# Mega City-Scale Digital Twin

Mega city-scale digital twin is a technology that builds a three-dimensional digital model that reflects the physical features of a large city and utilizes simulation analysis and prediction results for city operation decisions.

Megacity digital twins use aerial photography and photogrammetry to create a three-dimensional digital space of the entire city, which can be used as infrastructure for self-driving vehicles and other applications, and can be linked to real-world data to simulate various disaster events.
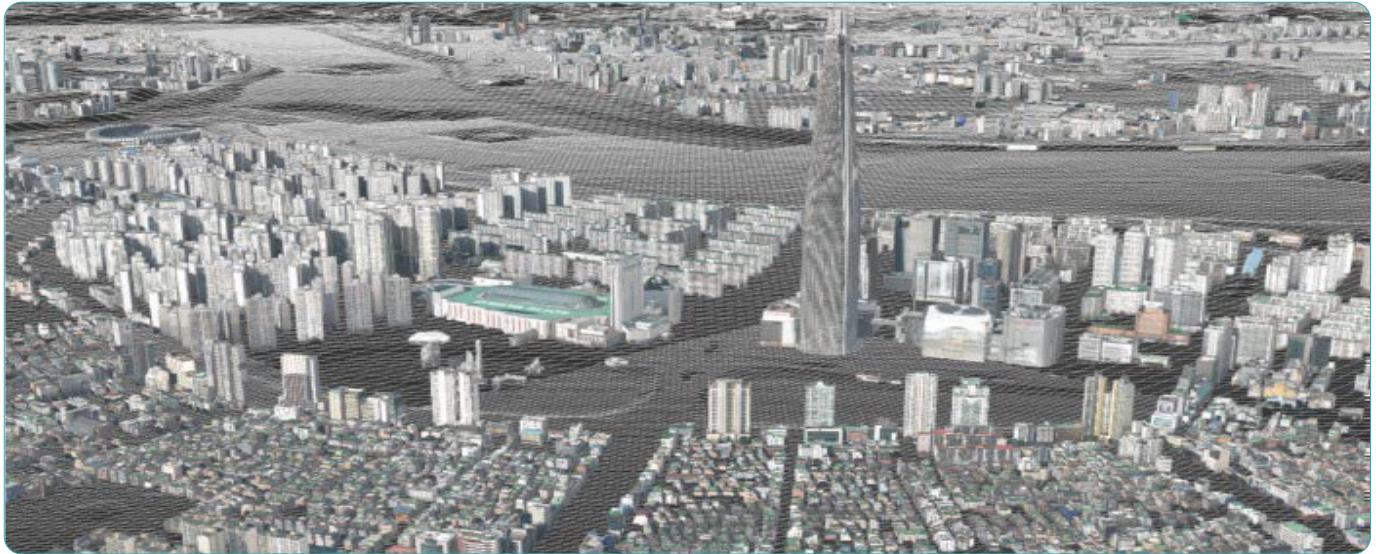
▲ Smart Seoul Map (S-MAP), Seoul's three-dimensional digital space built using digital twin technology.

Source : Naver Labs

Issues to Tackle

☑ Needing high-precision 3D spatial data for the introduction of new mobility solutions such as autonomous robots within cities.

☑ Requiring 3D digital simulation infrastructure for urban environmental changes and disaster/safety incident preparedness.

Expected Benefits ☑

☑ Establishing the foundation for new industries such as autonomous vehicles and outdoor delivery robots by utilizing 3D digital space

☑ Preemptively responding to disaster situations such as floods and deriving solutions to urban problems based on simulation results, including carbon emissions.
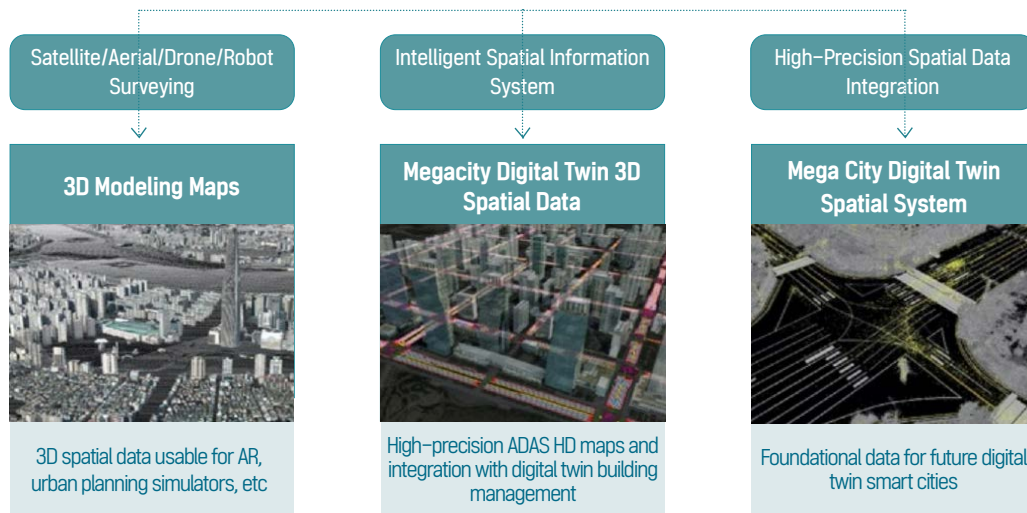
☼ Key Services

· Providing digital twin-based real-world objects and information.

· Replicating and matching physical objects with virtual models.

· Adding necessary weather and surrounding environmental data to the virtual model.

· Integrating and linking basic data.

· Conducting spatial and predictive analysis through simulations.

⚙ Use Cases

· In 2020, the Seoul Metropolitan Government collaborated with Naver Labs to build a 3D spatial model (Smart Seoul Map) of 600,000 buildings within an area of 605 km² using approximately 25,000 aerial photographs, integrating urban information such as environment, administration, and safety.

· In 2021, Korea Land and Housing Corporation (LH) built the "LH City Digital Twin" service after the development of the third-phase new towns (Incheon Gyeyang, Hanam Gyosan, etc.), allowing citizens to intuitively view urban landscapes, views, and sunlight.

· From 2023, Naver and Naver Labs began building a cloud-based 3D digital twin platform for five cities in Saudi Arabia, including Riyadh, Medina, Jeddah, Dammam, and Mecca.* The Saudi Arabian government plans to use digital twins for urban planning, monitoring, flood prediction, and other purposes.

Key Components

Configuration

Satellite/Aerial/Drone/Robot Surveying

Intelligent Spatial Information System

High-Precision Spatial Data Integration

3D Modeling Maps

3D spatial data usable for AR, urban planning simulators, etc

Megacity Digital Twin 3D Spatial Data

High-precision ADAS HD maps and integration with digital twin building management

Mega City Digital Twin Spatial System

Foundational data for future digital twin smart cities

Technology

1. Collecting and modeling 3D spatial data
· Analyzing and matching satellite/aerial photos and photogrammetry data using artificial intelligence.
· Converting into megacity digital twin data to create 3D models of the entire city.

2. Collecting precise road information and generating layouts
· Generating road and building information for the entire city by automatically extracting road surface symbols and lane information using AI technologies such as deep learning and computer vision.

3. Processing spatial data through matching and standardization
· Significantly reducing high-precision data collection and post-processing time by combining location information extracted from 3D models with MMS data.

4. Collecting and modeling future spatial data
· Supporting data collection, processing, and utilization that enables natural connection of complex environments flat ground, and stairs using self-developed mapping robots and wearable mapping devices.
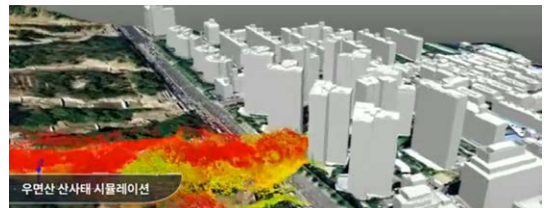
Lotte World Tower Wind Path Digital Twin
· Identifying and predicting wind speed, direction, and patterns according to building arrangement and height through airflow simulation.
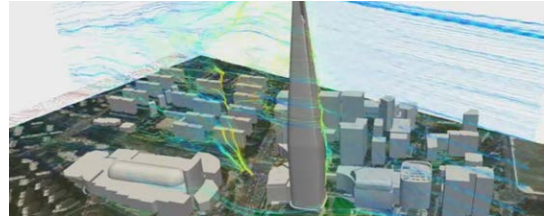
Umyeonsan Mt. Landslide Simulation
· Predicting damage scale by inputting rainfall, terrain, and soil data.

Source : e8ight

Technology Companies

E8IGHT
www.e8ight.co.kr

GAIA3D
www.mago3d.com

UOK
www.uokdc.com

NAVER LABS
www.naverlabs.com