Chapter 20
Geospatial Views for RESTful BIM

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ABSTRACT

In the near future Building Information Modelling will be applied in different areas of the AEC industry. Building Information Models (BIMs) will be used as resources to enable interoperability of software and 'Building Information Modelling' based Integrated Project Delivery will be realised as a common process of managing a project over a single shared information backbone. Thus, facilitating the collaborative use of shared BIMs is becoming important in parallel with the industrial demand in the field. Some urban management tasks such as disaster management, delivery of goods and services, and cityscape visualisation are managed by using Geospatial Information Systems as the current state-of-art, as the tasks in these processes require a high level and volume of integrated geospatial information. Several of these tasks such as fire response management require detailed geometric and semantic information about buildings in the form of geospatial information, while tasks such as visualisation of the urban fabric might require less (geometric and semantic) information. Today service-oriented architectures are becoming more popular in terms of enabling integration and collaboration over distributed environments. In this context, this short chapter presents an enhancement for a BIM Web Service pattern (i.e. RESTful BIM) that will help in facilitating information transfer from Building Information Models into the geospatial environment. The chapter starts with the background section later provides a review on the RESTful BIM pattern. Geospatial Views that can be developed for the RESTFul BIM will be elaborated on later in the chapter.

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1 INTRODUCTION

Building Information Models (BIMs) and Model Based Engineering in general have become an active research area in Construction Informatics in order to tackle the problems related to information integration and interoperability. The industrial rationale behind the rise of the trend towards BIMs and model based engineering is the inadequate interoperability in the industry. Gallaher *et al.* (2004) indicated that US$15.8B is lost annually in the U.S Capital Facilities Industry due to the lack of interoperability. Today, BIMs are seen as the main facilitators of integration, interoperability, collaboration and process automation. The key reason behind the advent of BIMs is enabling interoperability (seamless exchange and sharing of information) between various different applications used in the construction industry and throughout the lifecycle of the building. Building Information Modelling is applied in many different areas, i.e. either BIMs are used as a resource to enable interoperability or Building Information Modelling has been realised as a process of managing a project through a single shared information backbone. Over the last decade, the Industry Foundation Classes (IFC) developed by International Alliance of Interoperability has matured as a standard BIM in supporting and facilitating interoperability across the various phases of the construction life cycle.

On the other hand, geospatial information and Geospatial Information Systems (GISs) are used in various fields related to urban built environment ranging from three dimensional cityscape visualisations to emergency response management. Until recently, the transfer of semantic information and spatial relationships from building models to the geospatial environment could not be accomplished. This was mainly due to two reasons:

- Firstly, inability of standard CAD models to store semantic information and spatial relationships due to their lack of object oriented data structures.
- Although BIMs contain geometric and semantic information about the building elements in an object oriented data structure, the geospatial information models handled and treated the data in a different manner than BIMs, and were insufficient in representing all the aspects of the Building Information Models.

The combination of both these factors made it difficult to, transfer information from building models to geospatial environment and represent buildings within geospatial information models. This in turn, prevented a complete automation of several processes where detailed geometric and semantic information about buildings is required (to be held in the geospatial environment) (Isikdag, 2006).

Focusing beyond data integration towards remote communications, the development in web technologies has resulted in the emergence of service-oriented architectures that makes it possible for remote applications to inter-operate using standard web interfaces. The service orientation enables loose coupling of applications over the web, i.e. several applications can communicate and interact with each other without the need of knowing the details of their working environment. Each of these applications (or data layers) that take part in such a web-based interaction in a serving form (either as a data/component or application service) is known as a web service. Software architectures built upon web services are known as Service Oriented Architectures (SOA). Although the trend in the software industry is towards enabling application interoperability over web services (or SOA), the AEC industry is still not fully benefiting from the service oriented approaches, as the focus of the industry is still very data integration oriented.

The pattern RESTful BIM presented in this chapter is designed for facilitating service-oriented