

# 3D Modelling and Virtual Reality for the Management of Public Buildings

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## SUMMARY

Virtual Reality (VR) has become incredibly popular in recent years, as it is a leading technology in the era of Industry 4.0 and is considered to be one step higher than 3D visualization. It is described as a computer-generated environment that provides users with the sense of being surrounded by real world. Visualization through VR has made it possible to approach a range of issues around sustainable development under a new perspective, while as an interactive platform it enables smart and sustainable cities to identify their potential by getting smarter. Additionally, to make VR experience accessible and independent of the device used, the WebVR approach is researched and implemented. This approach mainly relies on the Three.js graphic engine based on Web Graphics Library (WebGL) which has been supported by most of the mainstream web browsers' latest version with no embedded plugin. As a result, some of the barriers obstructing the use of VR have been removed and hence, virtual reality has become more accessible and cheaper. VR is being used in early stages in various fields; namely in the: AEC industry, land administration and real estate domain, facility management, culture, tourism and urban planning.

Depending on the scale of each project, the requirements and the budget, the source data that is used to create 3D models to be represented in VR may vary. For instance, for spatial planning projects point clouds can be used; for emergency response and evacuation solutions detailed BIM models are more appropriate, while for representing the indoor reality and navigate through, for example, a museum, 3D image-based models (from 360o images) are commonly used. In this context, VR can be an invaluable tool in the building industry and especially in Building Information Model (BIM) projects that are becoming more and more popular, due to the evolution and legal mandate of BIM. Especially, the management of public buildings represents an ideal candidate to deploy a VR solution since the analysis and synthesis of different layers of information is

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required.

This paper investigates how to generate WebVR from different 3D modelling techniques, including BIM models and 3D point clouds overlaid with panoramic imagery, specifically for public buildings' management. The methodologies followed are presented through two case studies, highlighting challenges and shortcomings faced, while the final results are compared.

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