K.Y. He, I.C. Wu. ***Dynamic simulation and visualization for site layout planning.*** *Gerontechnology 2012;11(2):76;* doi:10.4017/gt.2012.11.02.196.00 **Purpose** In recent years construction projects have become more complex and time-driven, especially with the rapid rise in the number of active partners involved in each project. Space is regarded as a limited resource on construction sites. Proper planning for site layouts ensuring construction activities can be executed safely and efficiently is until now a time-consuming manual process. Site layout planning relies primarily on the knowledge and expertise of the planner, and is seldom subject to optimization efforts. Often, however, slight modifications to the original site layout plan, can mean limited space resources are allocated more efficiently, costs are reduced, and/or work efficiency is increased. Although construction site layout planning is an important pre-activity, systematic analysis to determine optimal space allocation is difficult because of the complexity of the situation, arising from the large number of engineering resources to be factored-in, and interrelated planning constraints. Space availability on any construction site needs to be considered in relation to scheduling, productivity loss due to path interference, and space constraints. **Method** This a 4D-site-layout-planning system based on the Monte Carlo method[1] is designed to solve space issues in construction sites, and to assist the planner in obtaining the optimal site layout plan. Monte Carlo analysis was executed to iteratively evaluate a deterministic model. This method is often used when a model is complex, nonlinear, or involves a significant number of uncertain parameters. The Monte Carlo simulation presumes that various steps involved in forming a network plan, and estimating the characteristics of the probability distributions for the various site layout plans have been completed. Formulas associated with the generation of normally distributed transportation hours and distances were used. **Results & Discussion** The implementation of this system was carried out in the MicroStation Visual Basic for Applications (MVBA) environment and encapsulates the complicated planning and optimization functions into five easy-to-use modules including management, layout planning, visualization, simulation and analysis. In our system, users can observe simulations of the entire construction process. For each simulation run, the total transportation time and distance of resources is recorded and evaluated, and then a Monte Carlo analysis is performed by the system in order to find an optimal site layout plan. Since space constraints affect the site layout of resources, and influence productivity on the construction site, it is essential that possible site layouts are generated and analyzed in advance, so that the available space can be used more efficiently. Furthermore, efficient construction site planning involves the simultaneous assessment of schedule and site layout so that space can be used more efficiently and dynamically. In response to these needs, this research developed a 4D-site-layout-planning system to assist planners in developing efficient site layouts, and to monitor the results dynamically and visually.

References

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