# BIM Health and Safety Support Framework for Construction

Adeeb Sidani[1], João Poças Martins[2], Alfredo Soeiro[3]

[1] CONSTRUCT, Faculty of Engineering (FEUP), University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal, (adeeb.sidani@hotmail.com) ORCID 0000-0002-0570-1207
[2] CONSTRUCT, Faculty of Engineering (FEUP), University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal, (jppm@fe.up.pt) ORCID 0000-0001-9878-3792
[3] Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465, Porto, Portugal (avsoeiro@fe.up.pt); ORCID 0000-0003-4784-959X

## Abstract

The construction industry still leads other industries with high numbers of injuries and fatalities annually. To have an effective site inspection, monitoring, and training, the AECO (Architecture, Engineering, Construction, and operation) sector gradually integrates new technologies such as building information modelling (BIM).

This paper presents a BIM-supported framework for Safety verification based on two main approaches: a Fully Automated Approach, adopting Automated rule checking, and a Fully Manual Approach, adopting Augmented and Virtual Reality (AR/VR) technologies. Moreover, this process will also enable safety training through AR/VR. The framework follows international standards such as ISO 1650, Directive 92/57/EEC, and PAS 1192-6:2018.

Integrating these technologies in a standardised manner will ease the adoption of the tools, enable clients to acquire a better perception and control of the H&S aspects of the project, assign specific tasks for each stakeholder, and involve H&S measures from the beginning of the project. Some limitations are found in implementing new tools, such as the lack of experience, low demand from the clients, incompatibility of software and data, high cost of hardware and software, and total time preparing BIM models.

**Author Keywords.** Building Information Modelling, Automated Rule Checking, Augmented Reality, Virtual Reality, Construction, Occupational Health and Safety.