GEOGRAPHIC INFORMATION SYSTEMS AS AN INTEGRATED DECISION SUPPORT TOOL FOR MUNICIPAL INFRASTRUCTURE ASSET MANAGEMENT

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The three-year Municipal Infrastructure Investment Planning (MIIP) project is currently investigating investment planning and strategic asset management. The project proposes the use of geographic information systems (GIS) as the framework for decision support tools for municipal infrastructure managers, and more specifically, as tools to assist them to prioritize infrastructure maintenance and capital renewal.

GIS helps store, manage, analyse, manipulate and display data that are linked spatially. In fact, GIS relates database records and their associated attribute data to a physical location in "real" world coordinates, thereby creating a "smart map". Visualization of discrete parts of these data on a GIS map is possible by layering the data into different "themes". GIS applications can then display the intersection of various "themes". Typically, GIS applications in use today in municipalities primarily assist administrative functions; however, municipalities are recognizing the benefits of spatially related data to manage their municipal infrastructure assets. GIS data represents real objects (such as roads, land use, elevation, trees, waterways, etc.) with digital data determining the mix. Real objects can be divided into two abstractions: discrete objects (e.g., a house) and continuous fields (such as rainfall amount, or elevations). Traditionally, there are two broad methods used to store data in a GIS for both kinds of abstractions mapping references: raster images and vector. Points, lines, and polygons are the stuff of mapped location attribute references. A new hybrid method of storing data is that of identifying point clouds, which combine three-dimensional points with RGB information at each point, returning a "3D colour image". Then GIS thematic maps are becoming more and more realistically visually descriptive of what they set out to show or determine. Shortcomings of using GIS for managing municipal infrastructure include the high costs of data conversion, the lack of strong 3D capabilities, no ability to store "time-dependent" data, and the lack of object-oriented representation. The major opportunity for GIS for an organization is to create an "Enterprise GIS" solution where data, information and knowledge can be shared and flow freely throughout the enterprise and potentially to the general public.

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