



Rapport de veille n° 39

BIM

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Objectif : *L'utilisation du BIM en phase de conception et de ses potentiels 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.

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1. Références anglophones

1.1 Articles scientifiques

[Sharing Incident Experiences: A Roadmap towards Collective Safety Information in the Norwegian Construction Industry](#)

KW Edwin - International Journal of Occupational Safety and Ergonomics, 2022

DOI : <https://doi.org/10.1080/10803548.2022.2118983>

This paper is a study on sharing practices after incidents across organisations in the Norwegian construction industry as a means towards improvement of occupational safety. Interviews were performed with safety personnel from different actors, including clients, contractors, and designers. The findings show that several arenas for sharing of safety-related information across actors exist, however the sharing is limited, not structured, and occurs occasionally. Furthermore, the information is not widely shared across all actors in the industry for whom the information could be valuable, e.g., early phase actors. As a willingness to share and an excitement for new technology is present, the work goes on to propose how and where the industry can improve on information sharing after incidents to move towards interorganisational learning. A roadmap for the Norwegian construction industry is suggested for collective information sharing with a focus on technological and digital solutions.

[Integration of Building Information Modeling \(BIM\) and Virtual Design and Construction \(VDC\) with Stick-Built Construction to Implement Digital Construction: A Canadian General Contractor's Perspective \[PDF\]](#)

Mohamed Adel, Zhuo Cheng and Zhen Lei – Buildings, 2022, 12, 1337, 15 p.

DOI : <https://doi.org/10.3390/buildings12091337>

Building information modeling (BIM) and virtual design and construction (VDC) are useful management processes and methodologies to enhance project communication and coordination. Over the past few decades, researchers and practitioners have made efforts to promote the adoption of BIM and VDC in the construction industry. However, currently, the promotion and adoption of BIM and VDC are relatively slow in North America. This paper focuses on developing an approach to drive the adoption of the technologies through cooperation among project stakeholders and proposing a method of collaboration through a case study. In this paper, the authors surveyed and interviewed a major Canadian general contractor on its implementation of BIM and VDC in construction projects. The was to benchmark the status of BIM and VDC applications in the Atlantic region of Canada from a general contractor's perspective. Both surveys and interviews were conducted with various project participants throughout the organization. Based on the results, a "Digital Construction Framework for the Future" is proposed to increase the adoption of BIM and VDC. This research can provide a general understanding of BIM and VDC adoption in this particular general contractor and areas of improvement in transitioning to a more digital working construction environment.

[BIM-Based Safety Leading Indicators Measurement Tool for Construction Sites](#)

M Dadashi Haji, B Behnam, MH Sebt, A Ardeshtir... - International Journal of Civil Engineering, 2022

DOI : <https://doi.org/10.1007/s40999-022-00754-9>

Recognition of safety leading indicators is considered as an important part of safety management in construction projects to prevent hazardous accidents occurrence. In the available literature, the lack of a comprehensive proactive approach for assessing safety, based on active safety leading indicators is tangible. In this study, BIM and knowledge base are integrated to develop a safety management framework, then, this framework is implemented in a case study to assess its performance. Safety leading indicators are extracted from experts' expertise, documents, and best practice, and then the relationships among safety leading

indicators, activities, and their attributes are established; these pieces of knowledge are stored in a safety leading indicator knowledge base. To measure the impacts of these indicators on the project, a framework is developed to integrate the knowledge base and building information modeling (BIM). The developed add-on generates a heat-map to visualize the impacts of the safety leading indicators on a daily basis, and it also produces a textual result sheet. To verify the effectiveness and efficiency of the developed tool a survey from professionals is conducted. This tool provides a way to automatically assess the impacts of the safety leading indicators. Using its results, safety managers and project participants can make important decisions to reduce hazards. The results also indicate that accidents occurring in the construction site dropped by 38% after employing the presented framework.

[A review of construction management challenges and BIM-based solutions: perspectives from the schedule, cost, quality, and safety management \[PDF\]](#)

M Parsamehr, US Perera, TC Dodanwala, P Perera... - Asian Journal of Civil Engineering, 2022

DOI : <https://doi.org/10.1007/s42107-022-00501-4>

Efficient project delivery in the context of contemporary construction management is dependent on large volumes of data. However, due to pertinent challenges underlying implementation, easy access to key construction management data remains a significant hurdle. Management is quickly transforming to facilitate the employment of predictive decision-making methods, wherein the digitalization of construction data functions as a crucial component. The Architectural, Engineering, and Construction (AEC) industry has been trailing behind in the implementation of modern management concepts as well as novel technologies. However, it is vital to re-engineer construction management to be on par with other related industries, such as manufacturing, oil, and gas. The advent of Building Information Modeling (BIM) has been attributed to the paradigm shift that construction management is currently undergoing. BIM is a platform equipped with unique and effective tools to support the implementation of management techniques. This research critically reviews challenges plaguing conventional construction management and decision-making solutions for construction management as devised by BIM. This review focuses on construction management's four key bottom lines (i.e., schedule, cost, quality, and safety management) and how a BIM-based construction management platform helps monitor these aspects. This review revealed that the primary focus of the researchers was to develop BIM-based automated prediction models and enhance communication and collaboration among project participants. Based on the findings of this research, a BIM-based construction decision-making framework was proposed. This roadmap provides construction organizations with the information required to implement a BIM-based decision support system for project management. Finally, the research identified several knowledge gaps and the potential for future research.

[Implementing safety leading indicators in construction: Toward a proactive approach to safety management](#)

J Xu, C Cheung, P Manu, O Ejorwomu, J Too - Safety Science, Volume 157, January 2023

DOI : <https://doi.org/10.1016/j.ssci.2022.105929>

Safety leading indicators have been investigated as a proactive management approach to managing construction safety. However, there is a lack of insight into the implementation of safety leading indicators in construction projects and organizations. This causes difficulties in the adoption and consistent use of safety leading indicators in the construction industry. The aim of the research is to explore what and how safety leading indicators can be implemented to improve safety management in the construction industry. Built upon Xu et al. (2021), the study prioritized the relative importance of 17 safety leading indicators through a three-round Delphi survey and voting analytic hierarchy process (VAHP). It was found that organization commitment; client, designer and contractor engagement; training and orientation; safety climate and competence were most critical to safety performance in construction. Furthermore, operational, organizational and strategic barriers to the effective implementation of safety leading indicators were identified through the focus group discussion. The study suggested strategies for addressing these barriers and moving toward a proactive safety management

approach. This study contributes to the theories and practices of construction safety management by linking the deployment of safety leading indicators with organizational and strategic issues at firm and project levels and addressing the root causes of poor performance. The effective deployment of safety leading indicators needs the engagement of clients, contractors, designers and supply chains to develop organizational capabilities to drive improvements from the project front-end to completion.

1.2Conférence / Ouvrage / Thèse

BIM Application for Construction Health and Safety: Summary for a Systematic Review

A Sidani, JP Martins, A Soeiro - In: , et al. Occupational and Environmental Safety and Health IV. Studies in Systems, Decision and Control, vol 449. Springer, Cham, 2023, pp. 553-563

DOI : https://doi.org/10.1007/978-3-031-12547-8_44

The AECO (Architecture, Engineering, Construction, and operation) industry is one of the highest-risk industries, bearing many accidents and fatalities every year. Hence, to have adequate site supervision, inspection, and training, BIM gradually incorporates digital technologies such as automatic rule checking, Augmented and Virtual Reality. This review aims to provide a general overview of building information modelling (BIM) approaches to improve construction workers' health and safety. In addition, identifying the most exploited tools, frameworks, and BIM dimensions and simultaneously listing the target groups, risks, construction fields, and locations. This short review is based on the findings of a systematic review involving 90 articles in the field of BIM-based health and safety in construction. The health and safety research field is becoming more investigated with several methods for risk prevention and maintaining health and safety during the project lifecycle. The authors mainly addressed fall-related risks while developing solutions to assisting safety managers with monitoring and inspection. Implementing and utilising BIM for health and safety has various limitations since every tool represents a standalone solution. BIM dimensions are still misunderstood, while BIM models still lack the standardisation and link to health and safety regulations.