



## ***Rapport de veille n° 52***

### **BIM**

**31/10/2023**

**Objectif :** *L'utilisation du BIM en phase de conception et de ses potentielles applications pour la prévention des risques*

La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS.

Les liens mentionnés dans le bulletin donnent accès aux documents sous réserve d'un abonnement à la ressource.

## Table des matières

<b>1. Références anglophones</b> .....	<b>3</b>
1.1 Articles scientifiques .....	3
1.2 Conférence / ouvrage / thèse .....	4

## 1. Références anglophones

### 1.1 Articles scientifiques

#### [Safer designs with BIM based fall hazards identification and accident prevention](#)

KD Tözer, GE Gürcanli, T Çelik, ÖA Kale - Safety Science, 2024, Volume 169

DOI : <https://doi.org/10.1016/j.ssci.2023.106346>

The construction industry has continuously changed its work processes, methods, techniques and associated hazards. In addition, the way in which work is carried out on construction sites varies from project to project. As a result, it is difficult to prevent workplace accidents. What is worrying is that the majority of hazardous situations that arise as a result of decisions made during the design phase are not identified until construction begins. According to studies carried out around the world, some of the hazardous situations in construction are due to decisions made during the design process. The aim of this study was to minimise the hazards that arise from design decisions and cause occupational accidents. To this end, a system has been developed that operates in a BIM environment used by designers during the design phase. Thus, if a designer makes a decision that could cause a hazard, he/she would be warned by the BIM software. Therefore, in terms of occupational health and safety, safer buildings should be designed. This study uses multi-storey building projects and a system that detects and alerts on design decisions that cause fall accidents. The study concluded that most of the hazards that cause falls can be identified at the design stage. Consequently, the majority of these hazards can be eliminated through alternative design recommendations.

#### [Managing Safety Risks from Overlapping Construction Activities: A BIM Approach](#)

A Rashidi Nasab, H Malekitabar, H Elzarka... - Buildings, 2023, 13(10), 2647

DOI : <https://doi.org/10.3390/buildings13102647>

Addressing safety risks in construction is an ongoing priority, and integrating safety considerations into construction scheduling is a crucial aspect of this effort. A notable challenge is the safety risk posed by concurrent tasks, which has received limited attention in prior research. This study aims to address this research gap by introducing a novel Building Information Modeling (BIM)-based model that assesses the increased hazardousness resulting from overlapping construction activities. Historically, research has predominantly focused on individual task safety, with less emphasis on the risks associated with overlapping activities. Our innovative approach introduces the concept of a ‘source–target’ match, which evaluates the degree of hazardousness escalation when activities overlap. Drawing on data from the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) fatal accident reports, we extracted 11 hazardous and 9 susceptibility attributes to build a source–target match table. This table reveals the characteristics of activities that generate hazardous conflicts when overlapping. The key contribution of this research is the assessment, prioritization, and visualization of risk levels in a BIM environment. This framework empowers safety managers to proactively address safety risks resulting from overlapping construction activities, ultimately reducing accidents in the construction industry. By shedding light on this overlooked aspect of construction safety, our research highlights the importance of integrating safety considerations into construction scheduling and provides a practical tool for mitigating risks, enhancing workplace safety, and ultimately improving project outcomes.

## 1.2 Conférence / ouvrage / thèse

### [Increasing workers' safety by using Virtual Reality \(VR\) in the project design and production planning \[PDF\]](#)

A HUSEYNLI, I TASNIM - Department Of Architecture And Civil Engineering, Chalmers University Of Technology, Gothenburg, Sweden, 2023, 69 p.

Construction sites pose inherently hazardous work environments due to the nature of the work involved. As such, the industry is known for its high rate of accidents and injuries compared to other industries which makes improving the safety of construction workers of paramount importance. This study examines the use of cutting-edge virtual reality (VR) technology to enhance the safety planning of construction projects in the design and planning phase. The study is built on a qualitative approach based on a literature review and an empirical study. The empirical study includes a workshop with two design engineers, a health and safety engineer, a VDC Developer and several researchers as participants. The findings from this study indicate that VR offers significant advantages over traditional 2D drawings in terms of safety planning. Immersive VR walkthrough can provide a more comprehensive representation of the project, aiding in the planning and implementation of effective safety measures. Moreover, the findings highlight that collaborative VR walkthroughs have the potential to enhance safety planning by improving communication and coordination among project stakeholders and the use of VR can increase safety awareness among design engineers, equipping them with the knowledge and mindset necessary to proactively address potential hazards. The study recommends the combination of VR with touchscreen boards for effective site planning and collaboration, acknowledging that VR technology is an immature technology which requires further research and advancement. Additionally, the study identifies some areas where future research should focus on.

### [The role of industry 4.0 in construction site safety and smart solutions of safety risk prevention](#)

Z Struková, M Kozlovská, A Tažiková - AIP Conference Proceedings, 2023

DOI : <https://doi.org/10.1063/5.0170476>

A well-established culture of safety risk prevention in construction can be developed with support of Industry 4.0 implementation. Wider digital transformation trends connected with Industry 4.0, undoubtedly belong to factors that are enabling an improved outlook for smart collective and personal protective equipment of workers. In more economically developed countries, especially wearable technologies have begun to play a role in workers' health and safety protection. These technologies are known as personal protective equipment (PPE) enhanced with built-in smart electronic devices that unlock uncommon opportunities to protect people. In addition to wearable technology, smart solutions for workers' safety in construction include for example red point positioning systems, smart sensors and drones. The presented study deals with implementation of smart technologies to keep workers safe in construction sites in Slovakia. The aim of the study is to identify the most distinguished barriers of use of smart collective and personal protective equipment and to suggest the right steps to overcome these barriers. These proposals are aimed at manufacturers of smart protective equipment, at experts in charge of safety on construction sites and at representatives of construction companies. In order to meet the presented aim, two methods were applied: desk study and interview research method. Three experts from construction sector, two safety managers and one site manager, were involved in guided interview that was focused mainly to their experience with implementation of smart protective equipment in construction sites. As a result, the barriers to adoption of smart occupational safety and health solutions in construction and proposals to overcome the barriers and to expand implementation of intelligent protective equipment preventing accidents in construction are presented in the contribution.

[Advancing safety management in construction: Additional inputs through information sharing and an integrated safety approach \[PDF\]](#)

KW Edwin - Thesis for the degree of Philosophiae Doctor, Norwegian University of Science and Technology, Faculty of Economics and Management Department of Industrial Economics and Technology Management, 2023

Managing safety is an essential function in construction projects, yet unwanted incidents continue to occur. Though injury and fatality rates in the Norwegian construction industry have decreased over the decades, the improvement has somewhat stagnated, making it challenging to lower them further. Developing safety management through innovative solutions can be a key contributor to reducing unwanted incidents. The main objective of this thesis is to explore how safety management in the construction industry can be developed by expanding the information base and applying a more integrated safety approach. The overall question of the thesis, 'How can incorporating additional inputs develop safety management in the construction industry?' is addressed through the following three research questions: 1. What opportunities for safety management exist in broader information sharing across the construction industry? 2. How can the construction industry improve safety management by looking at practices from the Norwegian petroleum industry? 3. How is project management related to safety management in construction projects? These research questions are answered based on three articles. [...]