

# Building Information Modeling to Benefit Entire Facility Life Cycle

By Beth Brucker

A recent study by the Stanford University Center for Integrated Facilities Engineering showed that, based on 32 major projects using BIM, some of the major benefits include:

- Up to 40% elimination of unbudgeted change orders
- Cost estimation accuracy within 3%
- Up to 80% reduction in time to generate a cost estimate
- Savings of up to 10% of the contract value through clash detections
- Up to 7% reduction in project time

With the Corps of Engineers engaged in the largest MILCON program since World War II – nearly \$70 billion from 2008-13 – it is easy to appreciate the savings in public funds that will be achieved using BIM.

As the Corps continues down the path of BIM implementation via its Roadmap (<https://caddim.usace.army.mil/BIM>), it is important to stay focused on both the real intent and the benefits that can accrue. BIM is not just a three-dimensional computer aided design model. BIM is a process of generating and managing facility data throughout the life cycle, from planning and design, operations and maintenance, through removal and smart recycling. The goal is to capture information appropriate to stakeholders at each

step of the life-cycle, making their jobs easier, more efficient, and resulting in better quality buildings.

As our Districts concentrate on BIM training an development efforts, many activities are underway by the Corps, other federal agencies, and industry (nationally and internationally) in developing standards for achieving this life-cycle management of BIM data. Working with the National Institute of Building Science's BuildingSMART Alliance, the Corps is helping develop information exchange standards in the areas of construction to operations handoff (COBIE), energy, quantity take-off, spatial compliance, specifiers' properties, and discipline coordination. While these standards are evolving, designers and engineers working in the green building area can already find significant opportunities for the use of BIM in creating green projects. Buildings modeled with the appropriate BIM data can be analyzed for energy efficiency, performance, daylighting, and use of sustainable materials. BIM could also be used to track LEED credits from design through commissioning and occupancy of the building.

The construction industry is making rapid progress in the use of BIM for construction schedule integration, logistics, sequencing, quantity take-off, estimating, and BIM-driven prefabrication. As more components of facilities can be



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*Design and BIM work for the U.S. Army Reserve Center at Fort Meade, Md., is completed through the Corps of Engineers Louisville District. Graphic courtesy of Mason and Hanger Group.*

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fabricated and created in ideal factory conditions, less material waste and safer working conditions are demonstrating some of the most far-reaching benefits of BIM to date. McGraw-Hill's recent SmartMarket Report found that even though architects are the major BIM users, contractors are expected to see the greatest increase in BIM usage in 2009. According to the report, 38% of contractors in 2009 will be heavy users of BIM, up from 23% in 2008.

The SmartMarket Report also found that owners expect to see only moderate increases in BIM use compared to others. This appears to be due to cost concerns for creating the BIM data and maintaining the BIM data in as-built/as-is condition. It also could be that facility management, maintenance and operations applications haven't been fully integrated into the process. The COBIE standard has been developed to address this gap in interoperability between the design, construction, and operation's technologies.

The Corps goal is to also incorporate BIM into its large horizontal construction projects in

the civil works program. Using BIM in the civil works area holds great potential in providing models for forensic analysis to illustrate potential failures, for city/regional leaders to create evacuation plans, and for project managers to compare alternative scope and designs for cost and impact on the site and surrounding area.

The Corps long-term BIM strategy is to use BIM as the process for generating and managing facility data throughout the life-cycle, allowing stakeholders from any stage in the life-cycle to access reliable and consistent information about Army facilities. This includes asset management, sustainment management, and condition and functional assessment of facilities for senior management analysis.

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