Chapter 84
Urban Geospatial Management System

Rudj Maria Todaro
Insula S.p.A., Italy

Ayça Cangel
International Competitiveness Research Institute, Turkey

ABSTRACT

A city is a complex system of dynamic elements, including streets, buildings, subways, and sewers, that are subject to constant changes. For the last decade, Information Technology has played a vital role in planning and management of such complexity through creating integration, flexibility and homogeneity in terms of data and processing. While an urban Information System aims to serve and support everyday tasks of people who are responsible for daily operations of the city, such a focus often involves top-down approach. A system that involves contributions of data from many users may provide better administrative level tools for correct decision-making, and urban planning literature presents many computerized tools and applications which could be applicable to more interactive real-life processes. This chapter presents a geospatial maintenance system of Venice that has been developed to include the contributions of users in different levels.

The City of Venice has been a unique tourism destination for decades and has attracted thousands of visitors every year coming for various purposes (leisure, restoration, business, etc.). Particularly important to Venice is its reputation for being the "City of Water," but this legacy also involves challenges. The city is constantly under the threat of degradation caused by salty lagoon water that flood into the city in certain times of the year. At this point, urban maintenance of city elements is essential to ensure minimum functional levels of city infrastructure. The system introduced in this chapter is an Urban Geospatial Maintenance System designed for Venice that focuses on planning and execution of maintenance work and is based on the logic of integration of classical management concepts and Geospatial Information Systems (GIS) concepts.

INTRODUCTION

The rapid development of Information and Communication Technologies plays a major role in the improvement of planning processes and utilization of resources in urban infrastructures management (Huang, 2003; Hamilton, Burns, et al., 2005; Hamilton, Wang, et al., 2005; Wang etal., 2007). However, the integration of new technologies stands as a big challenge for urban managers and engineers (Huber, 1990; Pierre et al., 2001a, 2001b; Quintero et al., 2005). Because the planning, design and operation of a complex urban system such as a city requires a complex information system in order to perform these operations with prospective success level. Today, public administrations have to integrate a wide range of data such as design data, maintenance data or geographic information from different sources and utilize these data in an operation of an urban infrastructure with minimum level of data loss or duplicity (Quintero et al., 2005) and maximum level of precision, consistency and integrity (Michele & Daniela, 2011). In addition to data, the service quality, financial status, time management, feasibility are some of the other aspects that have to be considered while realizing daily operations of an urban territory.

The system to be planned and managed is a combination of different subsystems that have mutual relationships and multiple functions as well as different user types that interact with the system and different parties undertaking planning and maintenance activities. Since the introduction of new technologies, functions such as feedback data management, the planning maintenance management or the works management have been developed to assist public administrations during the management process (Michele & Daniela, 2011). Rubenstein-Montano (2000) states that all of the computerized tools that have been introduced in the urban planning literature, somehow provide some type of decision support and classifies urban information systems accord-

ing to their decision support nature as: decision support systems, group decision support systems, spatial decision support systems, expert systems, and knowledge-based decision support systems. There are various studies in the literature presenting different applications of information systems used in urban management. Hadzilacos et al. (2000) mentions a decision-support system for rehabilitation planning and optimization of the maintenance of underground pipe networks of water utilities while Ghaemi et al. (2009) presents a web-based platform in their study that enables interactive environmental planning, which aims to provide tools for municipalities and community-based groups to identify candidate project sites. Pederson et al. (2004) describes a GIS-based management tool for conversation and management of biodiversity and the process of implementation in Oslo. The multi-agency system presented enable local authorities to find out any conflicts between conversation interests and other types of land use and acts as an information source for the public, and consultants who are related to environmental impact assessments. GIS serves as a facilitator for spatial decision-making and planning processes (Boroushaki & Malczewski, 2010). GIS based technologies have become widely used especially since 90's in urban infrastructure management especially within public administrations and have been combined with other specialist systems in order to fulfill the needs of advanced applications (Abel et al., 1992; Armstrong et al., 1991; Chang et al., 1997; Kim et al., 2000; Miyamoto et al.,1997; Parrott & Stutz, 1991; Pior & Osman, 1997; Sanchez, 1993; Siderelis, 1991; Yeh & Chow, 1996; as cited in Pior & Shimizu, 2001). In a GIS, any kind of data of an infrastructure is in relation with the geographical position of the on the territory map (Michele & Daniela, 2011). Planner's mode of work and their way of decision-making have evolved with the assistance of GIS since these systems have led to improvement of organizational efficiency and effectiveness (Leonard-Barton & Kraus, 1985; Aldosary & Zaheer,1996). In

Related Content

Prioritization of Sub-Watershed Based on Soil Loss Estimation Using RUSLE Model: A Case Study of Digaru Watershed, Assam, India

Dhanjit Deka, Jyoti Prasad Das, Madine Hazarikaand Debashree Borah (2024). *International Journal of Applied Geospatial Research (pp. 1-25).*

www.irma-international.org/article/prioritization-of-sub-watershed-based-on-soil-loss-estimation-using-rusle-model/340039

A Collaborative Academia-Industry Approach to Developing a Higher Education Programme in Building Information Modelling

Mark Kelly, Mark Costello, Gerard Nicholsonand Jim O'Connor (2016). *International Journal of 3-D Information Modeling (pp. 39-54).*

www.irma-international.org/article/a-collaborative-academia-industry-approach-to-developing-a-higher-education-programme-in-building-information-modelling/172180

Web-Based Collaborative Spatial Decision Support Systems: A Technological Perspective

Songnian Li (2006). *Collaborative Geographic Information Systems (pp. 285-315).*

www.irma-international.org/chapter/web-based-collaborative-spatial-decision/6663

Privacy-Preserving Spatial Trajectory Prediction Based on a Novel Matrix Representation

Wen-Chen Hu, Naima Kaabouch, Hung-Jen Yangand S. Hossein Mousavinezhad (2016). *Geospatial Research: Concepts, Methodologies, Tools, and Applications (pp. 1693-1717).*

www.irma-international.org/chapter/privacy-preserving-spatial-trajectory-prediction-based-on-a-novel-matrix-representation/149571

Capability Analysis of Suitable Natural Habitat for Wild American Ginseng: A Sensitivity Analysis of Main Growing Factors

Mehrnaz Khademianand Rick Bunch (2024). *International Journal of Applied Geospatial Research (pp. 1-23).*

www.irma-international.org/article/capability-analysis-of-suitable-natural-habitat-for-wild-american-ginseng/336927