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Editorial

Advanced BIM Application in Construction and Buildings

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We are very happy that the Special Issue "Advanced BIM Application in Construction and Buildings" of Buildings has been published. The eighteen papers deliver innovative ideas and challenging developments of BIM and/or BIM-based applications conforming to the Construction 4.0 era and smart construction. BIM has recently become an emerging core technology in the construction industry. BIM is defined as "a digital representation of the building process to facilitate exchange and interoperability of information in digital format" by Professor Charles Eastman. BIM basically identifies three-dimensional object-driven drawing information, which is the most basic information of design and engineering, and attributes information for each object. Based on this, it is possible to integrate information in the design, construction, operation, and maintenance phases through the linkage of physical and managerial information. In addition, the communication and collaboration at each phase are improved, which leads to an improved management efficiency.

The eighteen (18) papers submitted to this Special Edition can be divided into four categories according to the construction production processes as follows: (1) BIM standards; (2) contracts, design, and engineering; (3) construction; (4) operation and maintenance.

The first category (BIM standards) contains five papers. Pupeikis et al. [1] propose a comparative assessment of globally useful construction information classification systems in order to extract and exchange information for BIM utilization. Biabani et al. [2] investigate a collaborative behavior of BIM staff through a cognitive survey in order to examine the BIM competency. Majzoub et al. [3] analyze the impact of BIM in the tendering process from the contractor's perspective using a winning probability model in Saudi Arabia. Solla et al. [4] investigate how BIM applications can digitize the Green Building Index (GBI) criteria for GBI processes in Malaysia. Millan-Millan et al. [5] propose the HBIM (Heritage BIM) as a digital modeling tool to implement factors capable of inducing a more comprehensive assessment of the architectural heritage, such as the habitability of spaces.

The second category (contract, design, and engineering) consists of five papers. Peansupap et al. [6] propose a rule-based visual programming of BIM for arranging structural kingposts without clash occurrences in the design phase. Sibenik et al. [7] suggest a novel data exchange framework between architectural design and structural analysis building models. It is verified from prototype building models that the proposed data exchange provides a base for the missing standardization of interpretations, which facilitates the non-proprietary automated conversion between physical and analytical models. Thajudeen et al. [8] propose a parametric design platform method to support the design process of ETO-based components in a post and beam building system. Andrich et al. [9] present a checking flow of BIM models in order to identify the subjects responsible for each specific check during the process in a detailed design phase. Sobhkhiz et al. [10] propose an IFC-based Automated Rule Checking (ARC) system to validate models, aiming to achieve proactive bottom-up solutions building upon the requirements and resources of end-users in post design phases.

The third category (construction) includes four papers. Rodrigues et al. [11] develop BIM 4D to integrate safety measures from the design phase to the construction, operation, and maintenance phases. It is implemented by a case study concerning the prevention of

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falls from height. Akhmetzhanova et al. [12] propose a BIM-enabled clash detection and resolution process in the AECO (architecture, engineering, and construction and operation) industry of Kazakhstan. Xue et al. [13] propose a method to monitor the construction process of high-rise buildings by using a target detection technique. In the method, the building components are identified form the top view, and then the identified components are registered to the BIM elements. Ayman et al. [14] develop a decision support system (DSS), which combines BIM and EDM to track and monitor construction project activities during construction with better performance and accuracy.

The fourth category (operation and maintenance) comprise four papers. Akhanova et al. [15] present a BIM-based building sustainability assessment (BSA) framework that has 46 assessment indicators grouped into 9 assessment categories (from Kazakhstan). Daniotti et al. [16] develop a BIM-based interoperable Toolkit in buildings for efficient renovations via the efficient flow of information, which decreases the work spent on interventions while improving buildings' performance, quality, and the comfort for inhabitants. Benn et al. [17] provide exploratory research on BIM for FM in CREM (Corporate Real Estate Management) and present four implications including the formulation of informational, technical, process, and personnel requirements. Moreno et al. [18] present a BIM–FM prototype to support operations and access updated environmental data for a university building. The proposed integrated solution enables the comprehensive registration of dynamic FM-related data in an updated model.

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References

1. Pupeikis, D.; Navickas, A.; Klumbyte, E.; Seduikyte, L. Comparative Study of Construction Information Classification Systems: CCI versus Uniclass 2015. *Buildings* **2022**, *12*, 656. [CrossRef]
2. Biabani, F.; Kim, J.; Ham, N. Qualitative Assessment of Collaborative Behavior Based on Self-Perception Personlaity Tests for BIM Staff. *Buildings* **2022**, *12*, 426. [CrossRef]
3. Majzoub, M.; Eweda, A. Probability of Winning the Tender When Proposing Using BIM Strategy: A Case Study in Saudi Arabia. *Buildings* **2021**, *11*, 306. [CrossRef]
4. Solla, M.; Elmesh, A.; Memon, Z.; Ismail, L.; Kazee, M.; Latif, Q.; Yusoff, N.; Alosta, M.; Milad, A. Analysis of BIM-Based Digitising of Green Building Index(GBI): Assessment Method. *Buildings* **2022**, *12*, 429. [CrossRef]
5. Millan-Millan, P.; Cabeza-Lainez, J. HBIM Methodology to Achieve a Balance between Protection and Habitability: The Case Study of the Monastery of Santa Clara in Belalcazar, Spain. *Buildings* **2022**, *12*, 510. [CrossRef]
6. Peansupap, V.; Nov, P.; Tongthong, T. Utilization of Building Information Modeling for Arranging the Structural Kingposts. *Buildings* **2021**, *11*, 323. [CrossRef]
7. Sibenik, G.; Kovacic, I.; Petrinas, V.; Sprenger, W. Implementation of Open Data Exchange between Architectural Design and Structural Analysis Models. *Buildings* **2021**, *11*, 605. [CrossRef]
8. Thajudeen, S.; Elgh, F.; Lennartsson, M. Supporting the Reuse of Design Assets in ETO-Based Components-A Case Study from and Industrialised Post and Beam Building System. *Buildings* **2022**, *12*, 70. [CrossRef]
9. Andrich, W.; Daniotti, B.; Pavan, A.; Mirarchi, C. Check and Validation of Building Information Models in Detailed Design Phase: A Check Flow to Pave the Way for BIM Based Renovation and Construction Processes. *Buildings* **2022**, *12*, 154. [CrossRef]
10. Sobhkhiz, S.; Zhou, Y.; Lin, J.; El-Diraby, T. Framing and Evaluating the Best Practices of IFC-Based Automated Rule Checking: A Case Study. *Buildings* **2021**, *11*, 456. [CrossRef]
11. Rodrigues, F.; Baptista, J.; Pinto, D. BIM Approach in Construction Safety-A Case Study on Preventing Falls from Height. *Buildings* **2022**, *12*, 73. [CrossRef]
12. Akhmetzhanova, B.; Nadeem, A.; Hossain, M.; Kim, J. Clash Detection Using Building Information Modeling(BIM) Technology in the Republic of Kazakhstan. *Buildings* **2022**, *12*, 102. [CrossRef]
13. Xue, J.; Hou, X. High-Rise Building Construction Progress Measurement from Top View Based on Component Detection. *Buildings* **2022**, *12*, 106. [CrossRef]

14. Ayman, H.; Mahfouz, S.; Alhady, A. Integrated EDM and 4D BIM Based Decision Support System for Construction Projects Control. *Buildings* **2022**, *12*, 315. [CrossRef]
15. Akhanova, G.; Nadeem, A.; Kim, J.; Azhar, S.; Khalfan, M. Building Information Modeling Based Building Sustainability Assessment Framework for Kazakhstan. *Buildings* **2021**, *11*, 384. [CrossRef]
16. Daniotti, B.; Masera, G.; Bolognesi, C.; Spagnolo, S.; Pavan, A.; Iannaccone, G.; Signorini, M.; Ciuffreda, S.; Mirarchi, C.; Lucky, M.; et al. The Development of a BIM-Based Interoperable Toolkit for Efficient Renovation in Buildings: From BIM to Digital Twin. *Buildings* **2022**, *12*, 231. [CrossRef]
17. Benn, M.; Stoy, C. BIM for CREM: Exploring the Benefit of Building Information Modeling for Facility Management in Corporate Real Estate Management. *Buildings* **2022**, *12*, 400. [CrossRef]
18. Moreno, J.; Machete, R.; Falcao, A.; Goncalves, A.; Bento, R. Dynamic Data Feeding into BIM for Facility Management: A Prototype Application to a University Building. *Buildings* **2022**, *12*, 645. [CrossRef]