

ABSTRACT

Modern cities grant particular attention in improving their infrastructure system, in order to improve the every-day life of their citizens and lead the way towards a more sustainable environment, both locally and domestically. Large construction projects require an effective and efficient communication between numerous types of professionals, when expressing ideas, sharing information, monitoring the project's status and assessing the results.

Industry Foundation Classes (IFC) developed by buildingSMART (buildingSMART, 2016) is a Standard that aims to facilitate the above-mentioned requirements, by creating a strict set of guidelines on how to store, manage and visualize information that describe the project's life-cycle and provide insight on various domains of different professions. IFC currently supports in detail the "Building" object of a city, however lacks proper structure for the infrastructure objects. Up to a certain extent, existing entities can describe several infrastructure elements, but it is essential to extend the current schema to address holistically the city's infrastructure. The purpose of this project is to develop a process on how to transition from existing infrastructure information that is stored in Microsoft Excel spreadsheet to an IFC format.

Within this context, three highway entities are selected in collaboration with the Costain Plc., the industry partner that supports this project: (i) a retaining wall, (ii) a road gantry and a (iii) bridge. The proposed method is developed in three phases: (i) Asset Data Management Manual (ADMM) to Unified Modeling Language (UML), (ii) Modification of the UMLs based on selected criteria and (iii) UML to IFC EXPRESS-G format. The method is implemented in the case study that includes the three highway entities.

The project is structured as follows: firstly, the motivation and the problem are presented, followed by the research questions that this project aims to address. Chapter 2 is divided in the theoretical background which introduces IFC's structure and the state of the art regarding existing approaches and methods in extending IFC. Chapter 3 analyses the data utilized in this project, while chapter 4 presents the proposed methodology. Chapter 5 is the case study that implements the method and chapter 6 presents the results of every phase and the recommended extension schema for IFC. Chapter 7 links the findings of the project with the set research questions, and lastly, chapter 8 presents the conclusion, propositions for future research work and general recommendations.