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

Reducing Facility Management Costs Through Integration of COBIE and LEED - EB

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IT HAS BEEN SAID THAT THE ONLY CONSTANT IS CHANGE… it is a truism that is especially relevant within the facilities management industry. There are a number of major technology trends that drive today's planning, design, construction and facilities management functions—seemingly all independent of each other. The emergence of BIM (Building Information Modeling) as the dominant tool for design and construction is one major trend. Leadership in Energy and Environment Design® (LEED) has become the essential yardstick for defining green and sustainability. Computer Aided Facilities Management (CAFM) and Computerized Maintenance Management System (CMMS) are essential tools for managing facilities once they are placed into use. These trends all address different needs within the facilities industry. But a new standard, Construction Operations Building Information Exchange (COBIE), ties all three trends together in a way that leads to improved operation and energy efficiency over the lifecycle of a facility.

The facilities management industry is experiencing programmatic demands: assets are aging and reaching the end of their expected lifespan; the gap between the condition of assets and maintenance budgets is continuing to grow; and dwindling funding resources in light of today's tight economy are presenting new challenges and added responsibilities. Additionally, due to losses of information at each phase of a facility's lifecycle, facility data must often be recreated. According to the National Institute for Standards and Technology, the cost to re-create lost data can reach up to $15 billion annually.

Access to more information alone does not always ensure improvement. Information sharing and process improvements must occur, and decisions must be based on shared goals and objectives. One way to reduce facility management costs is to identify commonalities during the initial requirements gathering process. By ensuring that the integrity of information is sound, data can be collected once and shared wherever appropriate.

Integration of information required by the BIM and LEED offers such an opportunity and provides the potential to minimize information losses. Untapped savings can be achieved by preventing the loss of information from each phase of a facility's life cycle and combining it with the effort of collecting information for LEED certifications. By maximizing the quality and quantity of information that is received by the facility manager from the design and construction process, substantial improvements to operation, maintenance and energy efficiency can result.

If facility managers and planners fail to collaborate, efforts are often unnecessarily duplicated and wasted. For example, a planner without access to condition data collected by the facility manager over a period of years will unknowingly recollect condition information or proceed to make decisions without it altogether. Similarly, an energy manager collects the same information to develop energy projects as the facility manager does to maintain LEED certifications. If a project begins as a simple restoration, the facility manager will likely bypass the planner altogether.

If the project evolves because of new code and regulatory requirements and the judgment is made to recapitalize in a few years, decision making must start from scratch—since certain sustainment investments are curtailed in the meantime, and capital planning will be required.

Over time, a facility's systems and components start deteriorating predictably within its given life cycle curves. As a facility becomes functionally obsolete, additional investments are no longer justified because the cost of improvements far outweighs the benefits **(SEE FIGURE 2)**. The purpose or mission of the building occupants may change over time as well. Throughout a facility's life cycle, building codes will change, and there will be new regulations for health and

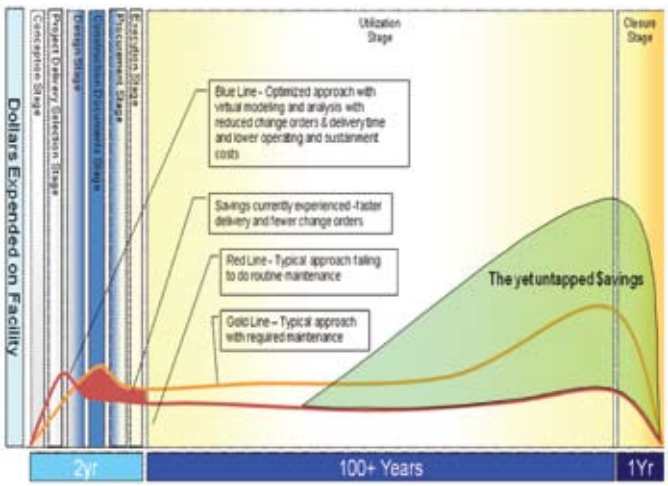

Figure 1. Lifecycle Funding Alternatives (Courtesy DKS Information Consulting LLC).

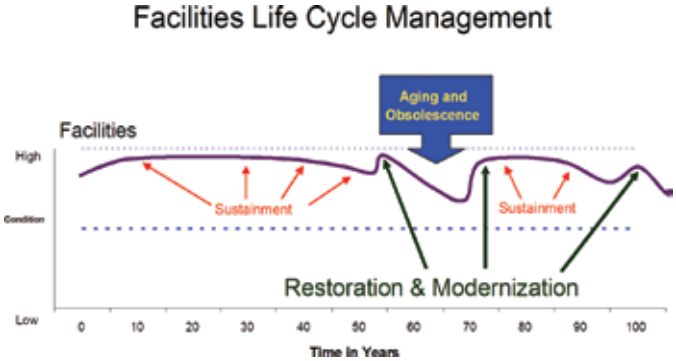

Figure 2.

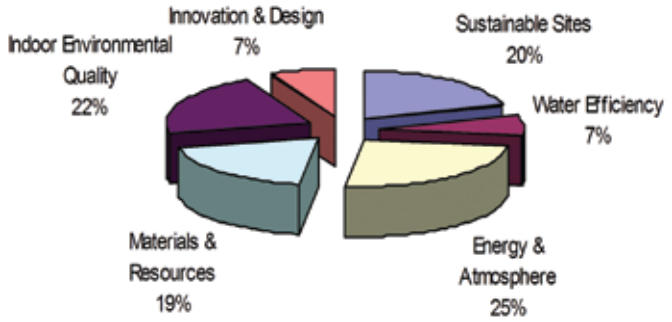

Figure 3.

safety, environmental compliance, energy efficiency, water conservation, security, and handicap access and ADA (Americans with Disability Act) compliance. While changes in function are not necessarily predictable, they are more likely to increase in complexity rather than decrease. These new requirements, including the potential achievement of LEED for Existing Buildings (LEED-EB) rating goals, must be included in the scope of any recapitalization or replacement project.

As a facility approaches the end of its life cycle in this critical recapitalization stage, a decision must be made whether to recapitalize the facility or demolish it and construct a replacement. Restoration addresses concerns about condition, while modernization addresses concerns about functionality and obsolescence. The goal is to ensure that the resulting facility meets the intended requirement while achieving the least life cycle cost.

The systems and components of the LEED-EB rating criteria also have a life cycle curve of their own. The six categories address a facility's life cycle first at the building level, then at a system level, and finally at a component level **(SEE FIGURE 3)**. Building owners may not be able to maintain levels of certifications as these systems and components deteriorate with time. Conditions that create barriers to certification need to be addressed and sustained at the opportune times through a process of condition assessments or re-commissioning. Most of the categories in the LEED-EB rating system can be facilitated with BIM technology. For example, Innovation & Design (use of BIM is innovation), Energy Efficiency, Water Efficiency, Materials & Resources and Indoor Environmental Quality (HVAC designs).

LEED is a series of green building rating systems developed by U.S. Green Building Council (USGBC). For new construction, LEED – NC provides a standard for defining a "green building." It is used by owners, architects, engineers, and contractors alike to take a holistic approach in evaluating a building and its systems over the life cycle. Having a true "As-Built BIM" gives one the opportunity to validate during the commissioning that the physical building is working as the model predicted. If it is not, then the project owner can adjust his analysis tools to ensure that future buildings successfully meet the design and stay within the original energy budget.

For existing buildings, LEED-EB is applicable to building operations, processes, system upgrades, and minor space changes. The methodology can be used by buildings new to LEED certification, or as a recertification vehicle for buildings that have previously achieved a LEED rating. As with other LEED systems, existing buildings can achieve one of four ratings: Certified, Silver, Gold, and Platinum. The LEED guidelines specify criteria that define environmentally superior buildings in each of the six categories illustrated in **FIGURE 3**.

The best time to invest in sustaining the building/component/system is while the condition has only deteriorated slightly, to a condition index of 95 on a 0-100 scale. The longer investments are delayed, the more it will cost to keep these systems/components operating in a good working order. If the investments are not made in a timely fashion and maintenance is deferred, the overall life cycle cost will increase and complete replacements will have to be made earlier than the expected life of the system. Oversights such as these can cause a facility to fail to achieve the results intended by its LEED certification.

A properly implemented CAFM or CMMS for facilities management will help facility managers, planners, and owners better manage facility life cycles. Information from a CAFM or CMMS can be used to inform the design process and result in better designs. This technology can serve as the integrating platform that captures information from the beginning to the end of a facility's life cycle, including that critical transition period from sustainment to recapitalization planning. Design, whether for renewal of existing facilities or for planning new facilities, is best performed using the BIM technology.

The benefits of BIM for design and construction are well known. But using BIM for design does not by itself provide sufficient benefit from a facility management perspective. In terms of life cycle costs, consider the following:

The total cost of ownership for planning, design, construction is 25 percent; and 75 percent is for operations and maintenance **(SEE FIGURE 4)**.

The cost-saving potential at the O&M stage of the life cycle is highest when all the information is collected and made available in early stages during planning, design, and construction. However, continuous accumulation of information is necessary to mine maximum savings and reduce the total life cycle costs of ownership.

The platform used to collect the O&M information as part of the BIM is COBIE. It is a data standard for documenting the information needed to optimize a facility's life cycle and reduce its operating costs. It defines a convenient structure and method for solving the problems described above (from duplication of efforts to oversights in maintenance). The COBIE approach integrates the capture of project data as it is created during design, construction and commissioning, rather than waiting until project completion.

In addition to the BIM model itself, representative COBIE data captured from designers includes floor, space, and equipment layout information. During the construction stage, contractors

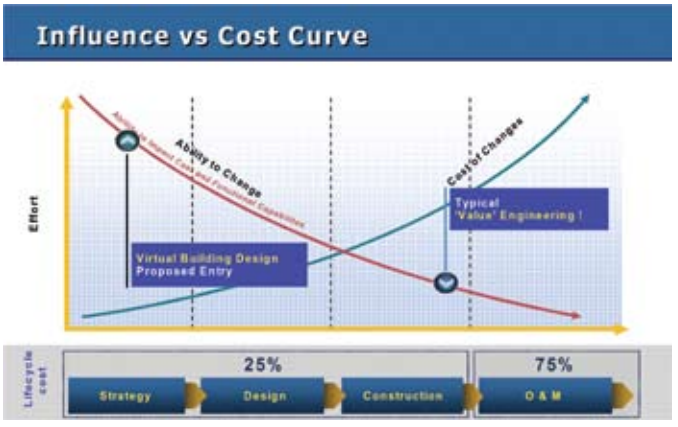

Figure 4.

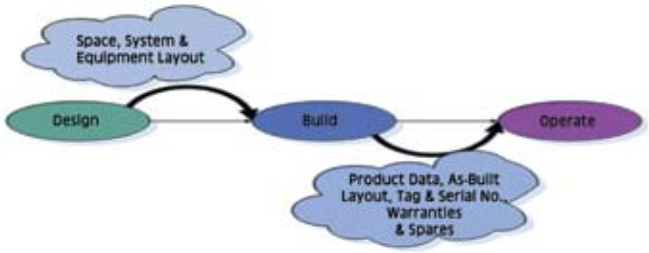

Figure 5. COBIE Process Overview. Source: E. William East, PE, PhD. Engineer Research and Development Center, U.S. Army, Corps of Engineers.

provide make, model, and serial numbers of the installed equipment. The data is provided by the facility contractors as well as product manufacturers who provide product data sheets and recommended maintenance and operation **(SEE FIGURE 5)**.

While COBIE is designed to work with BIM, its data may also be created and exchanged using simple spreadsheets, Extensible Markup Language (XML) or Industry Foundation Classes (IFCs). The benefits of the COBIE approach can be widely used throughout the facility acquisition industry (not just on large, high-visibility projects), including LEED. By allowing the exchange of COBIE data through the use of spreadsheets, energy managers can maintain LEED-EB certifications, and small homebuilders can provide a simplified as-built BIM to their customers along with the keys to their new home.

The benefits to adopting COBIE as a technique for capturing comprehensive facilities data are immeasurable. COBIE provides a link between all players in the facilities acquisition chain, allowing everyone from the LEED accredited professionals (APs) to the facility managers and planners to collaborate and share information. This is especially critical during the transition from sustainment toward capital planning for facility replacement. Regrettably, collaboration of this kind is not the norm in this industry. But considering the cost and environmental saving opportunities that can be achieved, it's clear that it is time for the old paradigm to change.

As energy managers continue to duplicate facility manager's efforts when conducting routine energy equipment performance evaluations (such as HVAC and lighting), it's clear that old methods of communication are broken. In contrast, if these managers could share information about a facility's condition, functionality, performance, energy efficiency, and all of the six LEED categories, redundancies could be eliminated and information could be sustained throughout a facility's life cycle. BIM and COBIE can serve as the integrating platforms that capture information from the beginning to the end of a facility's life cycle—from the critical transition period from sustainment to recapitalization planning—and assist in maintaining LEED certifications. ■

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