The Three Frontiers of BIM
by John Grady, McCarthy BIM Manager

As technology advances and the architectural, engineering and construction (AEC) community and owners further integrate Building Information Modeling (BIM) into standard operating procedures, new frontiers are opening up for BIM. To best understand these new frontiers, it is important to recognize that the evolving definition of BIM is going from that of creating a model for coordination purposes, to the broader perspective of the following: BIM is the process of getting the right information to the right stakeholder at the right time.

What this means to owners and the AEC community is that your focus needs to shift from “creating a model” to “establishing data maps.” This shift ultimately determines the level of information input into the model throughout its creation to maximize downstream (construction and operations) use. As the paradigm shift occurs, owners will benefit from the information rich models during construction and throughout the building lifecycle.

The three BIM frontiers continuing to evolve to accomplish this include:

1. Office to Field Migration
2. Data Management
3. Facilities Management

To be prepared for this BIM shift, let’s take a closer look at what each of these frontiers are, how they are developing, and how they will affect your next project.

Office to Field Migration

Until recently, BIM models have largely remained in the office or the jobsite trailer. That is now changing as building teams are finding new ways for the model to work its way out into the field. For this migration to the field to be successful, however, populating the correct level of data into the model, and maintaining a clear understanding of how that data will be used are both required. Here are a few examples:

• Drawings and Details – At the simplest level of data, you are able to access drawings and construction details in the field through iPads and other mobile devices. This is typically done by hyperlinking documents to models and only requires a robust filing structure and synching capability with the mobile devices.

• As-Built Measurements – The next level of data detail is getting information from the field back into the model to better accomplish subsequent construction activities. While in the past laser scanning has been the method to do this, a new technology called Get the Point directly combines a robotic total station with specific readings identified in the model. The benefit is that you get only the information required to do the job, not a bunch of white noise.

• Work Plans – The third level of data detail is utilizing the model to create work plans for specific construction activities, such as a concrete pour or the installation of a window. These work plans get the electronic model to the tradespeople in the field via old-fashioned paper. However, the paper contains 2D (plans and elevations), 3D (isometrics), 4D (series of 3D installation steps), and key quantity data (volume of concrete).

A team with all of the necessary project information will improve your project’s quality, enabling an efficient and timely delivery.

Data Management

In just the past couple of years, we have seen a tenfold increase in the amount of data contained in models. As we move from a model-centric to a data-centric approach, data management will become more and more critical.

The challenge with this increase in data density is the need to know what the data is, how it is to flow through a project and how to manage it. This is where Data Maps can come in — a Data Map being the project’s roadmap on how this is accomplished. Data management can be broken down into two primary areas: Model Data Management and Project Data Management.
Model Data Management deals with the ability to break the model down into its simplest format — a database — and harvest that information for Model Based Estimating, Project Management and Facilities Management. Recently, an increase in the number of software providers, such as Assemble, Autodesk BIM 360, Scenario and VEO, are all attempting to do just that. Unfortunately, there is yet to be one all-encompassing solution, requiring the combination of several software programs in order to fit a team’s processes and needs.

An example of this is the combination of Revit, Navisworks, Autodesk QTO, Assemble and Maximo to provide information over the entire lifecycle of the project. One important point to remember is to adapt the software to your needs instead of your needs to the software’s capabilities. Doing so will prevent you from having to change your procedure every time a new version of the software is adopted and limiting your abilities to the capabilities of the software.

Facilities Management

The vast majority of structures built today are created with some facet of BIM, encouraging the integration of BIM into Facilities Management (FM) tools. Through BIM we can now lift data such as spaces, equipment data, and room finishes from conception through the lifecycle of the structure. Integrating BIM with Computerized Maintenance Management Systems (CMMS) and Computer Aided Facilities Management (CAFM) solutions can streamline space planning, procurement, preventative/preemptive maintenance, work order creation and more. Also, upon completion of a project, information typically gathered by a team sent into the field can now be gathered from the model instead, offering significant time savings.

By integrating BIM into Facilities Management tools, a visual and interactive environment is added to the workflow. For example, an air handler unit can now have warranty information, links to operation and maintenance manuals, and links to real-time data such as air flow and temperature, wiring diagrams and spare parts lists. In addition, model element location information can now be linked with CMMS and CAFM systems. This allows facilities management teams the ability to have the necessary information in a more tangible form at their fingertips creating efficiencies in their day to day task.

Soon a facilities manager won’t even need to know how to navigate a model. Through the use of bar codes, real time location systems and portable devices such as iPads, the manager will simply have to scan codes located within the rooms of the building and the model-view will automatically orientate itself to match where the iPad is being pointed. This can be taken a step further by accessing different layers of the model, essentially creating an interactive “x-ray” portal into walls.

Conclusion

Many exciting technology tools are on the horizon that will make communicating information on your project much more intuitive, productive and efficient. To maximize the benefits of BIM, make sure all project stakeholders are involved early in the process. Bear in mind, there is no magic BIM to FM “easy” button. Many emerging technology systems are still in their infancy. As a result, your

Project Data Management relates to the project as a whole. This includes 3D models, 2D drawings, submittals, communications, meeting minutes, etc. With project teams spread across multiple locations, it is imperative that people have access to the right information at the right time. To ensure this, the following points must be taken into consideration:

- Does this platform (hardware and software) allow for version files? (i.e. Does it allow you to save a file with the same name and keep the old copy also?)
- For security concerns, can access to files and folders be restricted to control ability to only view instead of edit?
- Is this platform interoperable with other team members?
- Does this platform charge per user or is cost based on storage?
- Is this platform scalable so storage space can be added as needed?
- What happens to the files/data at completion of the project?

The decisions your team makes for data management can improve your project’s quality, enabling an efficient and timely delivery.
team should work to have the software conform to your process. Because of the rapid pace at which these software tools are developing, it is prudent to look at BIM technology in a mere twelve to eighteen month window instead of assuming you will obtain an all-encompassing solution.

Technology will continue to change, and your project building team will need to adapt with these new BIM frontiers to make sure the right stakeholder is getting the right information at the right time. Decisions you make now will help to layout your future with BIM.

ABOUT THE AUTHOR
As a BIM Manager for the Central Division of McCarthy Building Companies, Inc. based in St. Louis, John Grady strives to find the new best uses of BIM from prefabrication to safety on the jobsite. With more than 20 years of experience across a wide variety of fields, his career started with the US Navy Seabees as a tradesman. Today, he applies this practical know-how to the collaborative implementation of BIM with owners, design partners and subcontractors on McCarthy projects. John currently sits on the U.S. Army Corp of Engineers/Industry BIM Advisory Panel, the United Brotherhood of Carpenters BIM Curriculum Development Panel and the BIM Council of St. Louis Steering Committee. John can be reached at jgrady@mccarthy.com.

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