

Life Cycle information exchange (LCie): Space Condition

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BACKGROUND

During the operations of the facility, it is necessary to assess the condition of individual spaces. This is often accomplished to support facility management decisions relating to phased refurbishment and redecoration. In other cases space surveys are required to be conducted to update a variety of different attributes related to health, safety, environmental, accessibility, energy, or other topics.

BUSINESS CASE

Space surveys are expensive to organize, conduct, complete, and verify. In addition to the direct cost of conducting the surveys, failure to provide a common framework for the collection of such information results in a myriad of information silos that cannot be easily integrated to provide a holistic picture of facility condition. Given annually increasing number of different data calls that require space surveys, an initial estimate of the savings associated from implementing this information exchange could be estimated to be 1 data entry/fixing hour per room per survey per year.

EXAMPLE CONTRACT CLAUSE

Often building surveys are required to be performed by building occupants or facility management staff. In these cases policy documentation to use Space Condition survey forms produced through the LCie process, as opposed to contract clauses, will be sufficient to ensure collection of interoperable Space Condition information.

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
Condition Assessment	31-50 20 21 Facility Inspection Phase	34-41 11 00 Facility Manager	32-41 51 11 Inspecting	5.3 Evaluate Conditions and Detect Problems

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 “transactional” update of the as-built construction building model. A general description of the requirements for transactional exchanges is found in the LCie Overview (URL).

Inputs

Space Condition 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.

- Attribute 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	-	-	-	-
Type	-	-	-	-
Component	-	-	-	-
System	-	-	-	-
Spare	-	-	-	-
Resource	-	-	-	-
Job	-	-	-	-
Document	-	-	-	-
Attribute	-	Y	-	-
Connection	-	-	-	-
Coordinate	-	-	-	-
Issue	-	-	-	-

Processing

The capture of this transactional information may be seen as a type of building information survey where the appropriate portion of the building information is requested to generate a data entry form, the user completes that form, and the information is returned to update the building information.

Preparation of building information template

The first stage is the preparation of a template data set from the current building information. Implementation of the template information may be accomplished through specific software solutions using appropriate menus. To create realistic examples, bimServices demonstration scripts automatically create COBie spreadsheets containing the minimum set of information needed to provide the required BIM sub-set

- Select current project from building information database
- Select specific space from current project
- Generate space condition data entry form
- Provide space condition data entry form

Building information capture

The second stage is the captured of the required new information in the data entry form. As with step one this would be expected to be accomplished within proprietary software solutions. To provide a realistic example the COBie file provided in the first step may be used to:

- Access space condition data entry form
- Provide user credential information (if needed)
- Provide required space data

Building information transmission and processing

The final stage is the transmission and processing of that information by the target information system. For this specific information exchange the following steps are required. To provide a realistic example the completed COBie building information survey form is used as the input artifact that updates the model.

- Access space condition data entry form
- Provide user credential information (if needed)
- Provide required space type data
- Send information to the building information server

Processing information sent to the building information server will require the following steps.

- User authentication
- User authorization
- Checking file compliance with COBie
- Checking file compliance with LCie exchange requirements
- Checking the requested transaction with targeted information
- Backing-up prior building information
- Identification of matching component
- Updating mandatory attribute information
- Completion of the transaction and reporting

Output

There are two types of outputs created with this transaction. The first is the creation of the space condition form. This output may be shown on a screen as part of an information system or may be produced as a standalone template file, as is accomplished with the bimServices engine.

The second outputs 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:

- Other Space Condition reports

EXAMPLES

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

Duplex Apartment

- Example 1:
 - Input:
 - Prior building model (DuplexApartment_SpaceCondition_F1-203_before)
 - Exported template for Space Condition (URL)
 - Completed template for Space Condition (DuplexApartment_SpaceCondition_F1-203)
 - 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_SpaceCondition_2A12_before)
 - Exported template for Space Condition (URL)
 - Completed template for Space Condition (MedicalClinic_SpaceCondition_2A12)
 - 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=SpaceCondition
rem Replace %1 with MedicalClinic or DuplexApartment
set a1=%1
rem Replace %2 with appropriate space name
set a2=%2

call goCl      %a1% %a0%_%a2%
call goForm    %a1% %a0% %a2%
call goMerge2  %a1% %a0% %a2%
call goIC      %a1% %a0%_%a2%

time /t
```

Figure 1 doSpaceCondition batch file