

Enabling Infrastructure Digital Twin with 4D Surveying and Reality Modeling

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SUMMARY

Infrastructure Digital Twins have been a major trend over the last few years. There is little doubt nowadays that Infrastructure Digital Twins are one of the greatest opportunities to improve the way we Design, Build and Operate Infrastructure.

The essence of Infrastructure Digital Twins is to break data silos and enable the combination of different sources such as Survey & Reality Data, GIS Data, BIM Data, Operation data and IoT to empower infrastructure practitioners with a global view of their infrastructure so that they can make decisions in full awareness.

Surveying & Reality Modeling techniques are effective solutions to start quickly on the Digital Twin journey and enable immersive environments with immediate outcomes. Beyond the quick and effective start, another key value that Surveyors & Reality Modeling experts can bring is the capability of providing not only accurate data but up to date information to maintain the digital twin in sync with the field truth. The Digital Twin should not be thought of as a one-off project but more as a live twin that needs to continuously stay in-sync with the physical truth.

The frequency of synchronization is of course to be assessed based on the desired type of Infrastructure Digital Twin and more precisely the lifecycle stage of the infrastructure. A construction Digital Twin may need several updates per week whereas an Operation Digital Twin of a Bridge can be done less frequently.

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In this presentation we will discuss with several real-world examples, the usage of Mapping and Land Surveying techniques for the purpose of contributing to Digital Twins. Specific attention will be put on the notion of needed accuracy, fitness with expected outcomes as well as the handling of the time dimension, the 4th Dimension, and the resulting value of 4D Surveying. We will review different techniques, Reality data types for different Digital Twins such as Operation Digital Twins of Bridges as well as Operation Digital Twins at the National level of highways.

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