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## Study on BIM utilization for design improvement of infrastructure project

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### Abstract

Virtual construction could be done by using Building Information Modelling technology. But, to do that, information and knowledge on construction phase or fabrication phase should be available in design stage. In Japan, MLIT had been taking the leadership in the CALS/EC project which was just partially successful. We have to learn from “the experiences of CALS/EC” to get the fruit from BIM introduction to infrastructure projects. In the case of design-bid-build contract, since data sharing should be restricted based on the contract, consultants or engineers for designing are to become more capable of utilizing information relevant to construction of fabrication. The mobility of personnel is to be promoted in construction industry. In the case of design-bid-build contract, since data sharing should be restricted based on the contract, public sectors have to be more positive overcome contract related issues with their own leadership. If public sectors in Japan would not notice the similarity of issues of CALS/EC and BIM, Japanese construction industry may experience the same kind of frustration as one they had while executing CALS/EC projects.

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*Keywords:* Building Information Modelling; CALS/EC; design-bid-build contract

### 1. Introduction

Serious schedule delay is normally caused by unpredictable condition change in construction process. As a result of the delay, contractors might face serious risk of productivity reduction. Owner side also may have to take steps to meet critical situation. Frontloading is effective to decrease such risk caused by design change, and can improve the

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productivity. Virtual construction in design process must be the powerful method to precisely predict what would happen in the construction process. Virtual construction could be done by using Building Information Modelling technology. But, to do that, information and knowledge on construction phase or fabrication phase should be available in design stage. In Japan, MLIT had been taking the leadership in the CALS/EC project which was just partially successful. We have to learn from “the experiences of CALS/EC” to get the fruit from BIM introduction to infrastructure projects.

**2. What we have learned from CALS/EC projects**

*2.1. What is CALS/EC?*

CALS/EC is defined as “Continuous Acquisition, Lifecycle Support and Electronic Commerce” and used as the word expressing a series of activities to innovate construction projects by using the technologies of networking, electronic data and data sharing in Japan and Korea. Fig. 1 illustrates the image of CALS/EC set at the beginning of the project. A series of database is used for sharing information among public sectors, construction related companies and other organization or persons such as overseas companies, general public and other institutions. The number of organizations and persons involved in any civil project is not a few. Also, during the life cycle of facilities, the information can be utilized and recycled as well. From planning to maintenance, all the information produced during a project can be accumulated and used for various purposes. Fig. 2 illustrates possible information gap among each phase of planning, design, construction and maintenance. For example, from design phase to construction phase, some quantity of information with some quality is transmitted from one organization (or person) to another organization (or person) and used for the sake of construction or fabrication. But the rest of the information obtained in the design phase is not used anymore because of the insufficiency of the information for that sake. In that case, the information can be disposed and additional information is produced by the contractor or the fabricator, which might lead to the reduction of productivity. At the end of each phase, this kind of information deterioration occurs.

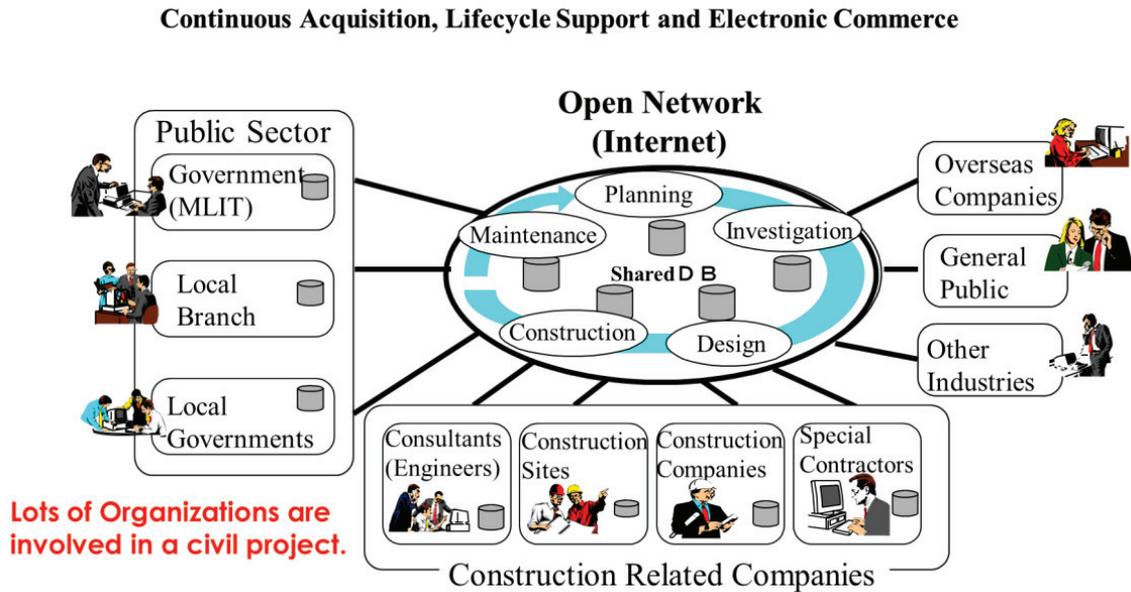


Fig. 1. Image of CALS/EC (Curtsey of JACIC).

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