Generation of as-is building information models by integrating information from multiple sources

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Problem Description

Facility management (FM) activities encompass multiple disciplines and involve facility, people, organization, process and technology, which rely on interdisciplinary information support. However, in practice, the required information is stored in separate sources with different formats challenging its utilization in day to day activities. This results in time being wasted for searching for the needed information in many different data sources and documents. An integrated as-is building information model (BIM) that represents all required information, can possibly minimize such waste and maximize the utilization of existing information. While many of today’s construction projects involve, building information models, the facility managers still face the challenge generating as-is building information models for existing facilities. Some of the current approaches for generating as-is BIMs involve utilization of point clouds, images and 2D drawings. A main problem with these approaches is that they mainly contain data to generate geometric information. Many other types of information needed for a complete BIM for facility management is missing.

Motivating Case Study

This research targets generation of an accurate and semantically-rich as-is information model by combining the information contained in many different sources. The case study is conducted in a 102-year-old academic building, College of Fine Arts at Carnegie Mellon University. This building has been through many renovations since 1911, during which a lot of information were generated and stored in different sources and documents. Information sources identified from this case are as-built drawings, handover specifications, computerized maintenance management system (CMMS), point clouds, sensor data and site visits.

There are three main tasks going on in this case study: (1) In order to evaluate the availability of the needed information for generating an as-is BIM, we are going through those information sources to retrieve information items, and then compare them with information requirement from specification guideline (UFGS), data exchange standard (IFC and COBie) and modeling system data model (Revit), to find out the overlap and coverage of information derived from such a variety of sources; (2) in order to evaluate the accuracy and quality of the information, we compare values from different information sources, to find out conflict information among them; (3) in order to track information changes, we compare values from different time, to see how information changes over time.