Building Information Modeling and Facilities Management

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The following is a brief overview of some of the ways in which a Building Information Model (BIM) can be used to enhance or streamline various facilities management functions.

Function	Use of BIM	Model Needs
Space and Asset Management (Including moves / adds / changes, space rental or chargeback, etc.)	Traditionally done with a CAFM overlay on 2D CAD drawings. Some of the enhancements afforded by the use of a model : • Better interaction with users – a great aid in helping them visualize a space layout before it's implemented. • Location of assets on walls and ceilings and in hidden areas such as ceiling plenums or under raised floors can be accurately documented. • Faster and more accurate calculation of rentable space. Some applications can automatically calculate space according to selected rules such as IFMA or BOMA.	A relatively simple model. Needs will vary between specific facilities, but the following covers most uses: • Visible interior geometry • Glazing • Wall ratings • Interior finishes • System outlets (electrical, data, plumbing, HVAC, etc.) A final construction or as-built model will contain much more information. This model can be stripped of unnecessary information to produce a space and asset management model that is a fraction the size and thus much more efficient to use.
Way-finding and Mapping	• A model can quickly generate 2D or cut-away 3D floor plans for use as stationary plaques. • Kiosks can be set up with lightweight models and inexpensive computers to allow interactive use by visitors.	• Visible geometry only. The space and asset management model described above will support this function.
Security	• Provides a base for planning security camera placement. • Provides a highly effective dashboard for monitoring security cameras, access control, etc.	• Visible Geometry

Function	Use of BIM	Model Needs
Safety	• Provides an excellent base for egress planning and monitoring • Provides a highly effective dashboard for fire and smoke alarms. • Provides an invaluable aid for emergency responders.	• Visible Geometry
Maintenance Management	Models have been proven to produce a significant ROI very quickly by dramatically increasing the productivity of maintenance personnel. They can also increase the reliability and efficiency of preventive maintenance programs, thus reducing energy costs and prolonging equipment life. • Minimizes the time needed to locate equipment and its access. Emerging Augmented Reality apps for tablet computers allow a model to be superimposed on what the tablet's camera sees, providing a virtual "x-ray" picture of hidden objects. • Maintenance information can be linked to equipment in the model thus reducing the time needed to find it. • Provides a dashboard for preventive maintenance alarms.	• Visible geometry. • Geometry of hidden equipment and distribution systems. • Attributes required for maintenance procedures attached to model elements (mfr/model #, capacities, serial number, link to M&O information, etc.)* * Compiling this can be a huge effort if done as a stand-alone task. If planned for, though, the effort can be dramatically reduced by collecting and attaching the desired attributes at efficient points during design and construction.
Energy Management	• Models can be connected to a Building Automation System, providing a highly effective dashboard for maintaining comfort and energy efficiency. • Models enabled for thermal simulation are highly effective tools for evaluating energy conservation retrofit. or upgrades. • An accurate building model provides a base for planning sustainability enhancements such as onsite energy generation, rainwater collection, etc.	• Visible geometry. • Geographic context of the building. Depending on the specific uses, more advanced models will be required: • Attributes describing thermal characteristics attached to building elements. • Building systems modeled with intelligent objects.

Function	Use of BIM	Model Needs
Remodeling	• Minimizes the need for destructive investigation and costly investigation such as location of embedded items like post-tensioning tendons • Prevents accidental damage to hidden elements. • Reduces cost for planning remodeling and repurposing projects.	• Final construction model • Selected elements field verified

As can be seen, the characteristics of models to support different functions vary widely. In most cases the process of converting a final construction model to the desired FM model(s) consists of the following:

1. Stripping the model of unnecessary elements.
2. Replacing certain elements with simpler model objects.
3. Augmenting the model with FM information – attaching attributes to model elements, linking elements to external files and databases, etc.

All of these tasks require time and effort. However, the cost of the effort can be significantly reduced by determining the FM functions to be supported early in the design process, defining the required FM model(s) clearly through a model development specification[1] and planning the modeling effort to accommodate efficient conversion.

[1] Bedrick, James. *The Model Development Specification (MDS),* 2012