

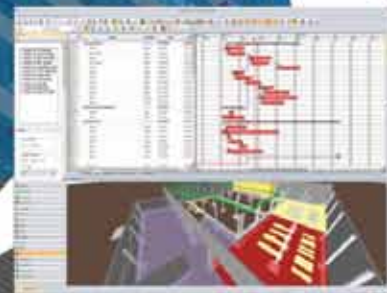
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Unlocking Value from the National BIM Standard™

By E. William East, PhD, PE and Danielle R. Love

ALL CONSTRUCTION PROJECTS require the exchange of information. Whether this exchange occurs between different project team members or within a particular team's organization, information is generated, collected, sorted and distributed to others. Unfortunately, a significant amount of this effort is spent recreating information previously provided in some other format. Teams at the buildingSMART alliance™ create standardized information exchange formats to eliminate this duplication of effort and to improve the accuracy and timeliness of the information provided.

At the Ecobuild America 2010 conference, the Facility Management Handover Model View Definition (MVD), known in the United States as the Construction Operations Building information exchange (COBie), was shown to provide substantial benefit to its early adopters. The presenters at the *COBie Case Studies and Innovations* session demonstrated how they customized specific deliverables required at different phases of the project to create value. This paper provides a life-cycle project that shows how COBie information delivers value to those who capture the information as it is initially created and to those who supplement the information throughout a project rather than recapturing the information at the end.

LIFECYCLE INFORMATION EXCHANGE (LCIE)

The creation of facility information related to the spatial and physical assets in the facility is not limited to a single contractor or commissioning agent. This information is created throughout the project starting with the original architectural program. Unfortunately, current contract specifications require the capture of this information at the end of the construction project. The

objective of the Life Cycle information exchange (LCie) project is to describe the day-to-day information required to supply COBie data throughout the project, unlocking the business value hidden in the data specification format. LCie specifies what COBie data is being captured by whom at which point in the project. In essence, LCie can be thought of as mini model views used to capture information from its authoritative source.

Instead of creating new legal theories based on shared building information models, the authors reviewed existing contract deliverables containing COBie information to evaluate the ability of current contracts to support COBie. The authors confirmed that the complete set of COBie information is already required in design and construction contracts. As a result, COBie is simply a change in the format of existing contractually required deliverables.

The next paragraph summarizes the life-cycle deliverables that contain COBie information. With these mini model views, all project team members and service providers can begin to streamline the delivery of the information they create.

PROJECT INITIATION

There are several sets of information created during the project initiation phase. Owners with standardized facilities define requirements using facility criteria to create generic room data sheets. Owners will also have discipline criteria identifying the general requirements for equipment and building systems. In addition, many owners have discipline specifications that provide program-independent criteria, generally related to specific types of products and equipment.

A project is initiated when general information such as name, location and facility type is supplied. The application

of criteria to this specific building results in space and equipment programs. Today, this program information is generally used and thrown away. Implementing LCie allows owners to track the delivery of their buildings through the use of open standards, during the entire life of that facility (TABLE 1).

Table 1. Initiation Phase Exchanges

Project Phase	LCie Exchange
Criteria	Facility criteria
	Discipline criteria
	Discipline specifications
Initiation	Project definition
Requirement	Space program
	Product program

DESIGN PHASE

During the design phase, designers identify the schedule of rooms and zones and the schedules for products and equipment in the facility. From the designer's point of view, COBie is simply the export of these design schedules. As the design progresses, these schedules become more complete, eventually including design consultants' schedules. Comments made during project reviews may also be captured as "issues" mapped directly to these room and equipment schedules. Information about the materials, products and equipment begins as the identification of standard templates and progresses to the specification of specific types needed to ensure the designer's vision (TABLE 2).

Table 2. Design Phase Exchanges

Project Phase	LCie Exchange
Design documents	Design early
	Design schematic
	Design coordinated
	Design issue
Construction specification	Product type template
	Product candidate

CONSTRUCTION PHASE

During the construction phase, builders capture additional information about the project as the information is received. Issues may be identified and collected during bidding, which is quickly followed by the prime and sub-contractors buying out the project. The exchange of product information is provided through manufacturers' product data sheets submitted in document format. Such information could be linked through an electronic submittal process directly to product schedules. The submission of system layout or shop drawings may also be captured through either documentary or electronic formats.

Following the approval of products and systems, the contractor is required to provide evidence of the installation and inspection of that equipment. The delivery of daily reports, invoices and punch list documents may be transformed into direct electronic information through the standard formats identified in **TABLE 3**, given that the majority of the information provided by the contractor is actually provided by product manufacturers and repackaged. The identification of these deliverables can be used to free the building and commissioning agent or heating, ventilating and air conditioning (HVAC) subcontractor from repackaging manufacturer information.

Table 3. Construction Phase Exchanges	
Project Phase	LCie Exchange
Bidding	Bid issue
Selection	Product type selection
	System layout
Installation	Product installation
	Product inspection
	Construction issue
Commissioning	Product type parts
	Product type warranty
	Product type maintenance
	System operation

OPERATIONS AND RECYCLING PHASES

Information representing the as-operated status of the facility may continue to be captured through the addition

of information about the status of space and equipment. The capture of such information in open standards ensures compatibility with the variety of tenants, contractors and information systems that are possible without the expense of external consultancies. As the facility is updated, consistent information may be captured by repeating the necessary LCie exchanges during renovations until the facility is recycled (**TABLE 4**).

Table 4. LCie O&M Exchanges	
Contracting Phase	LCie Exchange
O & M	Space condition
	Product parts replacement
Repurpose	Remodel
	Expand
	Demolish

CONCLUSION

LCie defines both the mini model that shows what each team member contributes to the overall space and the product schedules produced during a project. Delivery of this information is possible by requiring the open-format delivery

of existing contract deliverables. LCie unlocks the value in the data model by showing where to streamline document-centric approaches to administrative procedures. Continued efforts sponsored by the National Institute of Building Sciences and the U.S. Army Corps of Engineers Engineer Research and Development Center will allow team members to calculate the value of these changes.

FOR MORE INFORMATION

COBie: wbdg.org/resources/COBIE.php

COBie Calculator: projects.buildingsmartalliance.org/files/?artifact_id=3597

FM Handover MVD: buildingsmart.com/content/fm_handover_view_aquarium

LCie: buildingsmartalliance.org/index.php/projects/activeprojects/140 ■

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