

1 EXECUTIVE SUMMARY

Incompatible software applications cause significant waste and inefficiencies in the construction industry. A recent report commissioned by the National Institute of Standards and Technology (NIST) reported an annual cost of \$15.8 billion due to lack of interoperability in the construction industry. The main focus of this study was to identify the impact of incompatible software on HVAC and sheet metal contractors. The study, using a survey on software incompatibility, determined the losses in the HVAC and sheet metal industry to be an estimated 30.90 worker hours in data reentry for every million dollars worth of project. Leaving the cost of rework resulting from incompatible software aside, the waste caused by data reentry alone was estimated to be around 3,244,500 worker hours or 1,622 person equivalents annually for HVAC and sheet metal contractors. After adding the cost associated with rework, the overall waste for the HVAC and sheet metal industries is clearly very high.

The study also documents the processes involved in the execution of a typical HVAC and sheet metal project and provides a generalized process map for such a project. The report also reviews initiatives being taken worldwide in the field of interoperability and Building Information Modeling (BIM) to reduce or eliminate waste associated with incompatible software. One initiative studied extensively was the International Alliance for Interoperability (IAI) Industry Foundation Classes (IFC). The heating, ventilation, and air conditioning (HVAC) domain in IFC was of special interest for the study. A detailed explanation of the IFC schema for the HVAC domain is presented in this report.

Based on the study, the research team recommends the following actions be taken by the industry:

1. Increase the awareness of HVAC and sheet metal contractors to the issues regarding incompatible software and interoperability. We recommend that the industry consider developing a “Seal of Interoperability” as a way to pressure software vendors to convert to IFC-compatible software.
2. As with the software vendors, IAI should also be a target for contractors’ involvement. The IAI is creating the standards that will be used by all software vendors and architectural and engineering firms. Contractors should get involved by having their concerns and suggestions raised during development of the IFCs.
3. This study points toward the start of a large change in the working of the HVAC and sheet metal industry along with changes in the overall construction industry. The authors recommend that the industry consider identifying 104 of the business strategies that will help HVAC and sheet metal contractors embrace compatible software and the whole BIM concept.