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# BIM and FM: The Portal to Lifecycle Facility Management

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## The Portal to Lifecycle Facility Management

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WITH DOCUMENTED IMPACT IN DESIGN and construction, owners and facility managers (FMs) are looking for ways to extend the benefits of building information modeling (BIM) downstream to improve the management and operations phases of a facility's lifecycle. Facility managers are responsible for major corporate assets, often accounting for 35 to 50 percent on an organization's balance sheet. Industry research suggests that 85 percent of the lifecycle cost of a facility occurs after construction is completed and the NIST Interoperability Study indicated that fully two-thirds of the estimated \$15.8 billion lost are due to inadequate interoperability occurs during operations and maintenance phases. The business case is compelling.

Today's buildings are increasingly sophisticated and the need for information to operate and maintain them is vital. Unlike the design/construct phase, the information needs of FMs persist for the lifecycle of the facility. Multiply the information exchange challenges experienced during design/construct across the lifecycle of a facility and you have a sense for the magnitude of the problem—and the opportunity. Even small gains will add up to significant improvement and cost savings. The numbers are significant.

We recently surveyed a number of owners and FMs about their expectations for the use of BIM on their projects. It was part of a peer review on behalf of one of our clients poised to jump into BIM. We learned that while initial lack of understanding and documented metrics on cost/benefit led to slow adoption rates, owners are moving the use of BIM and collaborative design to the forefront of project delivery methods. A growing number of owners are developing guidelines for BIM deliverables to extract design/construct benefits today with an eye toward future use of the data for FM. The

interest in using BIM data to support operation and maintenance (O&M) is widely shared among owners.

### BIM AS AN FM PORTAL

On the surface, the concept is rather simple. Well-run BIM projects result in coordinated and consistent information about a facility as it evolves through design and construction. It is information worth capturing, pertinent (to say the least) to the operations and maintenance of the facility. Courtesy of a more collaborative and informed commissioning process, the information captured in design/construct BIMs can be leveraged for downstream use by FMs.

But while increasing numbers of owners are requesting, even requiring, the delivery of BIMs, examples of FMs actually using that data are almost non-existent. Simply delivering project BIM(s) to an owner has marginal value. To be effective, the data captured in BIMs must be channeled into a variety of FM software systems. Computerized Maintenance Management Systems (CMMS), Computer Aided Facility Management (CAFM) and Integrated Workplace Management Systems (IWMS), Building Control Systems, and Enterprise Resource Planning Systems (ERP) for asset

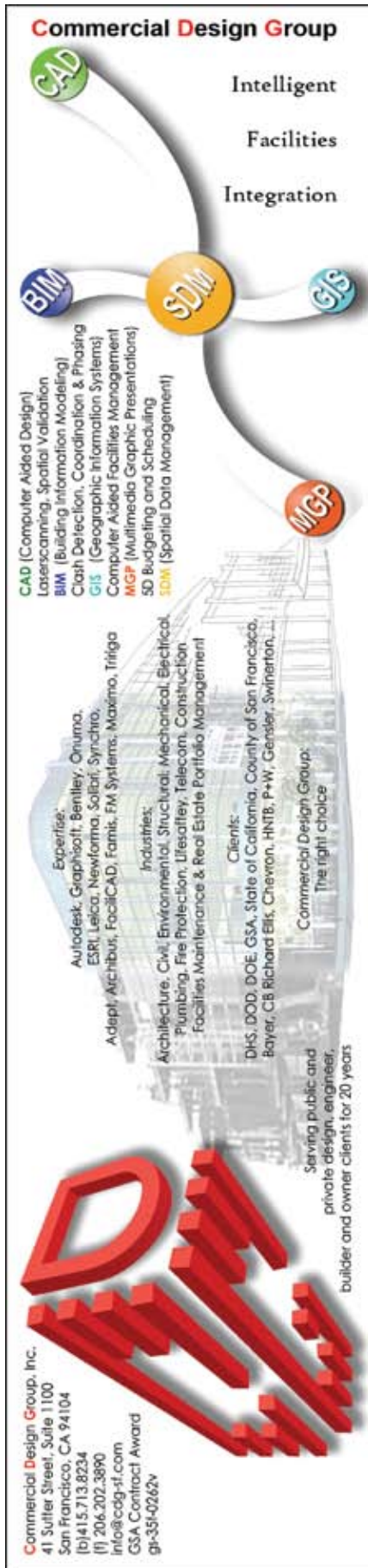
management and accounting, are among systems regularly used in FM.

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Accurate 3D geometry of the facility (currently just building models but soon to include geospatial of the owners' full property portfolio) derived from the design/construct BIMs provides the navigational framework to access information about a building and its spaces, systems and components. The model is connected to systems with information that has been moved from the BIM(s) into best of class corporate FM systems. Information about equipment—model number, warranty data, repair history—can be accessed by selecting an object in the model. The data displayed will reside and be maintained in a CMMS system. The BIM for FM Portal is linked to the CMMS, providing the visual access and reporting mechanisms that make the information more easily understood and actionable.

FM has a number of use cases for facility data that is developed during design and construction. Asset cost data is needed by FMs to predict lifecycle sustainment and timing of recapitalization. Capital projects initiatives leverage the information via the portal, including the basis for original design calculations to inform expansion and renovation. Cost Segregation Studies that allow for reclassification of property to accelerate depreciation are informed by data from the FM portal. Security and first responders will have access to accurate data on physical layout, location of hazardous materials and obstructions that will influence their response. Recent evolution in sensor technology suggests that integration with a FM Portal will facilitate informed

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response to alerts with access to real time data.

Though full adoption of BIM for FM still looms more as a vision than a reality, I don't expect this to remain the case much longer. The opportunity is too compelling.

### EARLY ADOPTERS

Despite the current BIM for FM buzz, case histories and metrics that document the benefits have proven rather difficult to find. But early adoption is underway and there are a growing number of efforts that point to a leaner FM process informed by facility lifecycle data captured during design/construct.

Owners are leading the charge to develop a more explicit definition of a BIM for FM. Government agencies like the VA and NASA, along with a growing number of private owners, are issuing standards and guidelines that specify the delivery of digital handover data. The Wisconsin Department of Administration and Massachusetts Division of Capital Asset Management are among several states charting similar courses and several owners in higher education have taken a similar tact. All have an eye to the use of the data to help operate their facilities. GSA, the driving force behind the BIM initiative in the United States, is committed to developing a process for leveraging BIM data to help manage its extensive property portfolio. You can look forward to a new volume in their useful GSA BIM Series, *Facility Management and Operations Guidelines*, scheduled for release later this year.

At Sandia National Labs ([www.sandia.gov](http://www.sandia.gov)) in Albuquerque, New Mexico, Birgitta Foster, Sandia Facilities' BIM

champion, has developed a vision of BIM for FM and backed it up with some interesting metrics. They've demonstrated how maintenance personnel can save time by gathering work order information from the model. Starting with the model of a pump in the mechanical room, workers can link to the Work Order in Maximo, a parts list, even the building controls system, from their laptop or wireless device. Sandia maintenance personnel estimate that this workflow could save up to two hours per work order. I will leave it to the FMs to do the math with their own hourly labor rate and number of work orders per year—it's a big number. (See **FIGURE 1**).

### INCORPORATING FM LEGACY DATA

The BIM for FM Portal is an easily understood model for capturing data from new construction projects, but FMs with large portfolios of existing facilities and legacy data face additional challenges.

John Moebes, Director of Construction at Crate and Barrel, has developed a process he calls "back modeling", taking archives of past project data and marrying it to 3D models. "We reuse accumulated intelligence—historic data on costs by system, construction and operation problems, defects, and suppliers—to build a more reliable forecasting, design and building process."

Accurate information is a key factor in decision making. It's not easy to synthesize the impacts from a stack of spreadsheets but good data married to 3D BIM makes the information actionable. Crate and Barrel now has 50 of 152 stores modeled in BIM. The models are continually updated to reflect project-related adjustments.



Figure 1. The concept for using wireless devices connected to a BIM Portal at Sandia Labs.

New laser scanning techniques for capturing model data have improved to the point where their use is common on many projects. That technology is making the capture of legacy data for BIM for FM portals more affordable.

## AN OPPORTUNITY FOR DESIGN/CONSTRUCT TEAMS

In addition to owner initiatives, design and construct partners have recognized the value in a closer working relationship that extends through the lifecycle of a facility. Derek Cunz, Vice President & General Manager at construction giant Mortenson Construction, a BIM leader in their own right, sees a strong business case for BIM in FM and ultimately a softening of the line between construction and operations. Their vision has given birth to Mortenson's Full Service Facility Solutions (FS<sup>2</sup>), which offers post construction services to their customers. The use of digital design/construct data is central to the service model.

Ryan Companies, a 70-year old design, build and management group is coordinating with GSA to deliver Construction Operations Building information exchange (COBie) formatted FM data for the CMSS of the 685,000 square foot Whipple Building at Ft. Snelling after the renovation is completed. Their intent is to deliver a searchable 3D Navisworks model with an attached database of all equipment and room data. (See **FIGURE 2**).

The Urban Design Group's (UDG) project with the University of South California's (USC) School of Cinematic Arts is an example of what can be accomplished with a thoughtful approach for moving BIM data into an FM Portal. Based on previous experience of an enlightened donor, project requirements mandated the delivery of an intelligent BIM with the intent of using the data for FM. UDG quickly recognized the complexities of developing an interoperability model to meet the needs of USC's operational environment. Extending the notion of collaboration to include O&M tasks and stakeholders was central to their success. With work still underway, UDG has developed a methodology to take BIM object properties and move them into the appropriate USC FM software. A Navisworks front end provides navigation to USC FM software to manage

occupancy, support maintenance and monitor equipment performance.

To be accurate, early adopters have accomplished their magic with custom development by some highly skilled people. For broad adoption to proceed, industry will need easy-to-use commercial software based on best practices and open standards.

## TOOLS NEED TO EVOLVE

FM software that can leverage BIM data are just emerging. Autodesk recently announced a relationship with FM:Systems to address the BIM to FM business opportunity. It's Autodesk's second attempt to establish a presence in the market. Mike Schley, CEO at FM:Systems, sees it as providing, "building owners with the opportunity to obtain more complete data about their buildings when they take occupancy".

Archibus has released a version of their product that is compatible with Revit. Other IWMS vendors suggest BIM compatibility as part of their development plans.

Given the variety of software categories for FM, interoperability via open standards looms as a key issue. While some of the early software entrants are based on proprietary data exchanges, a growing number of vendors are working to support the COBie. COBie is an open standard for capture and delivery of digital data as it is created during design, construction, and commissioning

for use in operations. The standard provides a means for commercial BIM authoring software to provide data for use by CAFM, IWMS, CMMS and other COBie compliant downstream systems that support FM operations.

COBie's increased popularity with software vendors correlates to the growing numbers of public and private owners that are specifying contractual requirements for COBie compliant deliverables. Virtually all of BIM authoring products support export in COBie format. TOKMO BIM services platform has demonstrated how IFC-based COBie data can be imported into TOKMO and then used by construction contractors to document as-built conditions during construction. Using the BIM as an FM Portal model, TOKMO provides access to the content via integration with Navisworks. (See **FIGURE 3**.) The Onuma Planning System has demonstrated the benefits of interoperability using web services links to real time building sensor data to view and manage equipment.

## THE BIM FOR FM PORTAL PROJECT

Before assigning too much credit to software efforts, let's not forget that the primary reason BIM has garnered so many accolades is because of the enormous process changes that have paralleled the development of technology. And much like the process that unfolded as design and construction teams learned to



Figure 2. Visualization of asset data from the ERP System. Image courtesy of Ryan Companies and Horizontal LLC.

