

The use of 3D GIS Models to improve the process of urban planning and management: the case study of the city of Fortaleza, Brazil

Summary

The disordered urban occupation that occurred in the main Brazilian cities in past years and the high population growth make it difficult to identify alternatives and solutions for urban planning, using only the traditional planning techniques. Fortaleza is the densest state capital in Brazil and the lack of use of appropriate methodologies and technologies for understanding the territory has hindered the process of urban planning and management, leading to a negative impact on the development of the municipality and on the quality of life of the citizens. The main objective of this thesis is to investigate the use of 3D GIS models to improve the urban planning and management process. The research is introduced by the analysis of the state of knowledge about 3D GIS models in the urban planning and management process followed by a comparative analysis of the urban planning and management systems in Fortaleza (Brazil) and Lisbon (Portugal), to assess the applicability of 3D GIS models, in two contexts, with the same cultural root but with different evolution and dimension.

The research presents the results of the development of a 3D GIS application, in an area of Fortaleza city with high building density, to verify if according to the current urban planning rules it would be possible to achieve the recommendations in plans and projects for the area, and finally evaluates the inclusion of the 3D GIS model in the urban planning and management process. 3D GIS models proved to have great applicability in urban management and planning process in cities with high construction density for which the simulation and visualization of alternatives can be a decisive factor in choosing the best planning solution. The 3D GIS model developed for the city of Fortaleza has demonstrated a high capability for simulation of urban landscapes, favouring the participation of the various actors, interactively and collaboratively, and expands the ability to analyze urban territory and its territorial dynamics in a sustainable way. Despite the differences in size and context between Fortaleza and Lisbon, the inclusion of 3D GIS models in the management and planning process reveals to be essential for both municipalities.

Keywords

3D GIS, urban planning, urban management, procedural modeling, Fortaleza, Brazil.



Identificação de terrenos com área igual ou superior a 1500 m².



Ocupação máxima da ZO4 e identificação dos edifícios em terrenos acima de 1500 m².



PhD student

Caroline Câmara Benevides

PhD program

Territorial Engineering (IST, University of Lisbon)

Supervisor

Jorge Batista e Silva (IST, University of Lisbon)

Co-supervisor

Ana Falcão Flor (CERIS, IST, University of Lisbon)

Period

2016-2020

Funding

-