



CRP 514: Introduction to GIS

GIS Utilization in Facility Management

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Introduction

Geographic information systems (GIS) are a technology that has many uses and advantages in many fields. One of the potential fields of utilization is Facility Management. GIS can be used by facility managers for space management, visualization and planning, and emergency and disaster planning and response, as well as many other applications.

GIS can be very helpful for facility managers in order to forecast for their future space, plan for yearly maintenance, response efficiently during emergencies and manage their facilities in an efficient manner.

This paper will cover the potential utilization of GIS in facility management field and will illustrate case studies and success stories about how GIS can help for better and efficient facility management.

Purpose of the study

This paper was initiated with the objective of:

- Illustrating the potential usage of GIS applications in facility management.
- Explorer case study and examples to support the study and to prove the efficiency of the integration between GIS & FM.

Methodology

The paper mainly is consisted of a literature review that explored the recent published articles by Esri that focused on GIS applications for facility management. In addition, a cast study from the same source was illustrated in the paper.

Literature Review

Overview of Facilities Management

According to the International Facility Management Association (IFMA), Facility management is defined as a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.

In another word, the facility manager rule involved the coordination and integration of workplace, occupants and work processes that ensures the continuity of the operation in a way that the facility will perform as designed and planned for it.

The FM sector acts as an umbrella, horizontally oriented market. It currently represents about 5% of global GDP. Because of its increasing relevance to the core business, it more and more takes the lead when developing a 'new world of work' and 'new ways of working'. As a result the need for convergence with Human Resources, Real Estate and Information Technology has increased dramatically. Also, the FM sector has started taking its social responsibility, has become a strong driver of economy and proofed its role as integrator of people, place and processes. As a result FM has become the leading business service able to integrate the tangible assets of real estate and facilities with the intangible assets of facility services.

The discipline of facility management and the role of facility managers in particular are evolving to the extent that many managers have to operate at two levels: strategic-tactical and operational. In the former case, clients, customers and end-users need to be informed about the potential impact of their decisions on the provision of space, services, cost and business risk. In the latter, it is the role of a facility manager to ensure corporate and regulatory compliance plus the proper operation of all aspects of a building to create an optimal, safe and cost effective environment for the occupants to function. (*Wikipedia*)

The facility manager should have two sorts of skills and knowledge areas in order to have a comprehensive background that qualifies him for successful facility management:

- Hard skills: such as electrical distribution, civil, plumbing, operation, maintenance and spatial planning
- Soft skills: such as managerial skills, negotiations, time management, team building, problem solving and financial awareness.

An overview of Geographic Information System GIS

Modern GIS is an integrated system of computer software 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. (*Rich and Davis 2010*)

GIS was first computerized in the 1960s as an effort to automate the landscape planning process of separating design influences, such as hydrography, vegetation, soils and ownership boundaries, into different layers. The approach before computerization was to draw each of the layers to scale on a separate page of acetate and then physically recombine them by stacking the pages in order to visualize different aspects of a proposed design. In the ensuing decades, GIS has matured into an enterprise-class technology platform that allows users to model the spatial relationships between and among many important aspects of our complex world.

GIS Basics

There are five basic core concepts of GIS:

- GIS has layers
- GIS provides seamless scaling
- GIS attribute data is strongly typed
- There are several kinds of GIS feature classes
- GIS supports topologically rich data models

GIS Layers

As known, GIS has multiple layers depend on the intent that the map was generated and designed for. Not all layers are relevant to the facility managers. Traditional geospatial data layers that might be of interest to facility managers include:

- Transportation (road centerlines, edge of pavement, rail lines, airports)
- Hydrography (lakes, ponds, rivers, streams)
- Utilities

- Pedestrian corridors
- Land use
- Zoning
- Parcel ownership
- Aerial imagery
- Digital elevation models
- Demographics
- Facility condition index (FCI)
- Performance measurement by building
- Total cost of occupancy by building

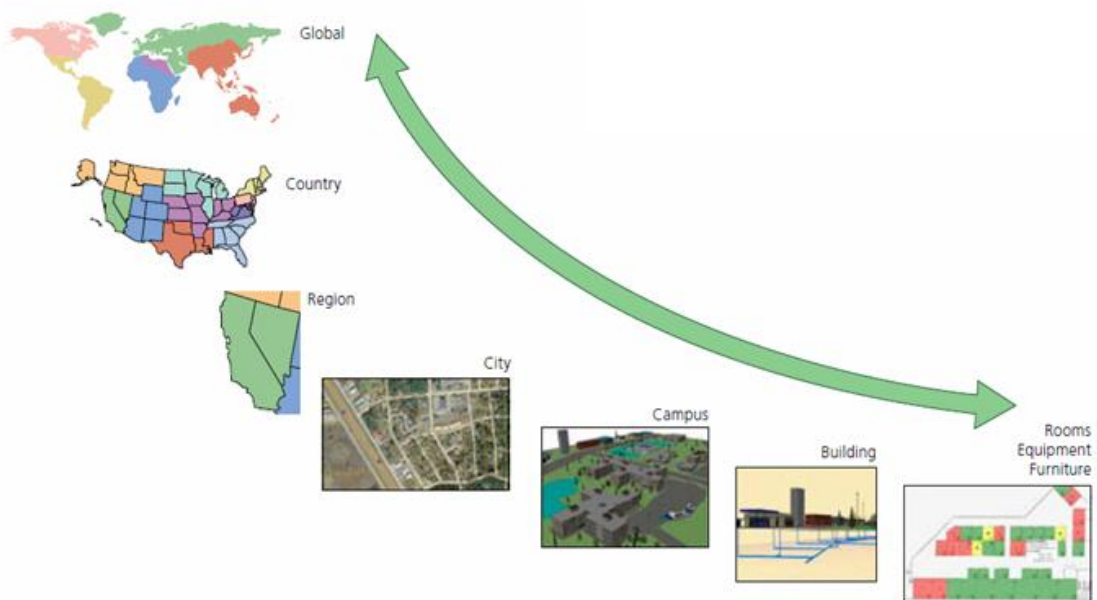


Figure1: The extend of GIS

GIS for Facility Management

GIS integrates with the top facilities management (FM) software and consulting firms, making it easier than ever to extend the life of your FM data.

GIS can be used throughout the life cycle of a facility from deciding where to build to space planning. GIS helps you to:

- Streamline asset information collection, dissemination, maintenance, and use.
- Facilitate better planning and analysis.
- Allow efficient sharing of information in and out of the field, providing a comprehensive view of operations.

GIS applications for Facility Management

Compliance

Meeting compliance codes ensures that a building or asset is safe and operates as intended.

Building compliance can span from energy efficiency, safety, and zoning to issues dealing with conformity to laws such as the Americans with Disabilities Act (ADA) of 1990. Buildings and assets are inherently spatial; they are located somewhere on the earth.

GIS can be used to efficiently collect and store information based on their location, providing a means for query, analysis, and reporting when necessary.

Asset Management and Maintenance

GIS helps organizations gain efficiencies even in the face of finite resources and the need to hold down costs. Operations and maintenance staff can deploy enterprise and mobile workforce applications that provide timely information to the field for faster, more accurate work order processing.

Lease and Property Management

Revenue can be increased and operations and maintenance costs reduced when GIS helps manage space. Real estate and property managers can see and make queries about space including its availability, size, and special constraints for the most cost-effective use.

Space Usage

GIS helps facilities managers organize and spatially visualize space and how it can best be used. Operational costs can be decreased by more efficiently using space including managing the moves of personnel and assets as well as the storage of materials.

Disaster and Business Continuity Planning

Viewing buildings and the locations of assets along with emergency information, such as weather patterns and disaster zones, can give organizations the information they need to make decisions quickly. GIS provides a holistic understanding of facility status and performance and

brings together departments, business systems, and data sources for a comprehensive view into and throughout organizations.

Green Buildings

Increase a facility's sustainability by using GIS to help reduce energy and water use, find better waste disposal, and decrease a building's carbon footprint. By managing information both inside and outside buildings down to the asset level, a difference can be made in the environmental impact of development.

Case Study

In this paper, we will illustrate a case study of a successful utilization of GIS for facility management. The case is related to the US Army Corps of Engineers.

Challenges

- Increased demands on federal operations and maintenance (O&M) budgets are keeping real property managers under pressure to provide additional space to their clients with minimal funding.
- To address the allocation of space, validation of assets, and verification of organizations and related personnel in the Fort Worth District.

Solutions

Esri business partner Dewberry & Davis, was contracted to provide the data collection and program creation services for the Fort Worth District. The company implemented Esri's ArcGIS Server and ArcGIS Online for the project.

The software had everything they needed, from the geodatabase to manage and maintain data in one central location for fast display over the Internet.

Sufficient resources was dedicated for the project since the company deployed 26 staff members for 12 weeks to redline floor plans and collect room utilization information. They collected

facility utilization information including the number of personnel and workstations, room conditions and organization, and room types. All this information is now stored in a geodatabase, the common data storage and management framework for ArcGIS.

Results

- More than 10,000 man-hours were saved by calculating building space .
- Standard forms are generated directly from data, increasing efficiency.
- Necessary paperwork now takes minutes instead of half an hour to complete.
- Data accuracy and integrity increased by using geodatabase.

Conclusion

GIS proves to be an effective tool to manage facilities, contribute to time saving and reduce significant cost. Although the initial cost of the GIS/FM applications might be high but It will payback for it selves due to the noticeable cost saving.

GIS serves you through the life cycle of your space, from site selection, space planning, and maintenance to lease management, usage, continuing safety issues, and continuity planning.

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