

SPATIAL OPERATIONS

Preserving Maryland's archival history with *SpatialOperations*

Background

The Maryland State Archives serves as the historical agency for government records of permanent value. Founded as a State Government agency in 1935, then known as the Hall of Records, the State Archives contains and protects paper materials, film based items, photographs, art work, maps, artifacts, and battle flags dating back to the Civil War. The Archives' mission is to conserve these items for as long as possible for use and reference by future generations.

Housed within the Edward C. Papenfuse building in Annapolis, Maryland, the Archives occupies a 100,000 square foot building which was specifically designed and constructed for its needs. The building was opened in 1986 with key aspects of the design including a public search room, light management, and HVAC systems which target specific temperature and humidity levels to maximize the life expectancy of the stored items.

THE CHALLENGE

Despite the efforts of the original design, there was concern that the Archives building may not be functioning optimally to protect the stored items as evidenced by mold growth in some areas indicating temperature and humidity problems. Previous efforts to analyze these variables involved using temporary sensors which were retrieved periodically to have their memory downloaded to a computer for analysis via spreadsheet or spe-



cialized desktop software. While helpful, this approach was very labor intensive and not performed consistently.

THE SOLUTION

To help understand and monitor the indoor environment, the Archives adopted the use of SpatialOperations based on its real-time data collection, alerting, and reporting capabilities in the areas of temperature and humidity. SpatialOperations is an Esri-based sustainability information system that visualizes, monitors, and analyzes indoor environmental data (temperature, CO₂, humidity), detailed power consumption data, water consumption data, and site characteristic/site sustainability data for a facility or group of facilities. SpatialOperations is developed to work with individually installed wireless data sensors or by consuming data from existing building automation systems.

The SpatialOperations system covers all areas of the Maryland State Archives building with an array of 64 sensors, each capable of reporting temperature and humidity. Readings are taken from each sensor every five minutes, and the information is stored within a Microsoft SQL database for reporting and comparative analysis purposes. If the temperature or humidity ever falls outside of a user-defined range, an email or text alert is sent to the Head of Conservation. Using SpatialOperations' map based interface, the Head of Conservation can then investigate the problem area including nearby sensors to determine what actions should be taken to protect the archived materials.

SpatialOperations not only assists in the efficient operation of the facility by ensuring that the optimal environment for document preservation is maintained; the application also monitors the conditions of the Archives digital data repository which includes server rooms/data centers that provide search indexing and electronic document retrieval via the web. SpatialOperations assists in protecting these resources with temperature/humidity monitoring and distributing to the IT staff to ensure 24x7x365 availability.



Archives staff can communicate with the HVAC operations staff to show recorded readings and trends—key to correcting the system to assist in preserving Maryland’s history for future generations.



Current Implementation

The Archives staff now have operational characteristics information about their building at their fingertips. At any time and from any location where internet access is available, the Archives staff can open SpatialOperations and see the real-time humidity and temperature readings. Likewise, using SpatialOperations’ historical analysis capabilities, Archives staff can communicate with the HVAC operations staff to show recorded readings and trends—key to correcting the system to assist in preserving Maryland’s history for future generations.

In addition to monitoring and alerting building operators with real-time information about temperature, humidity, and CO2, SpatialOperations provides key tools to effectively manage the operational characteristics of the building. SpatialOperations provides real-time access for:

Power Consumption

The Power Consumption module monitors and reports on live energy use information at a building or group of buildings. This can include lighting, process power (receptacle use/load), HVAC, elevator, etc. The graphical interface and map view allows the building manager to view where power is being consumed and when. The Power Consumption module assists with:

- Commissioning and continuous commissioning
- Meeting energy performance requirements
- Meeting established standards – ASHRAE, EnergyStar
- Monitoring on-site and off-site renewable energy production
- Monitoring building operational characteristics
- Staff education
- Building maintenance
- Documenting sustainable building cost impacts

Water Consumption

Water consumption can be monitored to the level of detail the building operator desires. Monitoring this information allows the operator to then compare the actual water consumed to the level of water usage expected based on the operational characteristics of the building. This module assists the operator in establishing:

- Water efficient landscaping
- Innovative wastewater technologies
- Water use reduction

Space Utilization

The Space Utilization module allows the operator to easily view, interpret, and analyze interior space characteristics, assignments, or assets. Furniture, equipment, and space occupancy can all be viewed from this module. It stores operational information management including:

- As-built drawings and pictures
- Equipment manuals are conveniently accessible (models, maintenance parts)
- Maintenance data (filter changes, cleaning, etc.) can be captured and stored
- Monitored data is collected and stored for analysis and reporting

Site Sustainability

The characteristics of the site can be accessed through the Site Sustainability module. This includes locations of underground utilities, tree inventory, parking space inventory, grade and drainage, impervious surface, and outdoor lighting information. This assists in analyzing:

- Green site & building exterior management
- High development density building
- Alternative transportation
- Reduced site disturbance
- Stormwater management
- Heat island reduction
- Light pollution reduction

The implementation of SpatialOperations at the Maryland Archives building in Annapolis has assisted operations personnel in achieving their mission of preserving and protecting Maryland’s historical records and treasures.

