

Sustainability Matters

BRINGING GIS & FMIS TO THE USER COMMUNITY

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THE USE OF GIS TECHNOLOGY FOR SUSTAINABILITY INITIATIVES

A Message from Larry E. Newman, P.E., LEED AP

Many of us have been using GIS technology for some time now to map and manage infrastructure outside the envelope of buildings. Our GIS databases contain digital orthophotography, planimetrics, property boundaries, street centerlines, utility locations, and other features of interest to our constituents. How many of us have considered the possibility of using GIS technology to “map” the interior spaces of buildings that our constituents own, occupy or operate; and to develop or use GIS applications to assist in the management of space or assets, or even to assist in implementation of “sustainability” programs for our employers?

If you think about it, the core concepts of Esri’s GIS lend themselves surprisingly well to the function of managing building infrastructure. Polygons, lines, and points are just as good at defining rooms, interior HVAC and plumbing infrastructure, and locations of furniture and equipment as they are at defining property boundaries, street centerlines, and manhole locations. Building infrastructure components have attributes and topology, along with as-built drawings and

operating manuals that need to be stored and made accessible via a computerized information system.

Much has been said about the “new” technology of Building Information Modeling (BIM) systems. A natural evolution of Computer Aided Design and Drafting (CADD) technology, BIM promises to provide a mechanism to store, manage, and maintain extremely detailed information about the built environment. BIM systems contain a wealth of information about individual buildings, and the data from BIM systems can be accessed by GIS-based information systems. But BIM data is often too complex to be used by building operators or managers on a daily basis, whereas GIS-based facility management systems can be used to track such things as occupancy, energy and water use, and characteristics of the indoor environment—and to present this information to building operators in a web-



based dashboard interface that allows management to truly work towards sustainability initiatives and operating cost savings. None of this type of data is normally captured or analyzed by BIM systems.

Sustainability defined

Broadly speaking, sustainability is defined as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. A variety of federal executive orders and legislation requires all federal agencies to meet energy use reduction, water use reduction, and real property management milestones in the near future. In addition, use of renew-

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COMPUTERIZED FACILITIES MANAGEMENT

- Asset & Space Management
- Condition Assessment
- Facility Inventory
- Furniture & Equipment Tracking
- GASB 34 Reporting Compliance
- Hazardous Material Management
- HVAC, Electrical, Communication Schematics
- Landscape Management
- Lease & Property Administration
- Utility Inventory
- Work Order Management & Scheduling

able (think sustainable) energy sources such as wind, solar and hydro are strongly encouraged. The combination of reduction of consumption and consumption of renewable-source products is expected to positively impact both budgets and the environment.

While everyone is at least theoretically concerned about the health of the environment, everyone is definitely concerned about the ability to eliminate unnecessary spending—especially in today’s deficit environment. Use of available computer technology (i.e. Esri licenses) to perform additional tasks that are not currently being done is one way to save money. Even more useful is being able to use available technology to save money. Read on to see how we have been able to demonstrate a saving of 24% of energy consumption alone through the use of GIS-based facility management technology. [SSA](#)

products

Facilities Management System

In the SPOTLIGHT

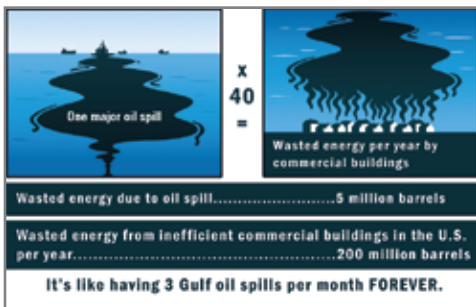
Why implement a Facilities Management System and why do it with GIS technology?

One answer to the first part of this question is that it is simply good management practice. It is often said that you cannot manage what you cannot monitor. This is as true of real property as it is of people. Maintaining adequate inventory and asset records provides, if nothing else, the ability to know the value of what you have. In the federal environment, Executive Order (EO) 13327 mandates that federal agencies establish and maintain a real property inventory system, and that they ensure that productive use is made of those properties or that they be disposed of. Monitoring of real property assets for productive use and operational efficiency is a key part of Facilities Management.

According to the General Services Administration (GSA), 60% of the buildings that will exist 30 years from now have already been built. Further, it is known that U.S. buildings account for:

- 30% of the total energy use in the country
- 12% of total water consumption
- 68% of electrical consumption
- 38% of carbon dioxide emissions
- 60% of non-industrial waste

Last year, an oil spill in the Gulf of Mexico caused quite a bit of indignation against a



major oil company. That spill is thought to have released (wasted) about 5 million barrels of oil into the gulf environment. It has been estimated that U.S. commercial buildings waste the equivalent of approximately 200 million barrels of oil per year due to energy inefficiency. That's like having three gulf oil spills per month ongoing—yet nobody seems to take notice.

Not only does this waste of energy result in large volumes of unnecessary carbon dioxide being released into the atmosphere, the cost of this waste is enormous. With crude oil prices hovering around \$90 per barrel as of this writing, the annual cost of this inefficiency in oil alone is near \$20 billion. The average cost per square foot of building for annual energy consumption is between \$3.50 and \$4.50 depending on location. SSA has been able to demonstrate a savings of between 20% and 25% on energy cost alone through implementation and use of a facility management information system that can monitor and report energy use—or approximately \$1 per square foot savings per year of operation.

Measure for measure with GIS

So, how many square feet of space in your building? How many square feet of building space does your employer operate? How much does your employer spend each year on energy, water, etc. for that facility? You don't know? This is information that you could be entering into and monitoring with your GIS technology! Most commercial buildings measure in the hundreds of thousands of square feet of space. Most counties, municipalities, and state agencies operate building infrastructure that measures in the millions of square feet. Most federal agencies operate facilities that measure in the hundreds of millions of square feet. At \$1 per square foot annual savings to their operating budget for energy alone, do you think you might be able to get the interest of your management by suggesting the use of GIS technology to effect these kinds of savings? Finally, a real

TECHNOLOGY UPDATE

SPATIALMMS MONITOR MANAGE SAVE

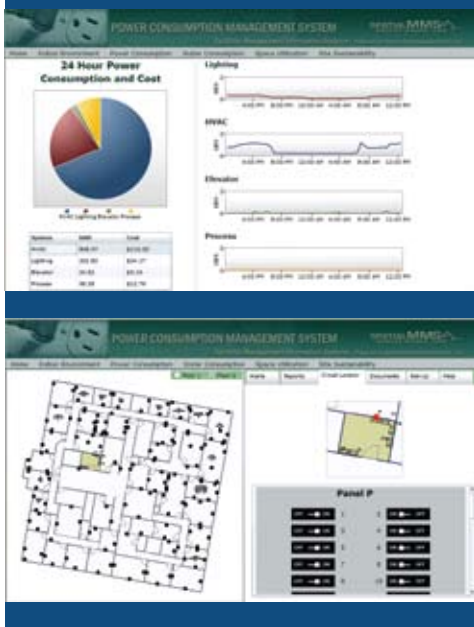


If you would like to consider using your existing Esri technology to implement a Facility Management Information System (FMIS), we invite you to consider the use of SpatialMMS (MMS), our own FMIS that is distributed as an extension to the Esri Enterprise Server technology or offered as a hosted solution remote from your computer infrastructure. MMS is presented to the user (typically the building operator) as a web-based information system through a dashboard interface. All that is necessary on an individual workstation to get information from MMS is a standard web browser and access to the internet. Once the system is configured and operational, the user can monitor the indoor environment (temperature, humidity, CO₂ levels, etc.), power consumption, water consumption, and site characteristics. Operational data is captured and stored in a configurable SQL-compliant database. MMS can analyze the data on demand for hourly, daily, monthly or annual consumption characteristics, and provide the results of the analysis in a variety of formats.

Building data—electrical infrastructure, HVAC infrastructure, building interior and exterior characteristics, as-built drawings and operations manuals, etc. are all available to users of the system. We are currently working on an interface to the U.S. EPA EnergyStar database

TECHNOLOGY *CONTINUED*

that will facilitate reporting of energy consumption information and compliance with federal mandates. MMS is configured to store and report information in a format that assists with collection of data required for U.S. Green Building Council (USGBC) LEED certification requirements. Consider the possibilities of utilizing MMS and Esri technology to provide a new level of service to your organization. [SSA](#)

**Introducing The Green Team**

Esri | Manhattan Software, Inc.
Spatial Systems Associates, Inc.

This team has been assembled as “best of breed” suppliers of software and services intended to provide the facility manager with the tools necessary to manage the operations of the facility while collecting and maintaining operational information necessary to produce the reports required to comply with regulatory oversight. The Green Team is prepared to assist you in developing and maintaining the information systems necessary to maximize efficiency in building use and operations while working toward and reporting on achievement of meeting sustainability goals.

Contact Spatial Systems Associates, Inc. for more information! [SSA](#)

ROI that is demonstrable and recurring for the use of our technology! Finally, a cost-based answer to what we can do for the environment and why we should! That is the answer to the second part of the initial question.

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Mapping the environment

So now the question should be: What is required and how might we proceed? If you do not yet have the interior spaces of your building in a format that is conveniently imported into your Esri GIS, that is the first step. Select a suitable geodatabase standard to use (we can assist with that) and begin the process of building the infrastructure databases. If you have AutoCAD or MicroStation drawings that are up to date with regard to the interior spaces, that portion is fairly simple. Typically you would want to “map the locations of interior partitions, doors, windows, etc. along with mechanical and electrical features. If you do not have digital versions of this information available, but have hardcopy “as-builts”, we would suggest scanning these documents, registering to the building outline and vectorization. Otherwise, you will have to field investigate the information. Typically some combination of all three is required.

Next you will need to establish an inventory of the furniture and equipment in the space, and identify the attributes of individual rooms that are important to capture. We recommend use of a portable computer with GIS data collection technology cus-

tomized for your facilities. Room numbers, personnel assignments, phone numbers, data jack identifiers, computer identifiers, and circuit locators are examples of the kinds of data that will need to be collected and maintained.

Then you will need to determine whether the building has a suitable HVAC control system from which data can be absorbed on an ongoing basis or whether new temperature, humidity, and carbon dioxide sensors will be needed. This information is necessary to monitor and report indoor environmental conditions. Most buildings have only a single electric meter. Assuming your intention is to be able to determine who is consuming energy and when, additional monitors will probably need to be acquired and installed. If the buildings use steam or chilled water from central plants, meters for these energy sources will need to be added as well. Water consumption meters will also need to be established as necessary.

Spatial Systems Associates makes your work easy!

Then you will need a facility management application that can absorb all of this information, analyze it on an ongoing basis, and provide reports to building operations personnel regarding consumption characteristics in a format that is easy to understand and accessible over the internet.

If all of this sounds like a lot of work, it is. Remember that the annual operational savings that you are targeting are significant though and easily justify the cost of doing this work. Typically the cost involved can be recovered in less than a year, and the savings go on forever. If it sounds like more than you are willing to take on with your existing staff, give us a call. Spatial Systems Associates can provide all of the services necessary to implement a system like this for your facility—we are doing it for others today, and would be happy to talk to you about doing it for you. With the goal of saving both money and the environment through the productive use of your existing GIS technology investment, why would you hesitate? [SSA](#)

SSA, INC.

COMPLETE GIS AND FMIS IMPLEMENTATION AND SUPPORT SERVICES

GIS & FMIS

GIS GEOGRAPHIC INFORMATION SYSTEMS

Needs/Cost Benefit Analysis

Excited, curious, or confused about the potential for GIS in your organization? Spatial Systems has been implementing these technologies for years. Allow us to evaluate your needs, project the potential for savings or increased revenues, and otherwise explain the potential for GIS in your business.

GIS Systems/On-Site Consulting

Maybe you need a little help bringing it all together. No one ever said GIS could be integrated overnight. Let us come on-site, provide implementation management and QA/QC to help you implement this time and money saving technology.

Web-Based Hosting

Perhaps you don't really want the hassle of building and maintaining a GIS internally. Consider allowing Spatial Systems to host your GIS data or its services and make GIS functionality available to you and/or your clients over the internet.

Wide-Format Scanning

Make it digital! Convert maps, blueprints, and imagery into a new theme/layer for your GIS. Unlimited length specifications with widths accepted up to 50" B/W, full-color, with various resolutions and output formats available.

Analysis

If you simply want to be able to take advantage of the ability of GIS technology to help meet the needs of your organization without the bother and cost of acquiring GIS software and learning to use it, Spatial Systems offers the services of our experienced staff to perform analysis and produce suitable reports and cartography for you.

Vectorization

Take all of your hardcopy or image files and turn them into topologically structured GIS compatible layers, with attribute links to your database.

Integration

Combine the new datasets with your existing data or models to fully integrate GIS technology with your legacy data systems.

FMIS FACILITIES MANAGEMENT INFORMATION SYSTEMS

System Design

We specialize in the use of legacy systems and data in the implementation of our SpatialMMS product line. Allow us to sit down with you to understand your need for FMIS technology and to recommend the most effective approach to implementation.

Data Development

Whether you have no as-builts or a sophisticated Building Information Model (BIM), or anything in between, Spatial Systems is prepared to use what is currently available in the establishment of a consistent and accurate dataset that is customized for your facility. When necessary, our field staff will gather relevant information on-site to meet the requirements of your desired functionality.

Monitoring Tools

Spatial Systems will arrange, when necessary, for the installation of energy, water, and indoor environmental sensors to capture relevant data for your facility. If your facility already has a monitoring or other control system, Spatial Systems will integrate our SpatialMMS tools to use the output from those systems to the extent permitted by your other vendors.

Dashboard Customization

SpatialMMS utilizes a fully customizable dashboard for your interface with the system. By understanding your specific requirements, we will deliver a web-based solution that meets your needs.

Hosting

If preferred, Spatial Systems will host your FMIS data and interface on our in-house servers. There is no need to purchase hardware or software to take advantage of this technology, and access to your facility data can be made available to anyone you designate who has access to the internet.

Alerts

If any of the monitoring technology detects that the readings from a sensor fall outside of parameters that you establish, SpatialMMS can generate an alert in the form of an email, a mail message, or establishment of a new work order in your existing work order management system.

Reports

Reports from SpatialMMS can be generated on demand or on a regularly scheduled basis to confirm for you that the building systems are operating properly and to report the periodic results of automated analysis of the collected data.

CONTACT US



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