

Intelligently Linking Information for Better Performance Management Across Industry and Government

One of the constant concerns about the acceptance and implementation of earned value management is the perception that earned value metrics and trends do not tie well to the schedule and do not reflect the true technical status of a project. We believe that the aerospace and construction industry can learn to manage programs better by using Building Information Modeling.

In 2012 the Department of Defense published the Integrated Program Management Report (IPMR) Data Item Description (DID) which emphasized the integration of EVM data with the schedule and facilitates integrated analysis by requiring a common electronic format for the cost and schedule. The use of common tags such as Work Breakdown Structure, Control Account Numbers, Work Package Numbers and Organizational Breakdown Structure allow for electronic correlation and analysis using computers to increase the breadth and depth of the earned value analysis and establishing root cause.

At the center of earned value management is the requirement to claim technical progress based on objective criteria. During the development phase of programs objective criteria for progress claims are sometimes not straight forward. But if the cost and schedule could be electronically tagged to the system design artifacts as the design matures the technical, cost, and schedule status would be naturally integrated. The vision of BIM is to address this current lack of data integration issue throughout the project lifecycle.

Building information Modeling was created as a process and concept in the early 2000s. The concept is to move the construction industry from building complex structures using 2D drawings to designing and building using a 3D interactive Building Information Modeling (BIM) approach. BIM is a process with an intelligent model at the core with time and cost can and serves as a virtual prototype, a complete model of all building with components of the building as discrete objects.

The IPMW 2017 held a first ever BIM track to bring the construction experts and performance management experts together to foster collaboration and a working relationship to resolve our common goal to improve cost, schedule, and technical performance across our respective communities.

The BIM track consisted of 5 presentations which are summarized below:

BIM01 Overview of Building Information Modeling (BIM)

A Wiki definition of Building information modeling (BIM): A process involving the generation and management of digital representations of physical and functional characteristics of places.

The BIM process allows teams to communicate ideas in a visual prototype manner allowing for collaboration across program management teams to investigate and interrogate a model, like never before, to guide owner decisions by access to accurate evaluation of construction status throughout the design and construction process and even into operations.

The BIM process provides for the integration of intelligent 3D design with schedule (4D) and cost (5D) and eventually to support the business operations and maintenance of the system (building).

BIM02 Design and BIM (3D)

3D BIM provides a 3D interactive model of the system being designed and built for project stakeholders to communicate. The typical approach in construction today is for architects to manually develop a few alternative designs based on experience to address customer requirements. BIM will allow the ability to use a computer to produce hundreds or thousands of viable design alternatives for customers, architects and builders to choose from based on a set of desired design outcomes.

The 3D model then continues to mature and gain fidelity as the building or system design matures. Keeping the 3D model up to date facilitates the ability to work through issues found during the design and build process. This is particularly useful since complex buildings are being designed and built concurrently.

BIM 03 BIM Integration into Schedule (4D)

4D BIM is the integration of a high-fidelity 3D model over time. Build sequences and dependencies are built into the model allowing the team to visualize the time phased build and design of the system. Being able to visualize the expected maturity of the design in the future can be very powerful in support of identifying potential resource conflicts, building sequence issues, and the ability to iterate on alternate sequences to work around unforeseen issues that arise such as weather or labor strikes.

BIM 04 BIM Integration into Cost (5D)

Simply stated, 5D BIM means adding the element of cost to models (3D) that have been linked to schedule information (4D). 5D BIM includes the pre-construction planning of costs and performance against budget, while also measuring actual costs and changes against plans for real time project insight.

Bringing together cost, technical, and schedule objects in both cloud and mobile environments enables automatic analysis of key project indicators such as cost performance (CPI), schedule performance (SPI) and earned value (EVM). The reports are highly visual as 3D models are color coded to communicate status, trade and location.

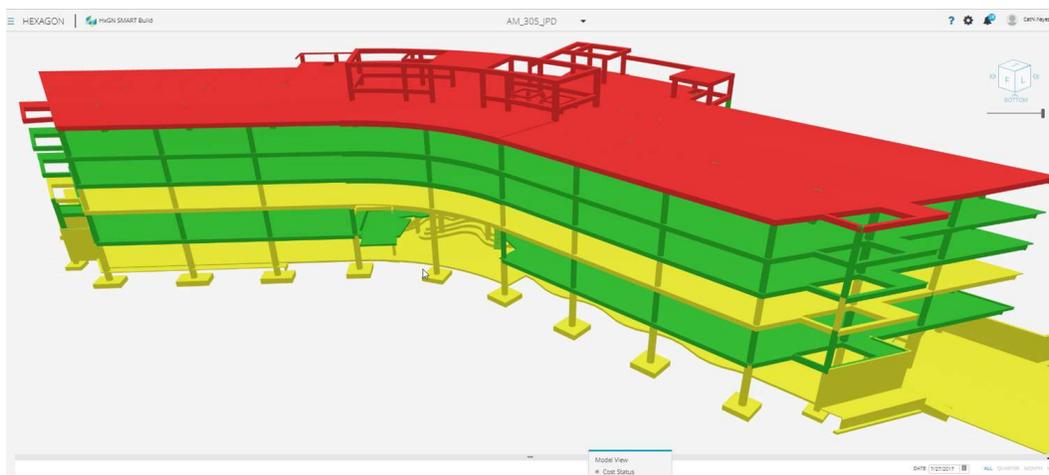


Figure 1: 5D Performance report (CPI)

The importance of linking with 5D

A key concept in 5D BIM is the "intelligent linking" of data. Intelligent linking of data is what makes real-time visibility of project status and performance possible. The key is to embrace the 5D workflow during planning, so the cost, schedule and model structures can be mapped, or linked, to each other with the right level of detail from the beginning of the project. By breaking down siloes of information, empowering workers and reducing risks for owners and contractors, 5D BIM presents a real opportunity for the building construction industry.

BIM 05 BIM Integration with lifecycle management (6D)

Extending the use of BIM into the sustainment phase of a project is where the lasting value can be obtained for the building lifecycle. The cost of operating and maintaining a building is 10 to 15 times the initial cost of the building. As buildings get "smarter" new capabilities can be integrated into the BIM model to provide building operators, users, and maintainers easy access to data allowing for more streamlined and predictable operations

BIM 06 The future of BIM Panel Discussion

During the panel discussion the presenters and members of CPM talked about the common issues we face in evaluating cost, schedule, and technical status throughout the project. The BIM process emphasizes the data integration of all aspects of the project to quickly and accurately evaluate status, evaluate alternatives to resolve issues, forecasting, and planning out future work.

The group agreed that there is synergy in the construction and BIM experts and the CPM performance management experts. Our plan is to continue the collaboration by forming a BIM interest group. The intent of the group will be to continue the collaboration and to look for opportunities to engage in both BIM forums and performance management forums.

Look for the next BIM track at EVM World 2018.

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