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Building Information Modeling and its Applications

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Editorial

BIM is a digital representation of a facility's physical and functional qualities. A BIM is a common knowledge resource for information about a facility that can be used to make reliable decisions throughout its life cycle, which is defined as from conception to demolition. BIM is a workflow process that stands for Building Information Modeling. It is based on concepts for building and infrastructure project planning, design, construction, and management. By planning, designing, constructing, and operating BIM models, BIM software can model and optimize projects [1].

Building Information Modelling (BIM) is a process that involves the creation and administration of digital representations of physical and functional aspects of places and is supported by a variety of tools, technologies, and contracts. Building information models (BIMs) are computer files that can be retrieved, transferred, or networked to enable decision-making about a built asset (often but not always in proprietary formats and including proprietary data). Individuals, businesses, and government agencies use BIM software to plan, design, construct, operate, and maintain buildings and a wide range of physical infrastructures, including water, waste, electricity, gas, communication utilities, roads, trains, bridges, ports, and tunnels [2].

The notion of BIM has been around since the 1970s, but it wasn't until the early 2000s that it became a widely accepted word. Standards development and BIM acceptance have progressed at varying rates in different countries; standards produced in the United Kingdom from 2007 onwards formed the basis of worldwide standard ISO 19650, which was released in January 2019. BIM is a notion that has been around since the 1970s. Workstation products such as Chuck Eastman's Building Description System, GLIDE, RUCAPS, Sonata, Reflex, and Gable 4D Series were among the first software tools designed for modelling buildings in the late 1970s and early 1980s. Early programs, as well as the hardware required to execute them, were prohibitively expensive, limiting their widespread adoption [3].

Interoperability and BIM standards

Data and files created by one vendor's applications may not operate in other vendor's solutions because some BIM software providers have built proprietary data formats in their products. Neutral, non-proprietary, or open standards for sharing BIM data among different software programmes have been established to enable application interoperability [4].

Poor software compatibility has long been thought to be a barrier to industry efficiency in general, and BIM adoption in particular. In August 2004, the US National Institute of Standards and Technology (NIST) estimated that the capital facilities industry in the United States lost $15.8 billion annually due to insufficient interoperability caused by "the highly fragmented nature of the industry, the industry's continued paper-based business practises, a lack of standardisation, and inconsistent technology adoption among industry participants."

Management of building information models

Building information models cover the entire time period from concept to occupation. A BIM manager may be engaged to ensure efficient administration of information processes over this time period. From the pre-design phase onwards, the BIM manager is retained by a design build team on behalf of the client to develop and track the object-oriented BIM against predicted and measured performance objectives, thereby supporting multi-disciplinary building information models that drive analysis, schedules, take-off, and logistics. Companies are also considering developing BIMs in various levels of detail, because depending on the use of BIM, more or less detail is required, and constructing building information models at various degrees of complexity requires varying modelling work.

BIM in construction management

Participants in the construction process are constantly challenged to complete projects on time and on budget, despite restricted budgets, limited workforce, hurried schedules, and insufficient or contradicting information. Because two things cannot happen at the same time and place, important disciplines such as architectural, structural, and MEP designs must be well-coordinated. BIM can also help with collision detection by pinpointing the specific position of inconsistencies [5].

The BIM idea envisions the virtual building of a facility prior to its physical construction to minimise uncertainty, increase safety, solve problems, and simulate and assess potential repercussions. Before starting construction, subcontractors from all trades can input important information into the model, with the option to prefabricate or preassemble some systems off-site. On-site waste can be reduced, and items can be recycled.

It is simple to derive material quantities and common attributes. Work scopes can be separated and specified. With the full facility or group of facilities, systems, assemblies, and sequences can be shown in a relative scale. BIM also prevents errors by providing 'clash detection,' in which the computer model visibly shows to the team where sections of the building (for example, the structural frame and building services pipes or ducts) may incorrectly meet.

BIM in green building

BIM in green building, often known as "green BIM," is a procedure that can assist design, engineering, and construction businesses in improving the built environment's sustainability. It can help architects and engineers include and assess environmental challenges into their designs throughout the asset's life cycle.

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