

1801-RP: Standardizing and Utilizing ASHRAE Online BIM Data Exchange Protocols

Background

Automated data exchange throughout a facility's life cycle between commonly used software tools for building design, construction, commissioning, and operation and maintenance (O&M) has been a goal of the buildings industry for decades. This goal has long been recognized as providing significant value in performing tasks such as energy performance analysis during design, and clash detection during construction planning. Less attention has been given to the benefits of automated data exchange from construction to O&M, such as HVAC&R equipment asset management. Furthermore, the current state-of-the-art in software implementations supporting these data exchanges is woefully inadequate, particularly in the US market.

The inadequacy of current data exchange software implementation is not primarily due to a lack of Building Information Model (BIM) standards. Significant long-term development effort has been put into existing BIM standards such as the Industry Foundation Classes (IFC) from buildingSMART International (buildingSMART, 2018) and the Green Building XML (gbXML) schema from gbXML.org (gbXML.org, 2018). These standards provide software developers and users of Building Information Models (BIMs) rich data schemas for sharing consistent, accurate building information between software tools used throughout a facility's life cycle.

Rather, the current inadequacy is primarily due to two related issues: 1) lack of robust reliable information exchange standards that clearly specify data requirements for specific work processes, and 2) lack of available BIM data exchange protocols (i.e., data models and content) that adhere to these information exchange standards, and that can be readily accessed for import into, and automated data exchange between, the tools already being used by ASHRAE professionals.

The successfully completed ASHRAE 1609-RP project applied ASHRAE Guideline 20 to the development of Asset Management information exchange standard documentation. Thus, 1609-RP directly addressed the first issue raised above by creating an exchange standard based on relevant ASHRAE publications targeted at ASHRAE member practitioners. This 1801-TRP project is intended to build on the products of 1609-RP by addressing the second issue raised above.

Project Objectives

The objective of this research project is to bring data exchange protocols based on ASHRAE publications, to useable completion and availability by: 1) aligning ASHRAE exchange protocols with relevant existing BIM standards, 2) creating neutral format data content downloadable from the new ASHRAE data repository (data.ashrae.org), and 3) documenting end-user guidance to support ASHRAE members in implementing these data exchange protocols in the adoption of BIM in their professional practice.

Scope of Work

Task 1: Identify BIM Data Sets

Select three to five equipment types based on relevance to ASHRAE members, availability of data, and value as exemplars.

Task 2: Identify Related Data Standards

Identify relevant references that enumerate specific data properties for the selected equipment types in addition to the 1609-RP documentation and referenced ASHRAE publications. For example, if pumps are selected as one of the equipment types, the CIBSE Product Data Templates include lists of specific properties for pumps under the categories of manufacturer data, construction data, dimensional data, performance data, electrical data, and sustainability, in addition to properties specific to operations and maintenance (O&M).

Task 3: Develop Spreadsheet Documentation

Create a spreadsheet of key properties for each equipment type, using the Data Element worksheet of the 1609-RP use case as a starting point with enhancements from the references identified in Task 2. Again, these properties will focus on O&M work processes. The spreadsheet will be developed to be consistent with the *Manage Asset O&M Documentation* use case spreadsheet created in 1609-RP. This new spreadsheet will become the ASHRAE template for this research project.

Using the ASHRAE template as a data model/schema guide, create and populate data content worksheets with a generic example of each equipment type selected in Task 1.

Post the developed templates and example data content worksheets on data.ashrae.org and invite public review.

Task 4: Add Classification Scheme to Spreadsheet Documentation

Add a classification scheme to the spreadsheet template that will support mapping equipment types/properties to different references identified in Task 2 such as the CIBSE Product Data Templates and the Construction Operations Building information exchange (COBie). This

classification scheme will support future formal transformations between ASHRAE objects/properties and other data formats like CIBSE and COBie.

Task 5: Create Neutral Format Schema and Data Content Documents

Create standard schema and data content documents, in either XSD/XML or JSON format, based on the ASHRAE spreadsheet template and data content worksheets developed in previous tasks. The neutral format schema and content documents will be posted to the data.ashrae.org repository.

Task 6: Create End-User Implementation Guide

Comprehensive and comprehensible end-user guidance is critical to the objective of promoting adoption of the BIM data exchange protocols developed by this project.

Write an end-user implementation guide including step-by-step procedures for utilizing the ASHRAE data content documents developed in Task 5 to support ASHRAE members and other users in the adoption of BIM in their professional practice. This implementation guide will provide details on accessing the ASHRAE data content documents and utilizing these data in their work process, including guidance on developing transformations for data exchange with other software tools and other formats such as those identified in Task 2.