

BIM and Facilities Management

BIM is changing the way buildings are designed and constructed, but is it changing how they're operated and maintained? There is a lot of interest in the industry surrounding the use of building information for facilities management, but how does this really work and how do the benefits of BIM extend to facilities management? This white paper focuses on methods for facility managers, and FM applications, to take advantage of the consistent, coordinated building information that comes from a building information model in their own work.

Interoperability, Facilities Management, and BIM

A 2004 NIST study¹ was undertaken to estimate the efficiency losses in the U.S. capital facilities industry (i.e., commercial, institutional buildings, and industrial facilities). The study reported that the annual cost (in 2002) associated with inadequate interoperability among computer-aided design, engineering, and software systems was \$15.8B.

The study went on to report that owners and operators shoulder almost two thirds of that cost as a result of their ongoing facility operation and maintenance. These statistics are borne out in the day-to-day activities of facility managers: manually updating occupancy reports via Wite-out®; calculating area for space charge-backs by counting ceiling tiles; digging through stacks of building documentation to find the maintenance manual for water heater; searching in vain for an as-built floor plan, only to find they never received it in the first place.

But the lack of interoperability highlighted in the NIST study is only part of the problem. Is the data trapped in those computer systems studied worth sharing? We tend to overlook the issue of data quality, glossing over the unfortunate truth that often the data produced by conventional design software is unreliable and thus not worth the effort required to share it. Whereas the hallmark of BIM is coordinated, consistent, computable information about a building project – information that's worth sharing and reusing.

Therefore, owners and operators can mitigate their portion of the cost associated with the lack of interoperability cited above by using the high-quality building information coming from a BIM design process during the longer, more expensive maintenance and operation phase of the building's lifecycle. To that end, Autodesk has used DWF™ technology to link Revit® and Autodesk® FMDesktop™ software platforms and products, Autodesk's suite of applications for organizing and reporting facility-related information.

DWF-based Space Management

The DWF technology platform was developed by Autodesk to distribute and communicate design information without losing critical data and without the recipient's needing to know or even have the native design software. In that framework, Autodesk FMDesktop reads DWF files published from Revit and automatically interprets space and room data, without the FMDesktop user's needing to know or even have a Revit software product.

Contrast this approach with the typical CAFM (computer-aided facilities management) process. The facility manager scans paper floor plans (or sometimes imports electronic CAD files) for use within the CAFM application. The electronic floor plans are then used as backdrops to create "polylines" (closed loops composed of line and arc segments) to define an area and identify room numbers to name that area. The time it takes to manually "polyline" a typical commercial building can stretch from days to weeks (a 75,000 sq. ft., 3-story office building might take 4 or 5 days to "polyline") and has spawned an entire cottage industry for "polylining" services. By using DWF files to move building data from Revit to FMDesktop, Autodesk has made this reliance on labor-intensive, manual creation of polylines obsolete.

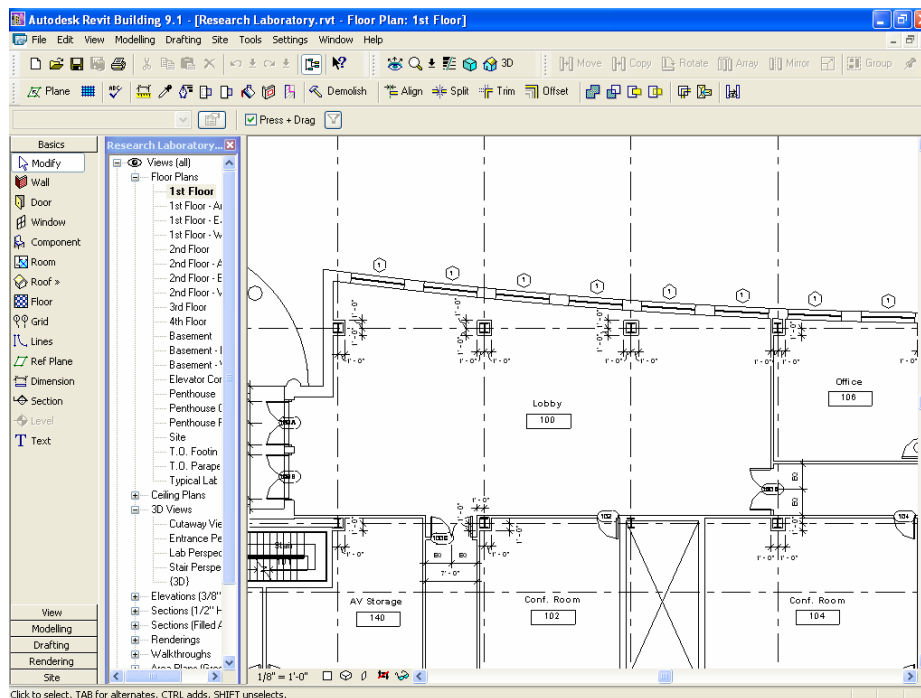


Figure 1:

Facility managers use DWF technology to move the coordinated, consistent, reliable space and room data being delivered from the Revit building information model into Autodesk FMDesktop.

Traditionally architects have had difficult choices to make when their clients asked for help getting design data into their CAFM systems: say "no," use high-rates to dissuade the client, or agree to do tedious manual entry or complicated database transfers at low margin for the sake of a client relationship. But now, architects using Revit® Architecture can simply publish their building information model to DWF and email the file to their clients who use FMDesktop. The client imports the DWF file into FMDesktop, which reads the room boundaries, room areas, room numbers and descriptions from the DWF, compares it to the existing database, warns the client about new and removed rooms, and then updates the CAFM model. No polyline services or database transfers.

In addition, DWF files can be generated from a variety of design systems using the free* Autodesk® DWF™ Writer. For non-Revit applications, there may be some manual data cleansing required by the facility manager (based on the quality of the data coming from

the design tool and the fidelity of its data transfer to DWF). But the end result is that owners/operators using FMDesktop can consolidate data from multiple sources – taking advantage of data coming from their different architects and contractors who’ve worked on different properties or renovated spaces using different authoring tools.

Facility managers can then use the simple tools in FMDesktop to generate their own color-diagram room reports and their own floor plans with room numbers, areas, occupant names, etc. - without calling the architect...unless it's time to move a wall. And if that time comes, DWF also facilitates the return of updated information back to the architect's Revit building information model. For example, the facility manager can reline the DWF to highlight modified room numbers or room types, and email the DWF back to the architect.

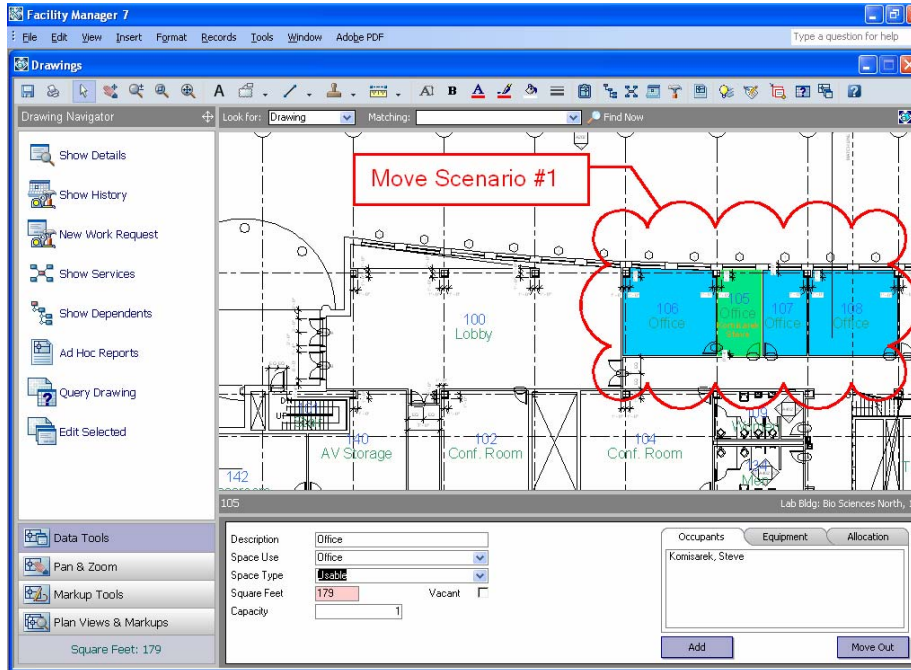


Figure 2:

Autodesk FMDesktop reads DWF files published from the Revit application and automatically interprets space and room data – minimizing the need for the manual creation of polylines.

Acceptance of BIM for Facilities Management

With the increase of BIM for design, the owner/operator’s use of that building information for facilities management is becoming more commonplace and more anticipated. Consider these examples:

- Government agencies such as the U.S. GSA now require the delivery of spatial program information from building information models for major projects that are receiving design funding in Fiscal Year 2007 and beyond (<http://www.gsa.gov/bim>).
- To facilitate life-cycle building process integration and sharing digital datasets, the National Institute of Building Sciences (NIBS) formed a committee in early 2006 to create a National Building Information Model Standard to provide a common model for describing facility information (<http://www.nibs.org/newsstory1.html#>).
- The American Institute of Architects (AIA) is considering how to modify their contract documents to codify the transfer of a building information model (http://www.aia.org/nwsltr_tap.cfm?pagename=tap_a_documents); putting in place an agreement structure whereby the building information model and the intellectual property it represents can flow naturally from the architect to the owner/operator, who can then get better data to manage a building from the most appropriate source of that data: the architect who designed the building.

Summary

The benefits of using BIM during building design have been well-publicized and are fueling its adoption rate among architects worldwide - transforming their drawing-based processes to model-based processes. The benefits of using information from a building model for facilities management are likewise compelling - fueling the discussion surrounding building lifecycle management and nudging facilities management towards model-based processes.

Facility managers using Autodesk FMDesktop can now take advantage of the reliable building information being created by Revit Architecture - immediately realizing several significant benefits. Using room data from the Revit design model dramatically reduces costs associated with the manual creation of polylines. DWF technology minimizes the frustration of cobbling together disparate building data from multiple design sources. But most importantly, facility managers can rest easy - confident in their use of the coordinated, consistent, reliable data being delivered from the building information model.

1. Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry, Gallaher, M. P.; O'Connor, A. C.; Dettbarn, J. L., Jr.; Gilday, L. T. (NIST GCR 04-867; 194 p. August 2004.)

About Revit

The Revit platform is Autodesk's purpose-built solution for building information modeling. Applications such as Revit Architecture, Revit® Structure, and Revit® MEP built on the Revit platform are complete, discipline-specific building design and documentation systems supporting all phases of design and construction documentation. From conceptual studies through the most detailed construction drawings and schedules, applications built on Revit help provide immediate competitive advantage, better coordination and quality, and can contribute to higher profitability for architects and the rest of the building team.

At the heart of the Revit platform is the Revit parametric change engine, which automatically coordinates changes made anywhere — in model views or drawing sheets, schedules, sections, plans... you name it.

For more information about building information modeling please visit us at <http://www.autodesk.com/bim>. For more information about Revit and the discipline-specific applications built on Revit please visit us at <http://www.autodesk.com/revit>.



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