Integrating BIM with Facilities Management at NASA LaRC

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The owners and facility managers have started adopting Building Information Modeling (BIM) for new construction projects, but BIM can bring even more benefits to post-construction Facility Management.

Facility Management and BIM

A well-known study by the National Institute of Standards and Technology (NIST) estimates the efficiency losses in the U.S. capital facilities industry resulting from inadequate interoperability among computer-aided design, engineering, and software systems at $15.8 billion per year. The largest part of this problem belongs to the Operations and Maintenance Phase of building lifecycle, resulting in efficiency losses of $9 billion per year.

These efficiency losses can be reduced through integration of various systems used for building lifecycle management, such as Building Information Models (BIM), Building Automation Systems (BAS), Facilities Management Systems (FMS), and Geographic Information Systems (GIS). By integrating these previously separate datasets Facility Manager has an increased ability to analyze operational data, thus enabling a holistic approach to capital asset management.

For example: if an average work order requires 5 man hours, 2 of which are spent researching information (what's the model number, how to replace spare parts, warranty information, etc.), imagine what the yearly savings could be if the 2 man hours could be eliminated.

In order to enable a better way of managing facility information post-construction, a better process for data delivery from construction to operations should be established and thoroughly controlled.

Project Description

The General Services Administration (GSA) and NASA are jointly managing the implementation of a 15-year facility modernization program at the Langley Research Center (LaRC) in Hampton, Virginia, known as New Town. The program scope includes the design and construction of six new buildings and renovation of two existing buildings.

The objective of a "BIM for Facilities Management" project was to review processes related to data collection and handover from design/build construction team to NASA's Facility Management group, and establish integration between the NASA New Town AOB1 project's BIM Models and NASA's LaRC IBM Maximo CMMS, and to evaluate effectiveness of the integration by applying quantitative and qualitative metrics.

EcoDomus, Inc. was tasked with developing an Implementation Plan to enable a more efficient way of data gathering, validating, and importing into the Facility Management software: IBM Maximo.

Implementation Plan and COBie

The Implementation Plan defined rules and responsibilities of the project team members for collecting right data and exchanging it with the CMMS application using open source industry standards where possible. The plan paid a special attention to COBie (Construction Operations Building information exchange). COBie is a vendor-neutral industry standard that describes both product (COBie file) and process of collecting and validating building lifecycle data during design, construction and commissioning. This data can be incorporated into the Operation & Maintenance phase of a building lifecycle efficiently.

Instead of requiring only the handover of paper documents containing equipment lists, product data sheets, warranties, spare part lists, and other information, the owners should require a standardized electronic delivery of this information. This information is essential to support the operations, maintenance, and the management of the facilities assets by the owner and/or property manager.

Today's standard practice of gathering and turning over of this information typically occurs after commissioning. This process is both expensive and a duplication of effort. The COBie process simplifies the work required to capture and record the project handover data.

The COBie process is to enter the data as it is created during the design, construction, and commissioning phases (see Figure 1).

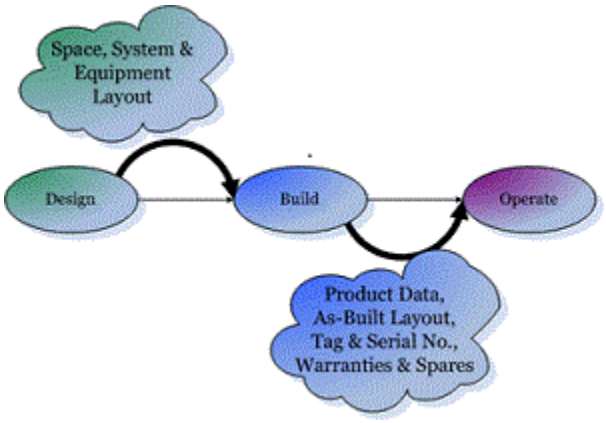

Figure 1

Designers provide floor, space, and equipment layouts while contractors provide make, model, and serial numbers of installed equipment. Commissioning agents validate installed equipment properties. Much of the data that is provided by contractors comes directly from product manufacturers who can also participate in the COBie process.

The Implementation Plan developed for NASA LaRC project outlined major tasks required for a successful data management process outcome: rules related to BIM data management, documentation requirements, schedule-based quality control, objects' naming conventions, and other procedures.

Lessons Learned

The project was in construction when the implementation team got involved and contractual scope of work has been established and signed, so not all of the efficient workflows were established due to lack of funds and readiness of the design and construction team. NASA and GSA were able to observe the deficiencies of the current processes, and as a result improved the contractual requirements to make them more detailed while utilizing open standards.

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