

## Object Classification List for BIM-based Maintenance Information Modeling in Electric and Telecommunications Field

Jong-Kwan Song\*, Geun-Ha Cho\*, Ki-Beom Ju\*

\*Dept. of ICT Convergence and Integration Research Division, Korea Institute of Construction Technology

E-mail : song5216@kict.re.kr, cgh@kict.re.kr, kbju@kict.re.kr

### 1. Introduction

Although it is essential to effectively manage facilities because Operating and Maintenance (O&M) cost for them accounts for more than 83% of lifecycle cost, information of facilities has systematically and efficiently not managed throughout the lifecycle of facilities. Especially, information occurring in design and construction phase is needed to effectively share to O&M phase in order to construct initial data of FM (Facilities Management) system. But substantial time and cost for them is spent to define and validate request information for O&M. Because of this, preventive O&M has not systematically been conducted by function, space, and use. Therefore, in order to share information occurring in design and construction phase to O&M phase, BIM technology is useful for sharing and managing information by object. In this context, BIM-based Guideline for FM is being developed by Korea Institute of Construction Technology as shown in Figure 1. As part of this study, we suggested OCLCS (Object Classification List and Code System) for electric and telecommunication field in order to support sharing and management of information for facility lifecycle.



Figure 1. Development Process of BIM-based Guideline for FM

### 2. Analysis of Object Classification Criteria for Electric

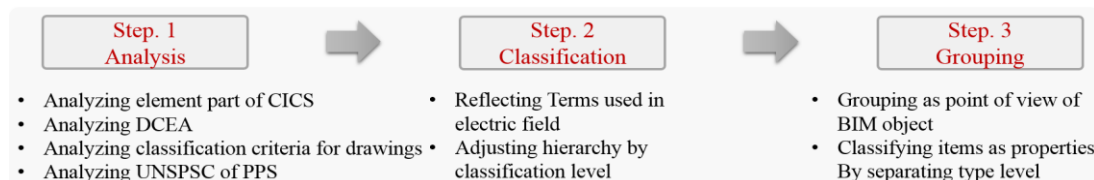
We analyzed DCEA(Design Criteria for Electric of Architecture field), commodity classification list of PPS (Public Procurement service), and a part of CICS (Construction Information Classification System) as basic material for developing OCLCS and established development direction of OCLCS for the electric and telecommunication field. First, as a result of analysis for CICS, we figured issues out as shown in Figure 2. Second, contents of DCEA was compared with CICS and we could know that there are the items corresponding to CICS, the items corresponding to CICS by adjusting location or separating an item, and the items not corresponding to CICS. Finally, the commodity classification list of PPS is UNSPSC (United Nations Standard Products and Services Code) developed by UNDP (United Nations Development Program). This could be used as the lowest level of OCLCS because UNSPSC classifies all commodity as a point of view of object. Therefore OCLCS could consist of CICS including hierarchy of construction industry and UNSPSC identifying most of the products.

- There are items composed of Different character in one classification item
- Lake of expandability for new objects
- Lake of sub-items that should be included within classification
- There are different hierarchies within same classification

Figure 2. Issues of Construction Information Classification System to apply BIM

### 3. Object Classification List and Code System

OCLCS was developed through 3 steps as shown Figure 3. Analysis of CICS, DCEA, Classification Criteria for Drawings, and UNSPSC of PPS was conducted and consisted of contents of OCLCS in the step 1.



- Analyzing element part of CICS
- Analyzing DCEA
- Analyzing classification criteria for drawings
- Analyzing UNSPSC of PPS

- Reflecting Terms used in electric field
- Adjusting hierarchy by classification level

- Grouping as point of view of BIM object
- Classifying items as properties By separating type level

Figure 3. Development Process of OCLCS

In this step, the initial version of OCLCS was made as conceptual classification. In next step, the initial version of OCLCS was updated by reflecting terms used in electric field and by adjusting hierarchy by classification level. Finally, the lowest level of OCLCS was grouped as point of view of object used in the BIM model and classified as properties by separating type level. In this step, drawings discipline code (KSF 1540:2010 (Principle and criteria for CAD Drawing)) was classified as level 1 to cover main areas and element part of CICS was classified as level 2 to cover elements also UNSPSC was classified as level 3 to cover objects for devices and equipment.

An Element part of CICS classified as level 2 needed to adjust classification items. The classification items adjusted was expressed as “●”, “■”, and “▶” in Note as shown Figure 4. “●” is additions of items of element part in CICS. “■” is items separated or moved of level 3 items of element part in CICS. And “▶” is duplication use of level 2 items of elements part in CICS. Thus CICS was adjusted to utilize as level 2 of OCLCS.

Level 1	Electric										Telecommunication								
Level 2	Power Substation	emergency power supply system	Main Line and Wiring System	Elevator and Other Facilities	Lighting Installation	New Renewable Energy	supervisory control Installation	Electrical Accessory	Common Wiring	Electrical fire fighting system	disaster prevention facility	Telephone distributing system	TV receiving System	Telephone and Interphone	Broadcasting equipment	crime prevention and security	Electric clock and Display device	supervisory control Installation	Common Wiring
Code	614	618	617	660	621	680	670	640	616	651	652	638	631	632	633	655	637	670	616
Note			●			●	▶	●	▶		■	●				■		▶	▶
<ul style="list-style-type: none"> <li>● Addition of an Level 3 item of Elements Part in Construction Information Classification System</li> <li>■ Separate and Movement of an Level 3 item of Elements Part in Construction Information Classification System</li> <li>▶ Duplication Use of an Level 2 item of Elements Part in Construction Information Classification System</li> </ul>																			

Figure 4. Analysis of Object Classification List

Level 4 expressed as 8-digit code and names of UNSPSC of PPS was applied as names and code of Level 3 of OCLCS. This OCLCS consisting of 3 level could be used by combining codes as shown Figure 5.

Level 1		Level 2		Level 3	
KSF1540/ Field		CICS/Elements		UNSPSC/Object	
Field	Code	Elements	Code	Objects	Code
Electric	E	Power substation	614	Panel boards	39121103
<b>Panel boards Classification Code : E 614 - 39121103</b>					

Figure 5. Example applying Object Classification Code

#### 4. Conclusion

This study suggested OCLCS for sharing and managing information occurring in design and construction phase to FM system of O&M phase. In order to develop this OCLCS, we analyzed CICS, DCEA, and UNSPSS of PPS and figured issues out. Thus OCLCS is developed by comparing and analyzing each criteria. This study is expected to be useful to exchange and share information in O&M phase by offering object point of view classification in design and construction phase. Besides, it is looking forward to effective O&M of facilities by enabling management of devices and equipment by function, space, use. This OCLCS inputted to BIM model in design and construction phase could be used to search, extract and classify objects

#### 5. References

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