An Approach to Augment Building Information Models (BIM) for Existing Buildings by Fusing Maintenance and Crowdsourcing Data

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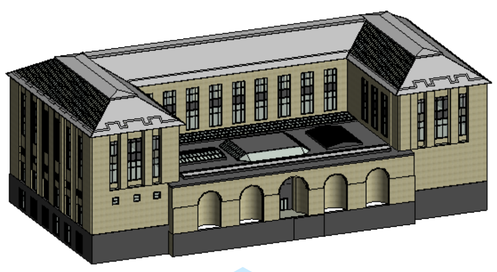
Problem Statement

Building owners are facing with challenges to maintain a large amount of existing buildings. E.g., USCG are responsible for more than 10,000 buildings with an average age of 43 years old.

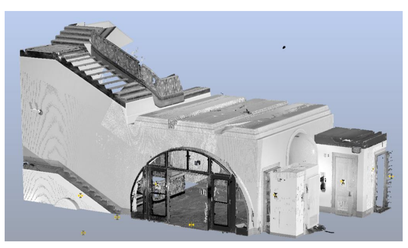
There is an estimated 15.8 billion annual cost due to the lack of data interoperability; 57% of the money is wasted during operation and maintenance phase.

Building Information Modeling (BIM) is a promising technology to solve these problems; However, most of existing buildings do not have available models that are ready to use.

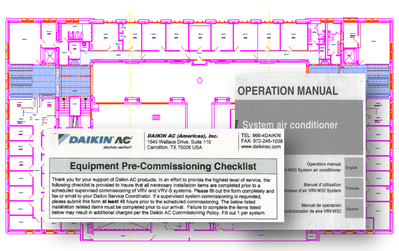
Motivating Case Studies



Model Generation



Laser Scans



Existing Documentation

Comparative Analysis

Missing Information

Cost Related

Installation Related

Thermal Related

Condition Related

Environmental Related

...

Modeling Requirements

IFC

Building Codes

COBie

Previous Research

LoD

Vision

Fusing Daily Maintenance Data

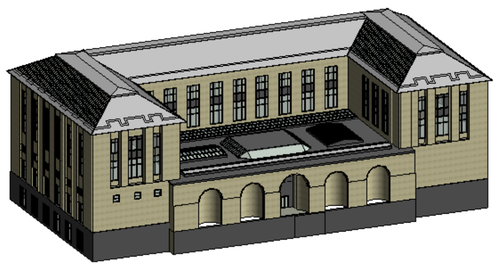
Computerized Maintenance Management System (CMMS)

Computer-aided Facility Management (CAFM)

Building Automation System (BAS)

Sensor Database

BIM Augmentation



Harvesting Crowdsourcing Data

FM Personnel

Knowledge Elicitation in Immersive 3D Environment

Building Users

Data Collection by Crowdsourcing

Expected Contributions

- A framework to generate as-is BIMs for existing buildings
- A mechanism to fuse facility maintenance data from heterogeneous sources
- A push-based approach to harvest crowdsourcing data from facility users

Publications to Date

- "Generating As-is Building Information Models for Facility Management by Leveraging Heterogeneous Existing Information Sources: A Case Study". Construction Research Congress, Atlanta, GA, 2014. (Accepted)
- "Challenges Associated with Generating Accurate As-is Building Information Models for Existing Buildings by Leveraging Heterogeneous Data Sources". International Society for Computing in Civil and Building Engineering, Orlando, FL, 2014. (Accepted)
- "Analysis on What Levels of Development Can be Achieved in BIMs Generated For Existing Buildings by Leveraging Existing Documentation and Point Cloud Data". International Symposium on Automation and Robotics in Construction and Mining, Sydney Australia, 2014. (Under Review)