

Geometry as a common ground for BMS and BIM

Dušan Isailović^{1,2}, Rade Hajdin^{1,2}

¹ University of Belgrade, Faculty of Civil Engineering, Belgrade, Serbia

² Infrastructure Management Consultants GmbH, Zürich, Switzerland

Contact: disailovic@grf.bg.ac.rs

Abstract

Bridge Management Systems (BMSs) are sophisticated software tools, widely used for managing bridges. Comprising a centralized database of all relevant information for the entire bridge stock and analytics to forecast bridges' condition and maintenance cost, BMSs are irreplaceable tools, used by all the National Road Authorities (NRAs) around the world. These powerful tools, although different from one another, all lack adequate visualization of bridges. Recently, numerous researcher proposed using the Building Information Models (BIMs) to address this issue.

This paper presents the geometric approach of introducing BIM to BMS. Rather than trying to thoroughly connect these two robust systems on the object definition level, this approach focuses on geometry. The paper firstly shows how all the inventory information from BMS can be associated with corresponding BIM objects. Afterward, the ways to include the condition assessment data into BIM are proposed. Once the basics of the geometric approach are explained, the example of connecting BIM with BMS is presented. The example is based on KUBA, the Swiss BMS.

Finally, the feasibility, as well as the challenges of the presented approach are analyzed. The analysis focused on two important questions. Firstly, it considered if BIM is capable of making workflow changes in the Infrastructure Asset Management (IAM) the same way it did it in the construction industry. Secondly, it evaluated the BIM capability to describe all the condition assessment information relevant to IAM.

Keywords: BIM, BMS, IAM, Catalog, Ontology, Decomposition

1 Introduction

1.1 Bridge Management Systems (BMSs)

Managing a bridge stock means managing various activities, such as inventory and inspection data collection, bridge condition assessment, special transport administration, and allocation of funds for maintenance interventions. To do this, majority of the road agencies in the world are supported by BMSs [1]. There are a variety of different BMS solutions on the market, however, a common BMS consists of the following modules: Inventory,

Inspection, Maintenance and Planning module [2]. Inventory module includes administrative and technical bridge data (e.g. bridge and road IDs, geolocation, bridge type, etc.) and an optional bridge photo. Inspection module enhances the bridge data according to the inspection findings, i.e. ratings of the structural (e.g. deck, piers, abutments) and nonstructural elements (e.g. safety rail, pavement, drainage system). These element ratings are stored in the inspection database as alphanumeric entries. Maintenance module records a historical log of all performed maintenance interventions for each bridge in the