

Integrating BIM and GIS for Design projects

Speaker: Mr. Thomson Lai

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After a brief self-introduction, Mr. Lai introduced the common technology currently used in construction industry, namely BIM, GIS, immersive and IoT and advanced data capture. He particularly raised the concern of using these digital technologies for predictive operational maintenance of plants, which lasts for a longer duration, say 40 to 50 years, as compared to the design stage. With the mandatory requirement on the use of BIM in public works projects as stated in the Technical Circular issued by the Development Bureau in 2018, it is without a doubt that digital technology is the way to go.

The core of this seminar lies in the practical experiences of technology integration, which are mainly in three-fold: (1) for geotechnical works; (2) assisting in structural design works; and (3) decision support for mega-sized infrastructural works

Geotechnical Application: Slope Mitigation Works

The integration of Drone, GIS and BIM for geotechnical works could be widely used in assessing the design options of slope mitigation works. The main applications / promising outcomes include:-

- Formulation of 3D Digital Surface Model (DSM) and / or Digital Terrain Model (DTM) using LiDAR / topographical survey data
- 3D spatial visualization of site setting and borehole distribution
- Formulation of engineering geological model with boreholes in AGS format
- Investigation of underground geological strata
- Simple volume calculation
- Spontaneous visualization of mitigation works options
- Clash detection of soil nails and flexible barriers
- Instantaneously creating 2D drawings (section view and plan view) from 3D models
- Providing location by location guide to stakeholders in public consultations (used with VR)

Structural Application: Piling Design Works

Mr. Lai illustrated a project example of BIM modelling assisted by GIS analysis for generation of about 1500 bored piles. The workflow includes:-

- Extract pile locations from 2D drawings
- Derive rockhead contours from GIS
- Carry out grid analysis (each grid x, y coordinates and depth to rockhead)
- The depth of each bore pile is known and the data are transformed by Dynamo
- Bore pile models could be generated by Revit.

Although the workflow requires some manual input / editing, it does expedite the process, especially the tedious procedure of drawing each pile to the founding level. Digital technology also allows the project information (such as grids and rockhead depths) to be transparently available to the reviewers to check and verify the accuracy.

BIM – GIS Integrated Solutions to support Decision Making of Infrastructure Development Projects

In this session, the speaker highlights some major research and developments in digital technology.

- The integration of scattered project data (of different formats and natures) into a Commonly Data Environment (CDE), which serves as a single repository to ease browsing, access and downloading of data.
- Simplification of BIM models to suit targeted users
- Compatibility of model formats (currently territory-wide HK 3D spatial data are in 3d-max format, which could not be used readily in BIM); conversions of formats to skyline 3DSD and ultimately to 3D GIS for fitting into BIM