

Life Cycle information exchange (LCie): Design Schematic

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BACKGROUND

The construction management team is responsible to those funding the project to ensure that the project fully meets the requirements identified in the Space Program and Equipment Program building information, previously delivered. The first LCie design phase deliverable, the Early Design information exchange, allows the design team to demonstrate their conformance with the Space Program and Equipment Program. In addition the owner and future tenants may begin to review the content of the model for conformance against the technical specifications.

BUSINESS CASE

Today building designs are not checked against the original architectural or equipment program. Delivery of Early Design models would allow the automated verification that design products meet contracted programmatic requirements. With the delivery of design elements, additional comparisons can be made between the technical requirements of the owner and the design.

EXAMPLE CONTRACT CLAUSE

The designer should be required to provide the Design Schematic deliverable as part of their schematic design deliverable.

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

Schematic Design	31-20 10 17 Schematic Design Phase	34-25 21 00 Architect	32-11 14 00 Designing	3.4 Develop Design
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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

Design Schematic 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.

- Floor worksheet.
- Space worksheet.
- Type Worksheet
 - The following required COBie fields must be present in this file:
 - Type name
 - Category
 - Description
 - Asset type
 - Who created the entry and when
 - The following required COBie fields may not be present in this file:
 - Manufacturer
 - Model number
 - Warranty guarantor-parts
 - Warranty duration-parts
 - Warranty guarantor-labor
 - Warranty duration-labor
 - Warranty duration unit
 - Replacement cost
 - Expected life and it’s duration unit
 - Warranty description
- Component Worksheet
 - The following required COBie fields must be present in this file:
 - Component name
 - Type component belongs to
 - Space component is located in
 - Description of component
 - Who created the entry and when
 - The following required COBie fields may not be present in this file:
 - Serial number
 - Installation date

- Warranty start date
 - Tag number
 - Bar code
 - Asset identifier
- Attribute worksheet.
 - (Optional) Zone worksheet.
 - (Optional) System worksheet.
 - (Optional) Coordinate worksheet.
 - (Optional) Connection 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	-	-	Y	-
Component	-	-	Y	-
System	-	-	-	Y
Spare	-	-	-	-
Resource	-	-	-	-
Job	-	-	-	-
Document	-	-	-	-
Attribute	-	-	Y	-
Connection	-	-	-	Y
Coordinate	-	-	-	Y
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:

- Design Coordinated

EXAMPLES

The LCie project has two example projects, a duplex apartment and a medical clinic. For each example project, a design schematic COBie file has been created. Additional types, components, and attributes have been added in each design schematic file in accordance with the COBie instruction worksheet. The design schematic files for both example projects can be found below.

Duplex Apartment

- Example 1:
 - Input:
 - Prior building model (DuplexApartment_DesignSchematic_before)
 - Exported template for Design Schematic (URL)
 - Completed template for Design Schematic (DuplexApartment_DesignSchematic)
 - 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_DesignSchematic_before)
 - Exported template for Design Schematic (URL)
 - Completed template for Design Schematic (MedicalClinic_DesignSchematic)
 - 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.

```
echo off
set a0=DesignSchematic
rem Replace %1 with MedicalClinic or DuplexApartment
set a1=%1
call goCl          %a1% %a0%
call goReplace1   %a1% %a0%
call goIC         %a1% %a0%
time /t
```

Figure 1 doDesignSchematic batch file