

Life Cycle information exchange (LCie): Space Program

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BACKGROUND

The specification of a spatial program is an essential part of the development of the requirements for a project. The space program maps the activities to be accomplished with different physical areas of a facility with the physical spaces and services that are needed to accommodate that activity.

BUSINESS CASE

The common specification of spatial program can be an essential tool for owners to verify that they have received the design, and later construction, product for which they have contracted. This information is also the basis for square-foot scale estimates of the cost of facilities. Without a common framework to ensure the exchange of this information each party to the project must recreate and capture space programming information as they need that information. This requirement is not limited to the use of space programming for the purpose of project go/no-go decisions, but is an essential part of the long term management of the facility and its assets. Assignment of space based on the capabilities of spaces to support a variety of activities is critical throughout the life of the project. Currently facility managers keep multiple, typically conflicting copies of this information.

EXAMPLE CONTRACT CLAUSE

The delivery of a common format for the identification of spaces, required space finishes, expected space functionality, and zoning or related adjacency requirements should be specified as part of the documentation required for the go/no-go decision package for the project. Many large owners have common forms for this type of information that must be submitted to funding bodies. For example, in the U.S. Department of Defense the Form DD 1391, provides a spatial and requirements-based breakdown of the project. The production of this common set of information, tailored to the requirements for a specific facility under consideration, should be included in contracts and/or standard operating procedures.

ORGANIZATION

The buildingSMART international Information Delivery Manual process identifies information exchanges according to the table shown below. Use this table to determine if this information exchange applies to your area of responsibility for a given project.

Code	Phase	Used
0	Portfolio requirements	
1	Conception of need	
2	Outline feasibility	
3	Substantive feasibility	
4	Outline conceptual design	✓
5	Full conceptual design	
6	Coordinated design and procurement	
7	Production information	
8	Construction	
9	Operation and maintenance	
10	Disposal	

The buildingSMART alliance classifies information exchanges according to a number of different classification tables, called OmniClass, provided by the Construction Specification Institute. In addition to OmniClass references to the subject exchange, the buildingSMART alliance provides an overall business activity diagram node referenced in the table below.

LCie Worksheet	OmniClass Table 31 Phase	OmniClass Table 34 Actors	OmniClass Table 32 Services	Activity Node Tree
Programmed Spaces	31-10 14 21 Project Programming Phase	34-21 17 00 Planner	32-11 14 24 Programming	3.413 Configure Layout of Building Rooms and Zones

EXCHANGES

The sections below describe the inputs required to apply this information exchange. The processing that is accomplished to process these inputs, and the resulting outputs that should be expected as a result of performing this information exchange. This information exchange can be characterized as a “batch” update of the as-built construction building model. A general description of the requirements for batch exchanges is found in the LCie Overview (URL).

Inputs

Space Program requires the user authentication and project authorization wrappers described in the LCie Overview (URL). In addition, the information below is the minimum data set that will be processed; however, additional worksheets may be provided by the creator of the COBie file. Please note that additional worksheets may be needed to produce a proper ifc file.

- Facility worksheet.
- Floor worksheet.
- Space worksheet.
- (Optional) Zone worksheet.

The following table summarizes the expected content in the COBie file. Referenced rows are for informational purposes and should not be changed. New rows require the addition of new row items to the designated worksheet. Updated rows require the addition of information to an existing row item. It may also be appropriate to add a new row item to a worksheet as part of an update. Optional rows are not required but will be processed if provided.

Key: Referenced Rows= Y or – (not reqd.)
 New Rows= Y or – (not reqd.)
 Updated Rows = Y or – (not reqd.)
 Optional Rows = Y or – (not reqd.)

Worksheet	Referenced Rows	New Rows	Updated Rows	Optional Rows
Facility	-	-	Y	-
Floor	-	Y	-	-
Space	-	Y	-	-
Zone	-	-	-	Y
Type	-	-	-	-
Component	-	-	-	-
System	-	-	-	-
Spare	-	-	-	-
Resource	-	-	-	-

Job	-	-	-	-
Document	-	-	-	-
Attribute	-	Y	-	-
Connection	-	-	-	-
Coordinate	-	-	-	-
Issue	-	-	-	-

Processing

All processing of batch deliverables begins with the receipt of the deliverable by its contractually required recipient. Transmission of the batch file to the intended recipient is expected to occur through appropriate secure large file exchange tool provided for the project by the owner. Once received, the deliverable is checked to ensure that the format of the information is correct, after that the new batch file becomes the current building model.

Batch building information processing

The processing stage for batch files checks the new file to ensure it is correct then moves the current building model to a backup folder. A series of checks against the previous model are then completed. The specific checks depend on the specific type of information exchange.

Output

The outputs of this transaction are files that demonstrate proper processing of the submitted information. The following reports would be expected:

- Incoming file compliance with COBie
- Incoming file compliance with information exchange requirements (identification of optional data)
- Verification of mapping to target model
- Results of completing the transactions
- Comparison of prior and current model states.

Follow On

The following processes are expected to occur after or concurrently with this process:

- Product Program
- Early Design

EXAMPLES

The LCie project has two example projects, a duplex apartment and a medical clinic. For each example project, a space program COBie file has been created. The facility, floor, space, and zone worksheets in each space program file have been completed in accordance with the COBie instruction worksheet. The space program files for both example projects can be found below.

Duplex Apartment

- Example 1:
 - Input:
 - Prior building model (DuplexApartment_SpaceProgram_before)
 - Exported template for Product Inspection (URL)
 - Completed template for Product Inspection (DuplexApartment_SpaceProgram)
 - Output:
 - Incoming file compliance with COBie
 - Incoming file compliance with exchange requirements (identification of optional data)
 - Verification of mapping to target model

- Results of completing the transactions
- Comparison of prior and current model states.

Medical Clinic

- Example 1:
 - Input:
 - Prior building model (MedicalClinic_SpaceProgram_before)
 - Exported template for Product Inspection (URL)
 - Completed template for Product Inspection (MedicalClinic_SpaceProgram)
 - Output:
 - Incoming file compliance with COBie
 - Incoming file compliance with exchange requirements (identification of optional data)
 - Verification of mapping to target model
 - Results of completing the transactions
 - Comparison of prior and current model states.

Software Implementation Guidance

SCRIPTED PROCESS

To recreate the example files identified in this information exchange documentation the bimServices engine was used based on information from two projects a Duplex Apartment building and a Clinic building. The following batch file was used to process the appropriate files through the bimServices engine.