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BIM Best Practices: A Rapid Fire Review of Industry Metrics and Trends

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TO SUPPORT THE BUILDINGSMART ALLIANCE'S™ BIM CASE study and metrics data collection initiative, a panel of twelve industry BIM pioneers presented their current best practices in rapid fire succession at the bSa International Conference, held December 8, 2009. In session W203 entitled, "BIM Best Practices: Winning Solutions from the Leaders", each presenter only had 12 minutes to profile their project, which allowed for a broad cross section of BIM uses.

The program kicked off with a presentation by Barton Malow Company and their use of Tablet PCs for tracking construction progress. Other presenters from BN Builders, Clark Construction, Gensler, Gilbane, Turner, Ayers Saint Gross, Ghafari, HDR, SOM, and GSA featured case studies ranging from sustainability and building performance modeling, laser scanning, integrated design bid build, integrated project delivery, lean supply chain management, clash detection, and virtual prototypes. During the session, data was collected about current trends in BIM uses and metrics. The next two sections report on the trends that were revealed.

TRENDS IN BIM USES

Here we will present the results for BIM use from categories organized and sorted by the type by discipline—construction company or architecture firm. Session presenters included five construction companies and five architecture firms. **TABLE 1** displays the results by category and the number of presenters utilizing BIM in each category. **TABLE 1** does not distinguish, however, between the discipline (construction or architecture) in each category, but indicates a combination of all BIM users for a given category.

Categories included the typical and expected uses of BIM, along with the more specialized and cutting-edge uses. 3D design coordination led BIM use, followed closely by design authoring, and 3D control and planning. Each of the presenters used one of these categories, with many using all of the 3D BIM capabilities.

Over half of all presentations included BIM use for design reviews, structural analysis, and mechanical analysis. Utilizing BIM for reviews and analyses corresponds closely with the use of BIM for its 3D design capabilities. Five of the presentations included BIM use for space management/space tracking and five for construction system design. BIM for programming and digital fabrication were the next two most frequently used categories. Four of the session presenters reported using BIM for each of these categories. BIM for lighting analysis, site analysis, building system analysis, and 4D modeling were each reported by three of the session presenters as a category used in their company. The remaining categories were each included in two of the session's presentations by industry leaders. These categories are

maintenance scheduling, asset management, record modeling, site utilization planning, energy analysis, cost estimation (quantity takeoff), existing conditions modeling, and tablet PC/field tracking. Only one of the presenters reported using BIM for LEED evaluation.

TABLE 1 reveals a solid foundation of BIM use for its 3D capabilities and a current trend toward utilizing BIM more for analysis, space management, programming and digital fabrication purposes. This may be the natural progression for BIM use as expertise levels improve within 3D and users expand to additional BIM capabilities. In addition to the trends in BIM use attributed to the technology, the data collected during this session indicates a trend in BIM use for integrated approaches to project delivery.

BIM METRICS PRESENTED

In addition to tracking trends in BIM use, information was collected about different metrics included in the presentations. Here are a few of the metrics:

- Project delivery method;
- Actual total project cost;
- Initial predicted project cost;
- Actual total project duration;
- Initial predicted project duration;
- Total project square feet; and
- Total number of project RFIs.

Category	Frequency of Category Use
3D Design Coordination	10
Design Authoring	10
3D Control and Planning	10
Design Reviews	6
Structural Analysis	6
Mechanical Analysis	6
Space Management/Space Tracking	5
Programming	4
Digital Fabrication	4
Lighting Analysis	3
Site Analysis	3
Building System Analysis	3
Phase Planning (4D Modeling)	3
Maintenance Scheduling	2
Asset Management	2
Record Modeling	2
Site Utilization Planning	2
Energy Analysis	2
Cost Estimation/Quantity Takeoff	2
Existing Conditions Modeling	2
Tablet PC/Field Tracking	2
LEED Evaluation	1

Table 1. BIM Use Categories and Frequency Used.

Six of the session presenters reported using BIM in an integrated approach to project delivery such as design build or integrated project delivery. Projects presented in the session were large-scale and the majority was public projects. Presenters attributed reduced time spent during the design process and reduced total project duration during construction to the use of BIM. One presenter's method for tracking savings during the design process was based on tracking reduced hours spent on design and associating each hour with dollars per hour. Savings in total project duration were presented as a percentage of construction time and a percentage of reduced RFIs.

Ongoing data about BIM use will serve to continue tracking trends and increase the knowledgebase across BIM users. More data about each of the metrics in this session will serve to further enhance BIM use and expand it beyond the current trends.

CONCLUSION

The session has become significant because it was the kickoff of the formal case study documentation procedure for bSa (www.buildingsmartalliance.org/index.php/projects/activeprojects/66).

Each presentation is now housed on the bSa portal and can be accessed by bSa members. Future conferences will feature similar case study sessions with the main goal being capturing

design and construction presentations on all BIM uses as outlined in the BuildingSMART BIM Project Execution and Planning Guide (www.engr.psu.edu/ae/cic/bimex).

Beyond the capture and dissemination of these BIM uses to an international community, the case studies committee is developing a standard template whereby consistent metrics can be tracked on all profiled projects. Currently, few common elements exist that allow the industry at-large to compare various projects. Tracking return on investment will allow measurements for improvement as we move to BIM-enabled design and construction practices. This project will endeavor to build templates to be used to report case studies, which will provide the industry some common performance metrics.

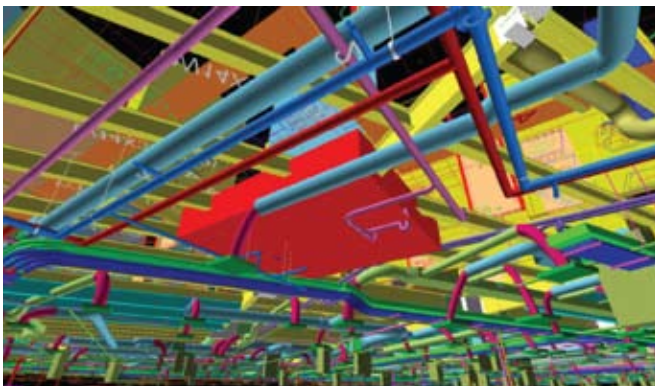
If you have a case study you would like to submit to the bSa, please email Kurt Maldovan (kurt.maldovan@jacobs.com) for a standard project profile template. ■

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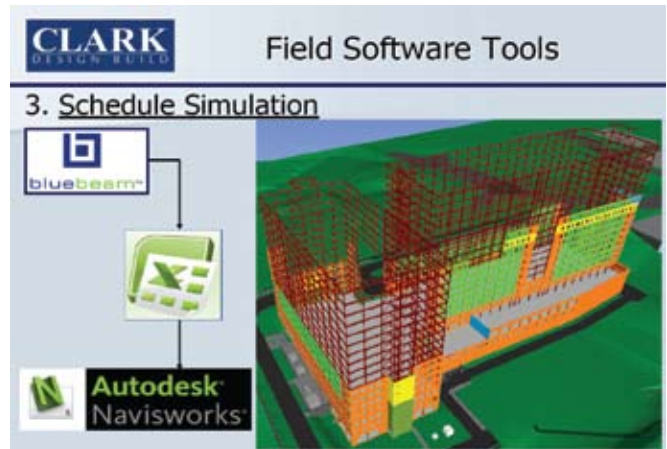


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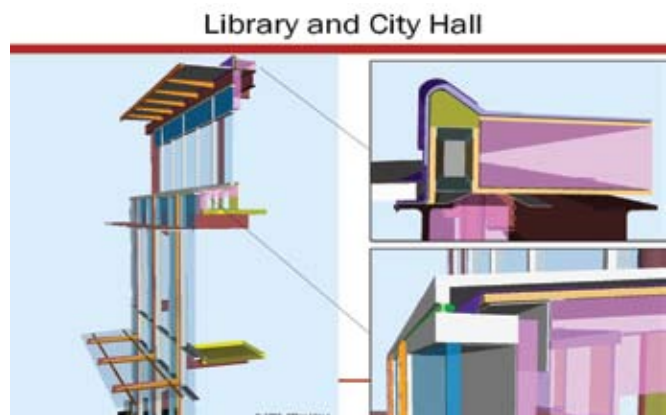
Galen Hoeflinger, RA, LEED AP from Ayers/ Saint/ Gross presented on documenting existing conditions. This is a view of a Revit model overlaid with laser scan data.



Mike DuLaney of Gilbane (Turner-Gilbane Joint Venture) presented BIM for site planning and coordination for Rapid Impact Analysis.



Steve Strickland of Clark Construction presented multiple BIM uses including tenant planning, coordination, material tracking, and 4D modeling (shown here).



Dace Campbell, AIA, LEED AP, of BN Builders presented ten BIM uses. This is a detailed enclosure analysis.