Management of Big Geographic Data for Smart City Applications

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SUMMARY

Geographic data relating to location/earth can be produced not only by mapping authorities but also by any mobile users with GPS receiver, satellite images and various sensor units in large volumes. Interoperability of these big geographic data sets and services generated in various thematic areas and Geographic Information Systems (GIS) software environments has become an important requirement.

According to the ISO/TC211 Geographic Information Committee and Open Geospatial Consortium (OGC) standards, object-oriented data schemas are designed with Unified Modelling Language (UML) and then geographic data exchange format based on Geographic Markup Language (GML) are produced. However, because it is very complex and difficult to directly adapt the conceptual data schemas into physical database environment, they can not be used locally in accordance with the application needs. In this perspective, new approaches related to technological developments should be examined for using UML/GML based data schemas within national Geographic Data Infrastructure (GDI) projects like Turkish National GIS (TUCBS) more feasible and efficient.

In this paper, firstly smart city concept will be explained with all the requirements and application domains. Then the concept of spatially enabled big data and its importance for smart cities. Secondly, initiatives to management and applications of big geographic data for smart cities will be introduced and explained. In order to use big geographic data coming from different sources, open data exchange standards and technologies to support interoperability for intelligent urban management will be analysed. Applicable aspects database structures such as NoSQL / NewSQL will be defined for object-relational database structure that manages geographic data sets configured in a specific standard and for managing large geographic data from different sources. Finally, the methodology will be defined for the integration of geographic data sets developed on independent

bases and for their usefulness in smart city management concept. Thus, it helps public authorities to determine the right investment plan for smart city implementation with low expense and high efficiency.