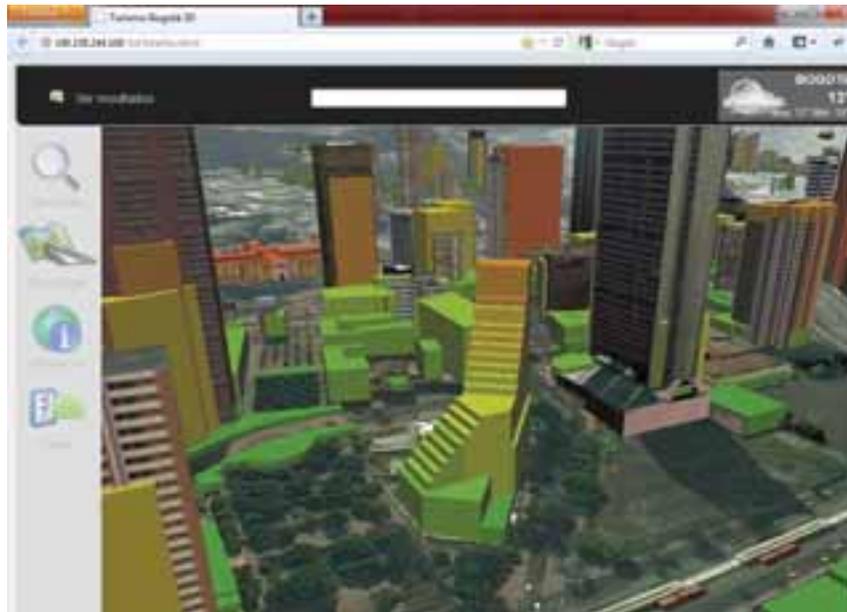


Figure 1: main interface

To make the query (basic or advanced) of the tourist sites should be allowed by type, selecting from a drop down menu. Then it is possible to write a text string searching at the data base the name of the sites. For advanced queries it is allowed to enter an address or a point on the map and choose the maximum displacement on which we have to estimate the service area.

The application allows entering the address as a parameter point of origin and point of destination, or else, selecting a point on the map and then calculating the route between the two points, the description of the route is displayed in a details box and gives the ability to view the virtual tour of the calculated route.



Figure 2: Routing results

The virtual tour is presented as a series of 3D views that flow over a period of time resulting in an effect of movement along a path, to a selected place for the user to specific tourist site, such as Monserrate.

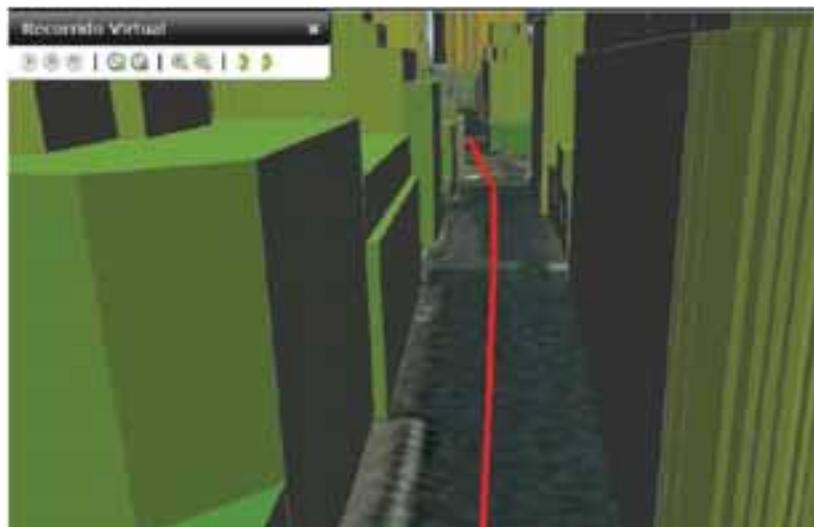


Figure 3: Virtual tour

CONCLUSIONS

The new city model requires new planning elements to it. These elements are determined by the characteristics of Bogotá as digital city under the concepts of the importance of spatial information in developing, applying a model of governance to improve the decision-making processes.

Spatial information has become relevant for the implementation of planning tools in the city, since its proper use and dissemination, have been highly increased by the creation of

spatial data infrastructure in the Capital District, allowed such information flows through the different institutions and shared in an efficient manner, minimizing duplication of effort and data.

Although 2D data are still useful for various applications, it lacks the detail necessary to solve complex problems related to planning, design and infrastructure. A 2D representation could lead to misinterpretation of the physical environment. Traditionally, geographical information systems in a web environment are restricted to presenting information in two dimensions, this due to the limitations generated by the web environment, where you can only send a small fraction of the information.

In the spatial data infrastructures, the process of managing and maintaining the three-dimensional spatial information, is provided with the active participation of the entities that are part of the infrastructure, reducing the duplication of work, facilitating access to information and generating a value to two-dimensional data for certain purposes can be considered as incomplete.

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