


JBIM

Journal of Building Information Modeling

An official publication of the National Institute of Building Sciences
buildingSMART alliance™

National Institute of Building Sciences: An Authoritative Source of Innovative Solutions for the Built Environment

Spring 2009



The USC School of Cinematic Arts: The Arrival of Spring in the Facilities Industry

Post Construction BIM Implementations and Facility Asset Management

Innovative pilot program slashing operations/maintenance costs, providing valuable metrics for DoD owned facilities

By James R. Watson, G. Russell Watson, Mat Krogulecki, MACTEC's Facility Lifecycle Group

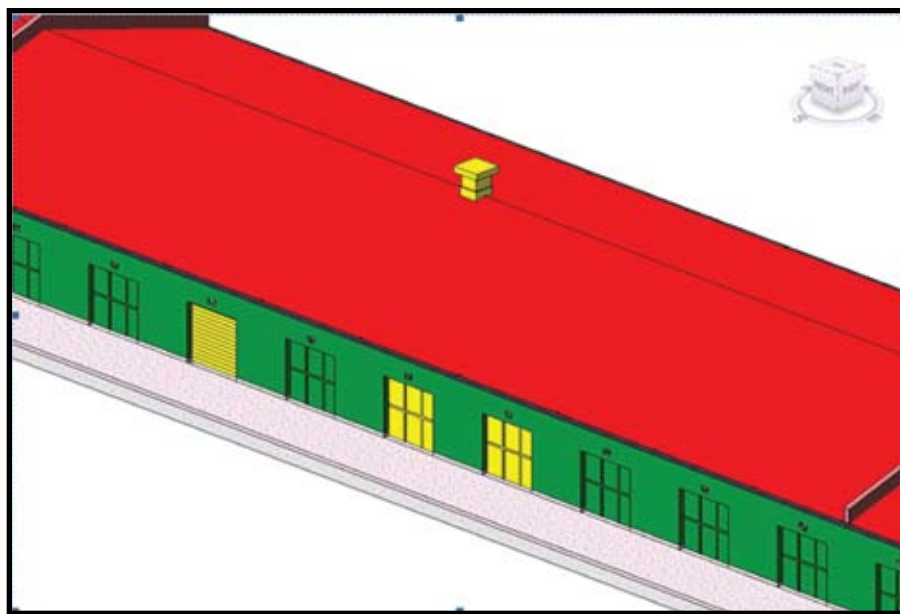
THE POWER OF MANAGING EXISTING

facilities through virtual modeling is being demonstrated and documented in a pilot program by the Facility Lifecycle Group of MACTEC Engineering and Consulting, Inc. The program is being funded by and conducted for an agency of the U.S. Department of Defense (DoD); it includes 10 significant mission critical facilities geographically dispersed throughout the United States.

The program features an innovative solution combining a modified BIM (Building Information Model) and structured facility asset management process, known as 'BIMam™', Building Information Modeling for Asset Management. The value of BIM created during design and construction phase is well documented and can result in an estimated 30 percent reduction in total construction costs.

The business case for implementing BIM in the design/build stage pales when compared to applying BIM technology combined with an Engineering Management System (EMS) to manage a building once constructed and occupied. According to a 2006 International Facility Management Association (IFMA) study, the typical construction cost of a building is \$120.00 per square foot and the annual operations and maintenance cost about \$7.26 per square foot. Therefore, the occupancy cost of owning a building over a DoD mandated 67-year life cycle represents a cost four times greater than the cost to construct. Hence, the typical 15 percent reduction in operations and maintenance gained through implementing BIMam produces twice the savings than just using BIM to reduce construction costs would produce.

Estimates are that it currently costs about \$486.00 per square foot to own and maintain a DoD facility over the lifecycle of the facility. Multiplying this estimate by the 15 percent



The above represents the current condition of assets through the shading of the building information model.

benchmark reduction that BIMam will produce will yield a benefit of \$73.00 per owned square foot. Compare that to a 30 percent reduction in a construction cost of \$120.00 per square foot which yields a \$36.00 per square foot benefit and the cost effectiveness of generating a BIMam for existing buildings becomes a solid business decision with a pay-back of less than one year.

BIMam contains building system components spatial data that meets the following criteria to be included in a BIM: must be readily accessible without removing any cladding/walls/ceiling/flooring material; significant relative to preventative maintenance schedules; high mission criticality to building occupants or contribute significantly to the overall cost of facility asset management. In addition, spatial, systems, systems components nameplate and condition data; and asset quantification are collected and stored via facility asset management software, us-

ing the Uniformat II taxonomy and in accord with COBIE requirements for maintaining an open architecture and the mission of the National Institute of Building Science (NIBS) BuildingSMART Committee.

The software transforms objective facts into meaningful metrics, actionable projects and facilitates modeling various funding scenarios, as well as variable decision matrix relative to the importance or preference for impacting one performance metric over another competing metric.

The advantage of generating a BIMam is that it then becomes the baseline data into which all future facility transactions can be documented. This means of course that BIMam is dynamic in not only visualizing the performance metric but also the dynamic repository for all asset information, growing in scope as remodels and/or additions are made to the building.

EMS Asset Management software can

generate multiple performance metrics to be displayed in BIM. BIMam then provides calculated condition/costs/schedules and repair vs. replace options for each systems and component of the facility. These metrics are impacted by modeled budget funding scenarios. These scenarios give facility managers the "what if" analysis capability with the hard data backup that has been missing in prior quests to provide a business case for the right funding scenario to decision makers. The funding scenarios also present the need for the right type of expenditures. For example, in some instances investing capital dollars to replace a system may be more economical than spending expense dollars to maintain the asset. Scenarios can be readily determined and presented graphically so senior management can quickly see the benefit of the intended scenario.

Using BIMam gives facility managers the dashboard tool to model the most efficient use of funds, time including routing maintenance staff based on current location versus service need and effective fire and/or other emergency escape routes.

The BIMam pilot program will provide decision support for use by division managers to verify and fund the needs and wants sent to

upper management by facility managers from the site level. Using BIMam these division managers can now weigh the impact of various funding options on their desired strategic outcomes based on an aggregated view of their total building portfolio performance metric.

Financial and strategic officers will now be able to track online the current status of the total agencies portfolio's performance metrics versus the desired performance metric. They will have the capability to drill down to the regional BIM and the site BIM and even the individual building BIM to run "what if" analysis with various funding scenarios to maximize the desired performance at minimum costs.

BIMam can show color coded performance metrics on each building and also for all aggregated buildings. Selected metrics can include Mission Dependency Index (MDI), Facility Condition Index (FCI), Space Utilization Index (SUI), Mission Readiness Index (MRI), and Return on Investment (ROI). Each of these metrics are color coded using the DoD defined red-yellow-green system, with green representing good condition, yellow representing fair condition and red indicating failing condition. These visual representations permit a fast transfer of knowl-

edge to executive level decision makers in a dashboard format.

The BIMam dashboard will have the ability to display not only three dimensional information but will also represent time passage and funding scenario applications. Users will have the ability to see the ramifications of both long and short term penalty cost for not fully funding O & M requirements. These penalty costs will be displayed as a changed color on a performance metric dashboard button.

Often limited budgets restrict available funding. Consequently, underfunding of facility management requirements sometimes occurs. The BIMam dashboard assures management has the right data at the right time to make the decision that is best for the overall performance of the agency mission. ■

James R. Watson is Director of Federal Programs for MACTEC's Facility Lifecycle Group. G. Russell Watson is Director of Business Development for the Facility Lifecycle Group. Mat Krogulecki is the BIM Manager for Facility Lifecycle Group. MACTEC (www.mactec.com), based in Alpharetta, GA, is a leading infrastructure engineering firm with annual revenues of more than \$450 million.

Learn How Design-Build Delivers **Results**






REDUCED COST.

SHORTER SCHEDULE.

LESS LITIGATION.

HIGHER QUALITY.

WE TEACH

HOW



INCREASED SATISFACTION.

Learn about Design-Build Education, Conferences and why Design-Build is the rapidly growing project delivery method of choice.

Visit The Design - Build Institute of America at www.DBIA.org