

Facilities Management using Remote Sensing and GIS Techniques

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Abstract

Facilities management in an urban environment calls for detailed information on existing urban features like settlements, transport networks, water bodies, vacant lands, etc. and the integration of the same with necessary collateral information such as trend of population growth.

Geographic information systems (GIS) are one technology that has many practical uses not only for facility managers but it is a system that allows one to view, understand, question, interpret and visualize data in many ways that reveal relationships, patterns and trends in the form of maps, globes, reports and charts. A GIS can be used for space management, visualization, planning, Health facilities, disaster planning and response, as well as many other applications. Modern GIS is an integrated system of computer software, data and information about the location and geography of things and phenomena and the relationships between them. GIS is used to interact with, manage and display geographic information.

Managing facilities is a complex challenge that requires information from a wide variety of sources. Using accurate data about the locations of facilities, and the assets within them, supports better decision making about site selection, capital planning, project coordination, work order logistics, security planning and many other aspects of facility management. In today's competitive world, a successful utility must take maximum advantage of each of its considerable recourses, from people to equipment to information. Integrated geographic and other spatial data to make maximum use of this valuable asset has become very much important.

This paper will provide a detailed overview about how remote sensing and geographic information systems are useful for the individuals and the government in field of facility management. The advent of high resolution satellite data has opened new application field for facility management. Working with high resolution satellite data such as Quickbird, IKONOS, and Cartosat-2 is much more valuable to acquire the better output. As facility managers begin to integrate GIS support into their information management strategic plans, one important consideration is the development, maintenance and management of the fundamental geospatial data required for better-informed facility management decision making. This will fulfill the economic, social and environmental objectives of sustainable development.

Keywords: Spatial data coordinate location, satellite image, GIS.

Introduction

In modern society Facilities have become the primary habitat for humans.

As technology advances at a record pace, our man-made ecosystems are becoming more complex and sophisticated. Given the importance of facilities and their place in society, a

revolution in facilities management is occurring. Geographic information systems (GIS) are designed specifically for the management and analysis of spatial relationships, and offer many benefits to the facilities management community.

Government and private facilities need to take precautions to protect their infrastructure, personnel, and physical assets. Tools and methodology have been developed for conducting vulnerability and survivability assessments to identify facility security vulnerabilities and provide recommendations and mitigations. Modern GIS is an integrated system of computer software^[1] and data and information about the location and geography of things and phenomena and the relationships between them. GIS is used to interact with, manage and display geographic information. Geographic Information Systems (GIS) are being used as a tool for assessments and as a front end into facility management software^[2].

Aims and Objective

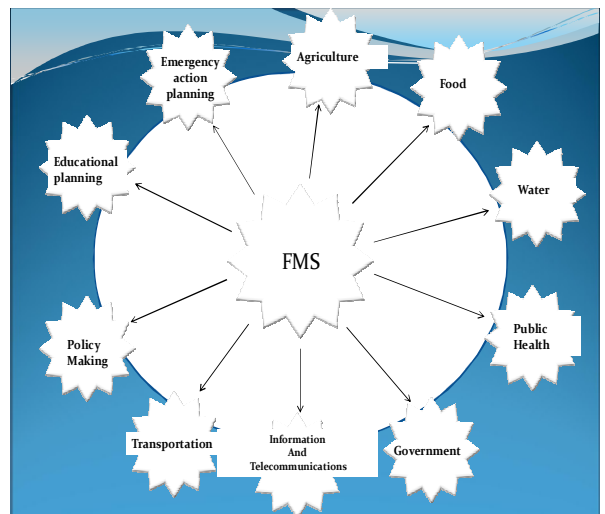
- GIS mapping for utilities that helps for development and planning purpose.
- Spatial data should be correct and accurate.
- Users will have easy access to information such as- parking space, building etc.
- Geographic information, which provides the position and shapes of specific geographic features.
- Attribute information, which provides additional non-graphic information about each feature.

- Display information, which describes how the features will appear on the screen.

Use of Remote Sensing and GIS in Facility Management

One of the most powerful capabilities of a GIS is that of geospatial analysis. Geospatial analysis can help facility managers answer important questions that are otherwise difficult to address. Geospatial analysis is usually grouped into a number of different types. The list below describes types of geospatial analysis, and how they can be used by facility managers today:

- Buffer – How many things are within x distance of this location?
- How many offices are there within x distance of this lab, classroom or parking lot?
- What are the walk times between a parking lot and each facility?
- Overlay – What things are within the boundaries of a specified area?
- Which offices are within the space described by this lease?
- Which security cameras are in this security zone?
- Geocoding – Provide a location that corresponds to a given address.
 - Where is 123 Main Street?
 - Where is John Doe’s office?
 - Where is phone number 230-0182?
- Density – Show the density of things typically per square unit, such as feet or acre (meter or hectare).



- Where is the highest concentration of students at 2 p.m. on Wednesdays?

- Where is the highest concentration of work orders in the past 30 days?

How can we get facility information through Remote Sensing & GIS

Through GIS, integration of spatial data sources can be a seamless process that provides us a single source solution to meet their management needs. With help of some thematic layers we can generated numbers of informations.

GIS provides seamless scaling from very large-scale global data to very small-scale local perspectives. The various scales at which GIS is useful for facility management include from global, regional and local to campus and room or space scales.

These informations can be provided in various level, major categories, types and sub types. For example:Transport network.

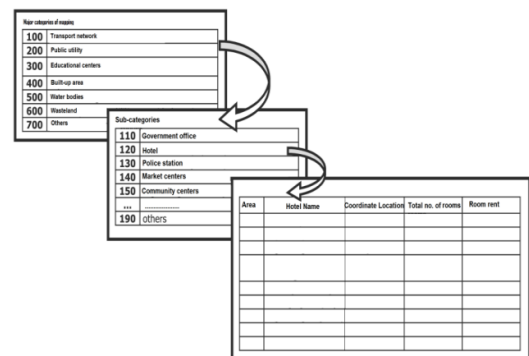
- Major roads
 - Minor roads
 - Lane
 - Unmattelled road
 - Railway
- 1) Public utility.
 - Government office
 - Private office
 - Police station
 - Market centers
 - Community centers
 - Overhead tank
 - Hotel
 - Guest house/Dharmshala
 - Historical place
 - Holy place
 - Parking place
 - Park/Garden
 - 2) Educational centers.
 - Universities/colleges
 - Private Degree colleges
 - Government schools

- Private schools
 - Primary schools
- 3) Built-up area
 - Residential area
 - Commercial centers
 - Industrial centers
 - 4) Water bodies
 - River
 - Drain
 - Canal
 - Pond
 - 5) Wasteland
 - Oxbow lake
 - Swampy marshy area
 - Scrub land
 - Salt affected land
 - Sandy area

All these information can be used in various planning purpose.

Attribute Information

Attribute data describes specific map features but is not inherently graphic. For example, an attribute associated with a road might be its name or the date it was last paved. Attributes are often stored in database files kept separately from the graphic portion of the map. Attributes pertain only to vector maps; they are seldom associated with raster images.



Result and Discussions

Our purpose to present this important topic leading all of you was to show the importance of GIS is useful for the individuals and the government in field of various application fields such as facility management.

Here are just a few workflows that are possible with GIS as an integrated component of an enterprise facility management infrastructure:

- GIS can be the core of a real-time visualization platform to provide live information feeds to a map-based visual interface, not only for specific facility but also with other facility systems, such as building automation systems (BAS), energy systems, metering, security, parking and many more.

- GIS can support physical security monitoring and analyses, both inside and outside of buildings, utilizing proximity analyses, staffing allocation and routing, especially when integrated with real-time data feeds from video or other monitoring equipment.
- GIS can provide utilities/telecom/IT infrastructure network analysis for redundancy and service interruption at the building, site and regional levels.
- GIS can help support parking (structured and unstructured, on-site, off-site) visualization and analyses, potentially in real time, to ease campus congestion and increase customer satisfaction.
- GIS is a powerful tool for analyzing foot and vehicle traffic on site roads and sidewalks to ease congestion and/or support retail market analyses.

Emergency action planning with and without GIS

Without GIS	With GIS
Planning with outdated paper maps	Terrain models and hydrography for natural and human threat modeling
No ability to do iterative “what if” scenario modeling of different types of threats or emergencies	Campus environment modeling, including combined natural, built environment and building interiors for incident modeling, planning and prevention
Lack of accurate, shared information between agencies	Routing and access, obstacle, choke point and assembly point modeling
No dynamic mapping to account for present environmental conditions	Modeling with real-time data feeds and services such as weather, traffic and accident/emergency conditions

GIS provides tremendous potential for analyzing in-building foot traffic or

movement of individuals (e.g., in a detainment facility or hospital). It is possible

that GIS could be integrated with security or cardkey systems, or video monitoring equipment to enable visualization of temporal movement of individuals through space for security, space planning and dispatch scenarios.

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