Review Paper Impact of BIM on Pre-Construction

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Abstract- *This paper intends to study the impact of BIM(Building Information Modelling) on the pre-construction stage of a construction project, various technologies and solutions offered by BIM and how they can help during challenges faced during pre-construction stage by its application and derive a desired output of the pre-construction phase.*

Keywords- Pre-Construction, Construction industry, BIM, 4D Simulation, LOD(Level of Detail).

I. INTRODUCTION

Recently, the use of construction technology to connect the project information and work has grown exponentially. This trend is further accelerated by the environments currently in production.

With the urgent need for construction companies to digitize their pre-construction workflows, it becomes critical to select the right technology solution and develop a strategy to ensure successful adoption and implementation.

Large construction projects usually take an average of 20% longer time than planned and are up to 80% over budget. Most of the problems that occur during construction and lead to overruns and overdue projects become apparent late in the construction process. But if done right, most of them can be prevented before construction. Having an integrated pre-construction strategy focused on demonstrating both accurate estimates and schedules as well as correct visualization of project scope and flow allows the team to attract more work and complete the construction phase guaranteed to promote successful execution in future.

The biggest challenge in preconstruction phase is accurately managing and achieving multiple moving targets. The design development process cannot be completed without design iteration; however, it can be sped up and regulated. Architects, builders, subcontractors, suppliers, and owners can now work together much more quickly and efficiently thanks to technology. Using accessible BIM tools, document management systems, and change control systems enables all stakeholders to immediately review changes and determine their influence on cost, time, and constructability.

Through the use of the same technologies, the contractor is better able to convey to the owner the effects of the changes, which helps the team determine the most advantageous cost, schedule, and order of construction. The hand-off of preconstruction to the construction team is another crucial step in the preconstruction process. BIM also allows the team to use a cloud-based platform to share all critical construction documents, site layout options, construction sequencing, budget line items making communication with contractors more efficient as compared to traditional methods.

II. OBJECTIVE

To study the impact and advantages of BIM(Building Information Modelling) on the pre-construction stage of project.

III. LITERATURE REVIEW

In this connection the following literature has been reviewed.

BUILDING INFORMATION MOELLING AND PROJECT INFORMATION MANAGEMENT FRAMEWORK FOR CONSTRUCTION PROJECTS

Timothy O. OLAWUMI 1, Daniel W. M. CHAN 2*

Abstract:

In order to improve the functional management of project information, the study intends to provide an efficient BIM-project information management framework (BIM-PIMF) and related assessment model. The study's research strategy is comprised of an explanatory case study methodology and case study data from four BIM construction projects. The study identified and established the three sub-criteria of the BIM-PIMF model, namely the essential indicators for a successful BIM deployment on construction project sites, the BIM process level factors, and the BIM product level factors. On a five point metric scale, these criteria were semantically related to the creation of the BIM-

PIMF framework. The creation of the BIM-PIMF framework and associated analytical scoring system is one of the study's outcomes.

Observations:

The BIM-PIMF was created as a metric to assess how well players (experts) and the deployed BIM software can provide a usable information management system. The BIM-PIMF assessment matrix was created to evaluate the degree of implementation and adoption of the BIM-PIMF framework in building projects. It is a stratified spectrum of deliverables. The stated evaluation matrix's goal is to help project teams, contractors, and other stakeholders find methodical strategies to increase their capacity to improve and enhance the project information network.

Conclusions:

It was determined that BIM is appropriate and pertinent for the construction industry due to its capacity to simplify the management of project information and processes, including its dynamic depiction of building systems. The current BIM frameworks were investigated in order to design the BIM-PIMF model for construction projects. The BIM-PIMF also assesses how well participants (experts) and deployed BIM products can produce a workable information management system for a construction project.

Knowledge transfer, support and improvement, frequent facility upgrading, standardisation of project characteristics, trust and open communication were among the nine BIM-PIMF key indicators developed.

The BIM-PIMF framework can be used by project teams and construction stakeholders to:

(1) enhance the deployed BIM's capacity;
(2) assess the extent and capacity of a construction project to achieve the desired maturity level and fulfil the BIM-PIMF key indicators; and
(3) improve and optimise the information channels and the progressive enrichment of BIM technical capabilities.

4D/BIM SIMULATION FOR PRE-CONSTRUCTION AND CONSTRUCTION SCHEDULING. MULTIPLE LEVELS OF DEVELOPMENT WITHIN A SINGLE CASE STUDY.

Conrad Boton, Sylvain Kubicki, Gilles Halin

Abstract:

Since the initial seminal studies, 4D modelling has been an applied study topic for about 20 years. A number of case studies have been produced in recent years to illustrate the many uses of 4D and to evaluate technological ideas. However, the specific content of 4D models receives very little attention in the majority of articles. Parallel to this, 4D is typically identified as a "BIM usage" due to the increased adoption of Building Information Modelling. The Level Of Development of datasets is a key concern in BIM protocols. In this work, two separate 4D uses from a single pilot project are described. They try to evaluate the quantities of graphical and temporal information necessary for the put into use uses. The variety of 4D uses using 4D models, both planned and ad hoc, as well as the logical understanding associated with 4D LOD are ultimately covered by the writers.

Observations:

The pre-construction case study's modelling of the architectural elements took the longest to complete because SketchUp was unable to properly obtain data from the architect's BIM authoring programme due to user errors. For the purpose of properly connecting 3D objects to scheduling tasks, numerous alterations were necessary. Because the logistic model was made up of a few generic logistic pieces at LOD 100 that were fetched from the Sketchup 3D Warehouse, modelling the logistics components took very little effort. The 4D modeller only produced the logistics model for the case study's building phase. The BIM methodology had already been used to produce the other models for other uses. The 4D model creation process took longer than it did for the first portion of the case study, mostly because there were more components and details. Although this section was considerably more exact and intended to manage more elements, we saw that it took less time than the first part. This is due to the fact that 4D simulation was fully integrated into a larger BIM development workflow and that the coordinated architecture, MEP, and structure models were reused by the 4D modeller after being generated in earlier BIM processes.

Conclusions:

The NeoBuild Innovation Center project in Luxembourg was the subject of a 4D simulation case study that was presented in this publication. The first portion of the experiment, which was carried out during the planning stage, was designed to investigate the constructability of technical decisions and to foresee sequencing problems in group meetings. The second phase was carried out throughout the building stage with the goal of coordinating site activities, simulating logistics and site regions, but also more thoroughly analysing some construction elements. It was demonstrated

that managing several graphical LODs matching to the many model usages—both planned and unexpected—is necessary (ad-hoc analysis with the model). Additionally, other actors with various LODs contributed to different portions of the model. The graphical LOD required during building is higher than the graphical LOD required during pre-construction. As a first step towards models sharing throughout 4D tools, uniform temporal LOD should be presented and validated in order to define LOD for 4D/BIM applications. Another extremely intriguing result of the experiment was the bidirectional communication between the building site and the 4D model.

The subject of 4D LOD standards, including temporal LOD description and relationship between temporal LOD and existing graphical LOD in BIM techniques, will be addressed by authors in upcoming publications.

IV. CONCLUSIONS

The study shows that impact of BIM has created a huge development in the construction industry

Use of digital technologies and BIM software has led to prevention of delays and risks in the construction process. BIM application allow us to identify situations and factors causing delay and risk to the project in the pre-construction phase itself. This helps in analysing and finding better solutions to the problems.

BIM helps in rapid development of building data which saves a lot of time. It allows us to adapt the project to the changes quickly without much delay.

BIM enable us to extract accurate information w.r.t to the building model in order to avoid miscalculations and clashes during the construction process.

Simulation is another tool which helps us communicate and display the construction process graphically among the team members and stakeholders. Graphical representation of construction process helps in understanding the progress of the project better so that misunderstanding and miscommunication can be avoided between team members.

Cloud based applications enable us to share and change project information on a single platform so that correct information is supplied to the team members and stakeholders.

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