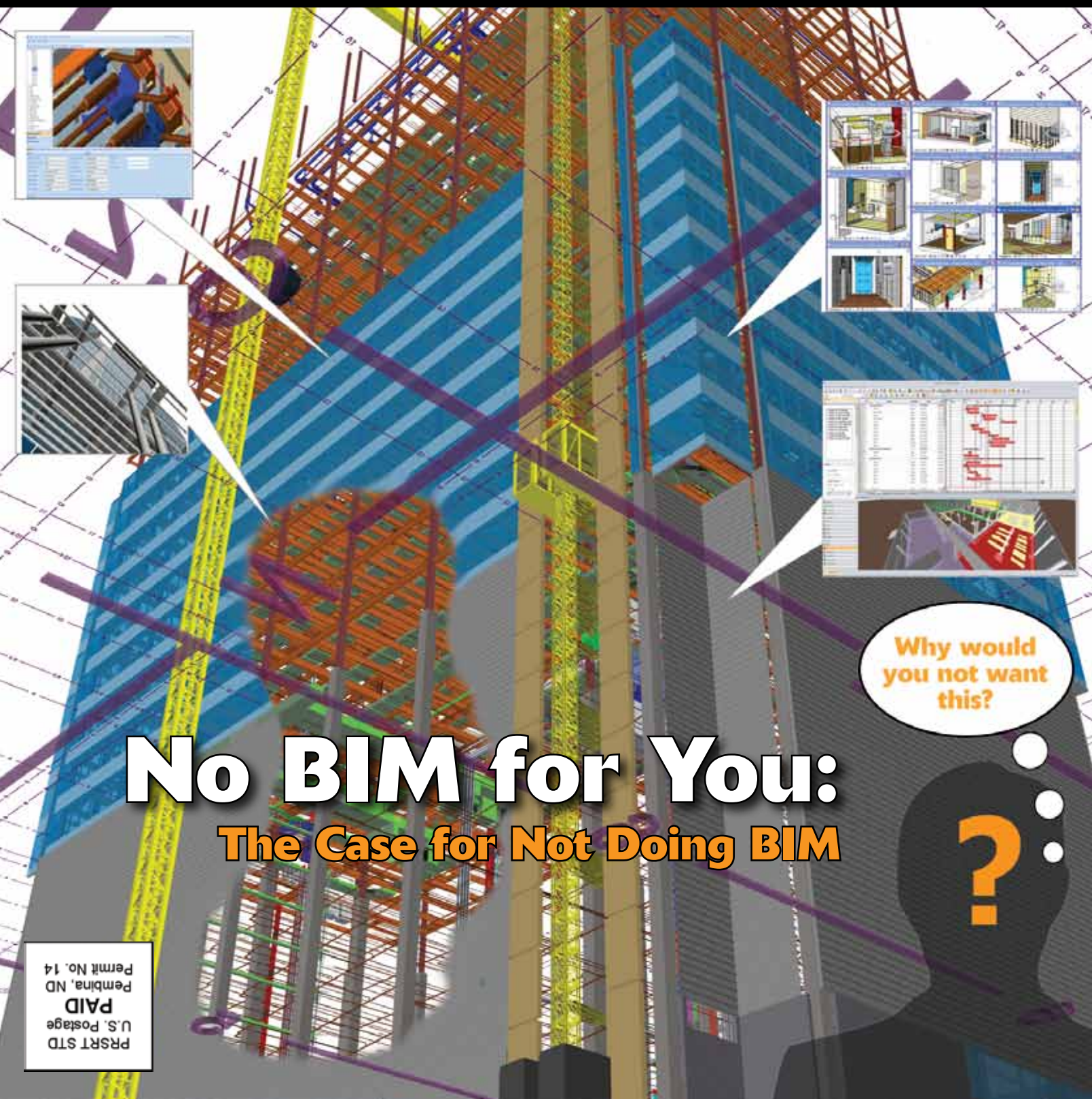
JBIM

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 2011



No BIM for You:

The Case for Not Doing BIM

BIM for Facility Management: Design for Maintenance Strategy

By Birgitta Foster

AS THE LARGEST COMBINED BUILDING OWNER AND energy user in the United States, federal agencies are becoming acutely aware of the cost of managing their property portfolios. In order to tackle issues with their space data, several agencies are turning to building information modeling (BIM) as part of their design and construction procurements.

Through a series of Executive Orders (EO), government agencies have been mandating energy reduction measures for all federal facilities yet have all but neglected to address the rising costs of their facilities' operations and maintenence (O&M). Many are not aware that energy is 25 percent of the overall cost of federal building operations. O&M, on the other hand, is commonly around 50 percent yet there does not appear to be a strategy to equally reduce those costs.

A FEDERAL OVERVIEW

In the past several years, the federal government has issued a series of EOs and memorandums mandating improvements in agency asset management programs by promoting efficient and economical use of federal real property. The current series began with the 2004 EO 13327, *Federal Real Property Asset Management,* which established the Federal Real Property Profile (FRPP). The government's only database of all real property[1], FRPP, is maintained by the U.S. General Services Administration (GSA). Twenty-four executive branch departments and agencies are required to submit real property data at the constructed asset level to the FRPP on an annual basis. Property data not only includes the gross square footage of assets but information on annual building expenses (grounds, custodial, energy and O&M).

In 2007 and 2009, two additional EOs[2] were issued, essentially expanding on EO 13327's call for more efficient and economical use of federal real property. These orders further promoted federal energy reduction programs and provided strategic guidance to improve sustainability and the management of existing buildings to reduce energy, water and materials consumption.

In June 2010, a Presidential Memorandum was issued for *Disposing of Unneeded Federal Real Estate – Increasing Sales Proceeds, Cutting Operating Costs and Improving Energy-Efficiency.* Under this memorandum, agencies were directed to not only focus their efforts on identifying and removing unused inventory but to also put in place immediate measures to better utilize all existing real property assets regarding space utilization and occupancy rates, energy-efficiency programs, annual operating cost reduction initiatives and sustainability. Unlike the EOs, this memorandum also set a target of $3 billion in cost reductions by the end of fiscal year (FY) 2012, advising the agencies that the savings should come from reduced operating, maintenance and energy expenses from the reduction of unused inventory.

In 2004, at about the same time the federal government began mandating improvements in agency asset management programs, a groundbreaking study by the National Institute of Standards and Technology (NIST), called *NIST GCR-04-867*, was published. It detailed the cost impact of inadequate interoperability of information exchanges in the U.S. capital facilities industry. The study determined that this was costing the industry about $15 billion per year due to the inefficiencies caused by the lack of interoperable data exchanges throughout the buildings' lifecycle. A majority of this cost was caused by poor information handoffs during the construction to operations phases (FIGURE 1).

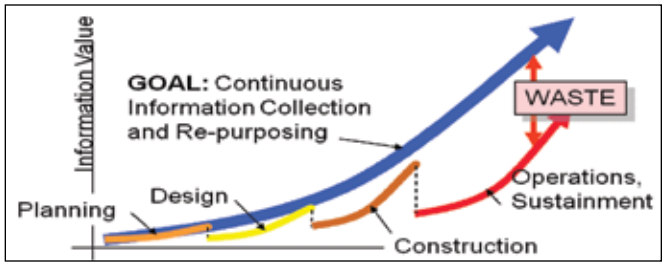


Figure 1.

Truthfully, it is hard to determine if any of these EOs and memorandums has had any effect. In the recent *Federal Real Property Report* for FY09, the number of federal buildings did not decrease but actually increased over FY08 by 23,000 buildings, to a total 429,000 federal buildings. This translated to an increase of 71 million square feet, making the total for the federal government 3.34 billion square feet of building assets.

The NIST study estimates this annual cost as $.023 per square foot of existing space. If this unit cost was applied to the reported FY09 federal inventory of 3.34 billion square feet, the U.S. government could have saved an estimated $768 million per year if the information exchanges could be interoperable through the creation of open standards.[3]

THE NEXT GENERATION FOR FM: DESIGN FOR MAINTENANCE

When looking at operational costs, it's easy to assume energy is the biggest component since there has been such focus on energy efficiency. The federal government has initialed several energy reduction strategies; but what about the largest building cost—maintenance? Presently, BIM is being used during design and construction phases but needs to be applied throughout the lifecycle to include facilities management (FM). Because we have been trapped in a two dimensional world, designs were

produced solely for the creation of construction documents. There is a need to look beyond the two- to-three year design for construction phases and begin to use BIM for a **design for maintenance** strategy.

In far too many facilities, equipment is located in areas where it is either unsafe or impossible to perform the required preventative maintenance (PM). Records may show the equipment has received scheduled PM but often, because of lack of access, this is simply not true.

Although this may seem to be bad practice, the O&M group often has no choice, or, more importantly, no voice, during design. However, with advancements in design tools like BIM, the design team can collaborate with the owners' O&M group, using 3D visualization to include the use of avatars to ensure there are clearances to maintain critical equipment (FIGURE 2).

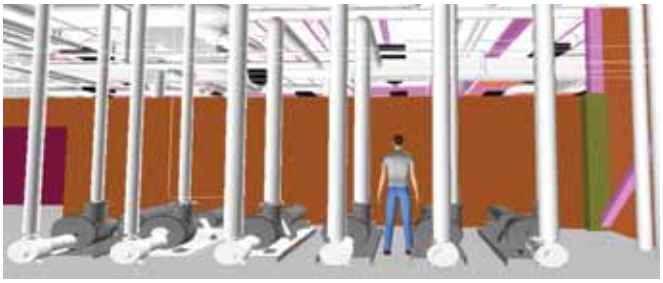


Figure 2.

With safety awareness also being emphasized at the maintenance level, more equipment is being identified as unsafe to maintain. Unfortunately, the acceptable solution is to abandon the existing equipment, take it off scheduled PM (for example, the fan in FIGURE 3) and find a better location to install a new piece of maintainable equipment.

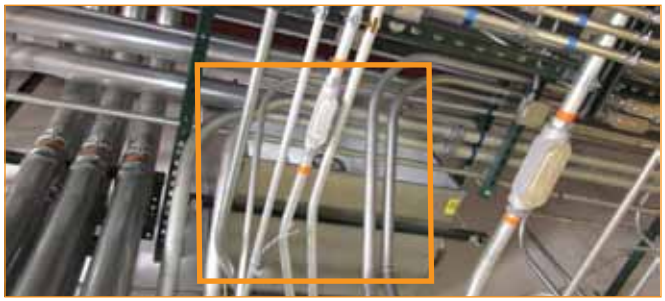


Figure 3. As highlighted in this box, the maze of conduit has blocked access to the relief fan.

There needs to be a concerted effort put into designing out future maintenance issues. The recent FY09 Federal Real Property report noted that: "Many properties needed to carry out the federal government's work are not operated in an efficient manner, resulting in wasted funds." In most cases, these non-maintenance-friendly installations result in 2 to 3 times more time to perform weekly or monthly routine maintenance tasks, accounting for waste applied over a piece of equipment's 20-year expected service life.

Possibly the largest contributing factor to these maintenance nightmares is the lack of understanding of means and methods by the designer. This approach relies on the ill-conceived notion that the contractors know more about how to "design" the final piping to equipment than the designer. As owners, it's not clear to us if this is a design problem or a quality issue. Therefore, we should use tools that allow the engineers to design and contractors to install and get away from this misplaced notion of means and methods.

There is an opportunity to bring FM into the next generation by taking full advantage of current technologies. By supporting a design for maintenance strategy using BIM, the federal government could better address their mandates to promote efficient and economical use of federal real property. ■

Birgitta Foster, BSME, MBA, is with SSA/Sandia National Labs and is Assisting Director of the buildingSMART alliance™. She is a leading authority and presenter on BIM for owners and focuses on uses of BIM after construction.

FOOTNOTES

1. These assets are defined as, "any real property owned, leased or otherwise managed by the federal government, both within and outside the United States, and improvements on federal lands."
2. EO 13423, Strengthening Federal Environmental, Energy, and Transportation Management. January 24, 2007. EO 13514, Federal Leadership in Environmental, Energy and Economic Performance. October 5, 2009.
3. This effort is underway under the guidance of the National Institute of Building Sciences through the building SMART alliance™.