



## Developing 5D System Connecting Cost, Schedule and 3D Model

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### Summary

A recent topic, BIM could be considered as an effort to integrate all the information. So far, the integration of cost and schedule data has been done successfully as there is a good case of EVMS in order to synthesize those data. There have been many efforts to develop a 5D system that integrates cost, schedule data and a 3D model, but its technology is so difficult that few have succeeded. The 5D system will have many advantages once it is made: The visualization of schedule data and verification of cost in real time are possible and the future cost and schedule can be expected accurately. Especially, in case of an atypical structure the clash of members and errors of drawings which are hard to find in 2D drawings can be detected and corrected in a 3D model. This paper presents the methodology and results to develop a 5D system with the integrated cost and schedule data from EVMS, and a 3D model of the 2<sup>nd</sup> Geumgang Bridge within nD-CCIR, a 5D system developed in the UK.

**Keywords:** BIM (Building Information Modelling), 5D System, EVMS (Earned Value Management System), Cable-Stayed Bridge, 3D Modelling, WBS, CBS

### 1. Introduction

*BIM* (Building Information Modelling) which many people say nowadays is linking 3D modelling with construction information such as schedule, cost data and etc, and it is managing various information through 3D modelling conventionally rather than new concept.

In short, BIM is the integration of information. Comparing the other industries, the construction industry has had many difficulties in being computerized, because its size is bigger than others and it has many uncertainties. It might be impossible before, but it becomes possible by drastically developed computer technology.

There has been a big stride in integration of information in many construction companies because they recognized its utility. *EVMS* (Earned Value Management System: cost and schedule management system in the firm), which *Daelim Industrial Co., Ltd.* (domestic construction company in Korea) developed as a tool of managing schedule and cost, enables us to know real-time schedule according to cost data and real-time cost according to schedule data by managing schedule and cost simultaneously. It is not conventional system managed with cost, but new system managed with cost and schedule. It is, however, difficult to understand the detailed schedule although it is well-explained, and moreover it takes much time for even workers concerned to know it, because it presents by only texts and tables. It has become necessary combining schedule, cost and 3D modelling so that anyone knows it easily with visual effect.

There is very few 5D simulation software such as Virtual Construction made by Vico Software in Finland because of difficulty in making program and the domestic structure of cost is different from foreign one, which makes us not be able to use it. Although commercialized foreign estimating system based on BIM is more efficient and accurate than domestic one based on 2D, it takes much time in order to calculate more exact quantities and make more exact 3D modelling, because our