3D Real Scene
Product and Service Solution

Terra Info Tech (Beijing)Co., Ltd

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"3D Real Scene of China"

- In 2022, the Policy Memo[1] issued by Ministry of Natural Resources of People's Republic of China clarified the objectives, tasks, division of labor and requirements for the construction of 3D Real Scene in China.

- In 2023, the Directive[2] issued by Ministry of Natural Resources of People's Republic of China clearly pointed out the target of 3DRS construction from 2023 to 2025, covering data and supporting environmental construction tasks.
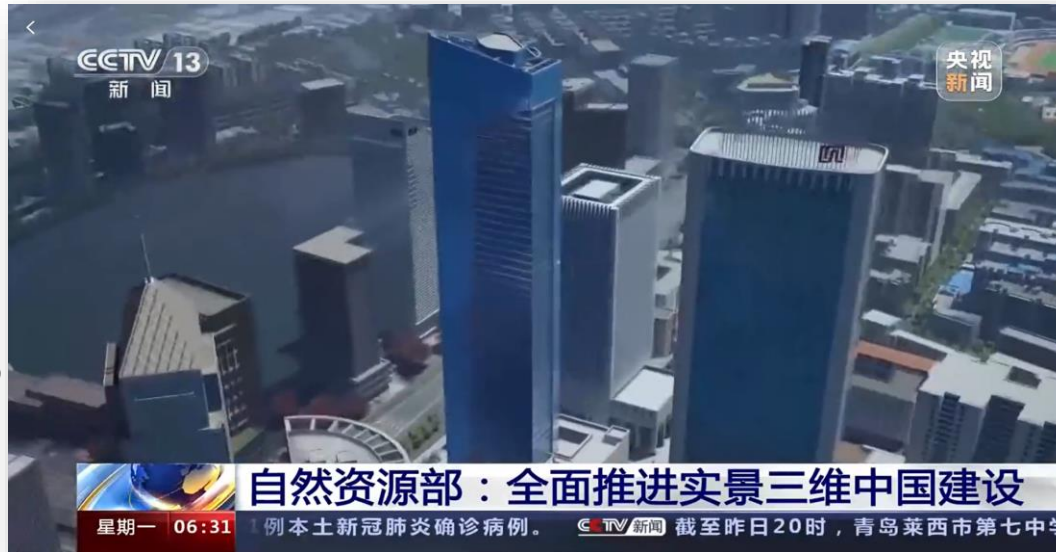
- 1 Policy Memo: Notice on comprehensively promoting the construction of 3D real scene in China
- 2 Directive: The overall implementation plan of 3D real scene in China construction in the period of 2023-2025

● **National construction objectives**

In **2025**, the realization of the **5-meter grid** of entities for terrain-level 3DRS of the Chinese mainland region and main islands, and the initial coverage of the entities for city-level 3DRS **with 5-centimeter resolution** of prefecture-level and above level cities.

In **2035**, the realization of the grid **better than 2 meter** of entities for terrain-level 3DRS covering the Chinese mainland region and main islands , and the initial coverage of the entities for city-level 3DRS **better than 2-centimeter resolution** of prefecture-level and above level cities.

3D Real Scene Product and Service Solution

The "SmartEarth 3D Real Scene Product and Service Solution" is a comprehensive solution provided by Terra Info Tech (Beijing) Co.,Ltd. for the construction of 3D Real Scene in China from data acquisition to application implementation. it is suitable for a variety of application development environments and scenarios.

Data Acquisition

Equipment

- LiDAR ALC2000
- Oblique Imagery AMC6150
- Hyperspectral AMMHS
- Framed AMC1150
- Swing type aerial camera ASC1150
- Dual frequency lidar Mapper5000
- UAV Aerial Camera UMC560
- UAV
- SLAM MBL

- DOM/DEM
- Oblique Imagery
- Point cloud
- Hyperspectral
- Indoor point cloud
- BIM/CAD

Smart Data Processing

Processing Software

- Terra Builder
- Semantic Entity Editor
- PhotoMesh
- Semantic Entity Generator
- City Builder
- Semantic Entity Builder

Platform support

Database System

- On-demand assembly
- Data management
- Service interface & Publish

Twin Engines Platform

- SmartEarth GeoSpatial Platform
- Parallel World Platform

Industries

Applications

- Natural resources
- CIM
- Urban Big Data
- Public Safety
- Smart Traffic
- Water Conservancy
- Firefighting &Emergency
- Smart Industry
- Smart Park
- Telecom
- National Defense
- Smart Ocean

Smart Acquisition : Aerial Digital Capture Device

Hy-DAS :Hyperspectral Data Analysis System
SIOM: Shanghai Institute of Optics and Fine Mechanics

Oblique Imagery AMC6150

The series of oblique imagery products including AMC5150, AMC6150 and AMC1050 independently developed by Terra using core technologies have advantages for smart acquisition of urban 3D reconstruction

Swing type Aerial camera ASC1150

The ASC1150 independently developed by Terra has the functions of rolling pitch, rotation and vibration，and supports the output of equivalent large-format images by whisk broom, which greatly improves the efficiency of aerial photography operations.

LiDAR ALC2000

The ALC2000 is a laser aerial photography device integrated with OPTECH's T2000 LiDAR, which supports the complete adaptation of visible image and FOV, its laser pulse frequency is up to 2000KHz, which can realize smart acquisition without blind area, multi-echo and efficiency

Framed AMC1150

Terra's AMC1150, AMC1280, and AMC3100 aerial photography products, available in single and multi-camera options, cater to the intelligent data acquisition needs across various scenarios.

Hyperspectral AMMHS

The AMMHS visual and infrared multispectral sensor with its processing system Hy-DAS, covers all spectrum segments. Its spatial and spectral resolution indices are among the world's leading standards and are widely used in the monitoring and evaluation of eco-city, water quality of river and lake

Dual-frequency lidar Mapper5000

Mapper5000 is airborne LiDAR with double frequency developed by SIOM to support amphibious use. The detection depth is up to 50 meters underwater, and it is used in the exploration of islands and reefs，the investigation of marine environment.

AMC6150 Oblique Aerial Photography System

Main Technological Parameter

- **Ultra Short Exposure Interval :**
- **With 185Km/h flight speed can obtain 2cm resolution image**
- **Supports a variety of focal lengths for different tasks**
- **Focal lengths type:32mm、40mm、50mm、70mm、90mm、110nm 、150mm**
- **Support fixed wing aircraft and helicopter two modes of carrying**
- **Fixed-wing plane: Nanchang Y-5、Harbin Y-12、Cessna 208 Caravan、King Air 350ER、Citation Jet**
- **Helicopter : ROBINSON R44、AS350**

ASC1150 Swing type Aerial Photography System

The aerial photography system based on AMC6150 with ultra-wide sweeping camera，supports the output of equivalent large-format images by Whisk Broom scanning, which saves a lot of flight operation costs

ASC1150
摆扫航空照相机

• **The parameters were compared with mainstream aerial cameras in the market**

GSD/cm	Aerial camera	Focal length/mm	Pixel size/um	Flight height/m	Scan coverage/km	Flight Efficiency （km^2/h）
5	ASC1150	90/180	3.76	1200/2400	2.00/3.20	**245/370**
	UCEM3	100	4	1250	1.32	160
	DMC3	92	3.9	1179	1.29	157
	DMC4	111/148	3.9	1400/1900	1.58	185

ALC2000 LiDAR Measurement System-All in One Design

ALC2000 LiDAR measurement system is a multifunctional aerial equipment system for photogrammetry.

ALC2000 is an aerial camera specially integrated forT2000 , with highly adaptive image coverage and laser field of view.

The system is based on the T20000 and is equipped with a high-precision Applanix AP60 IMU/GNSS inertial navigation system that supports seamless integration , and developed an integrated 260-megapixel aerial photography camera system

Main Features of the System

- High adaptation of optical image and LiDAR field of view
- Automatically ADAPTS to the terrain to ensure even coverage of the navigation strip
- No blind zones in aerial
- Ultra-small speckle
- Multiple reflections
- Adjustable pulse emission frequency
- Adjustable scanning Angle
- Roll Compensation and ZigZag Scan

ALC2000
机载激光雷达航摄仪

SmartEarth　上海航遥

Use Cases—3D Scene Reconstruction

The Historical Path of China's Data Construction

Advantages
➤ widely used, simple

Disadvantages:
➤ **Shapefiles (SHP) are not suitable for expressing complex tree-like structures and relationships, and OBJ models are not suitable for expressing complex spatial structures**
➤ **The coordinates of 3D models are not geographic coordinates, making topological calculations impossible**
➤ **There is no multi-Level of Detail (LOD) support; It is not possible to achieve a unified 2D and 3D integration.**

shp+obj

Advantages
➤ Defines a complete set of urban objects, including attributes and structures
➤ Complete geographic coordinates, supporting topological calculations
➤ Multiple Levels of Detail (LOD)

Disadvantages:
➤ **The expression is in the form of text files, with low read/write performance and large storage space**
➤ **It cannot express entities unrelated to the city, such as marine entities and water conservancy entities**
➤ **It only defines urban objects and cannot express entities like addresses and pipelines.**

CityGml

Advantages
➤ High read/write efficiency and small storage space;
➤ A single file needs to support large data volumes up to the TB level
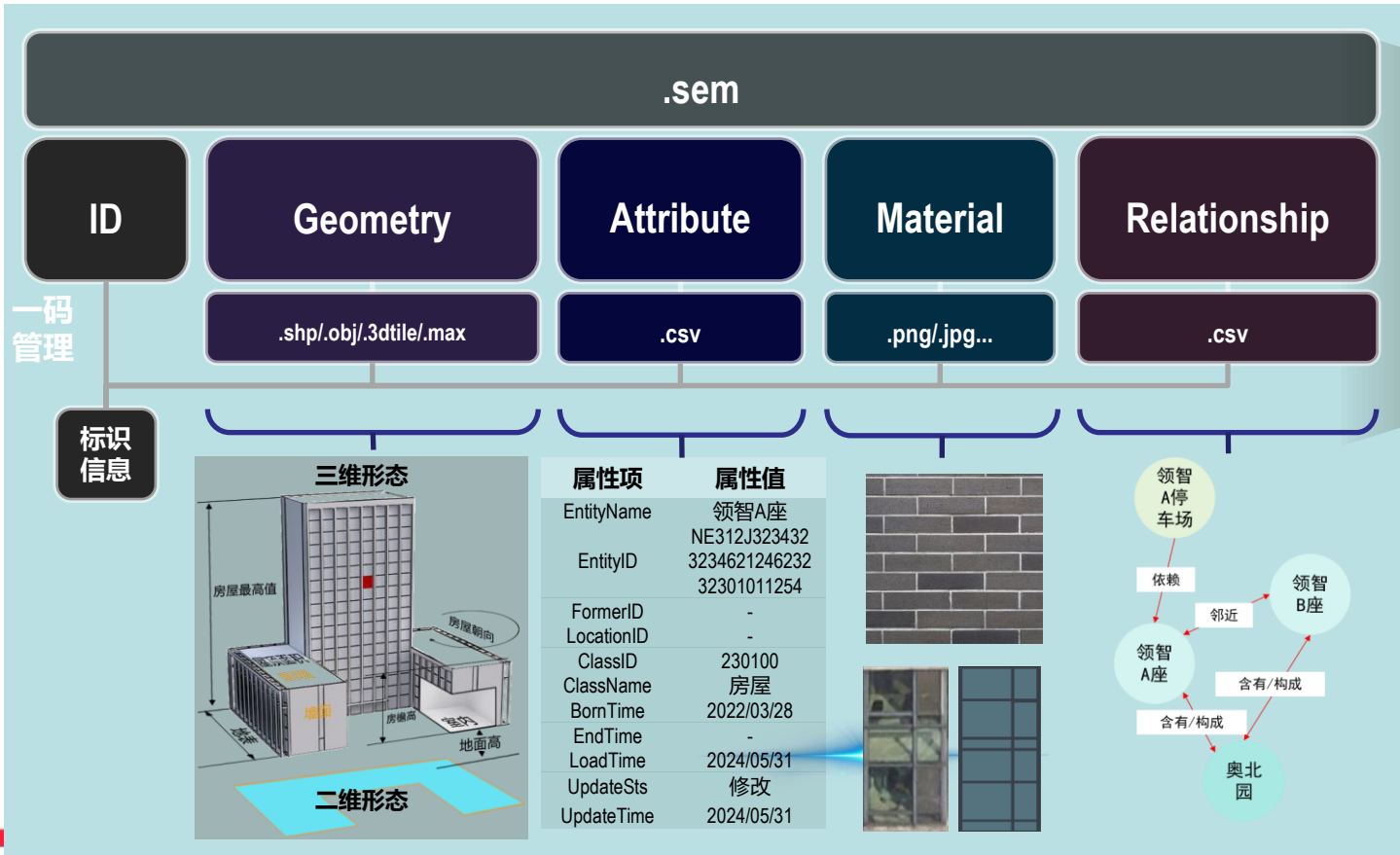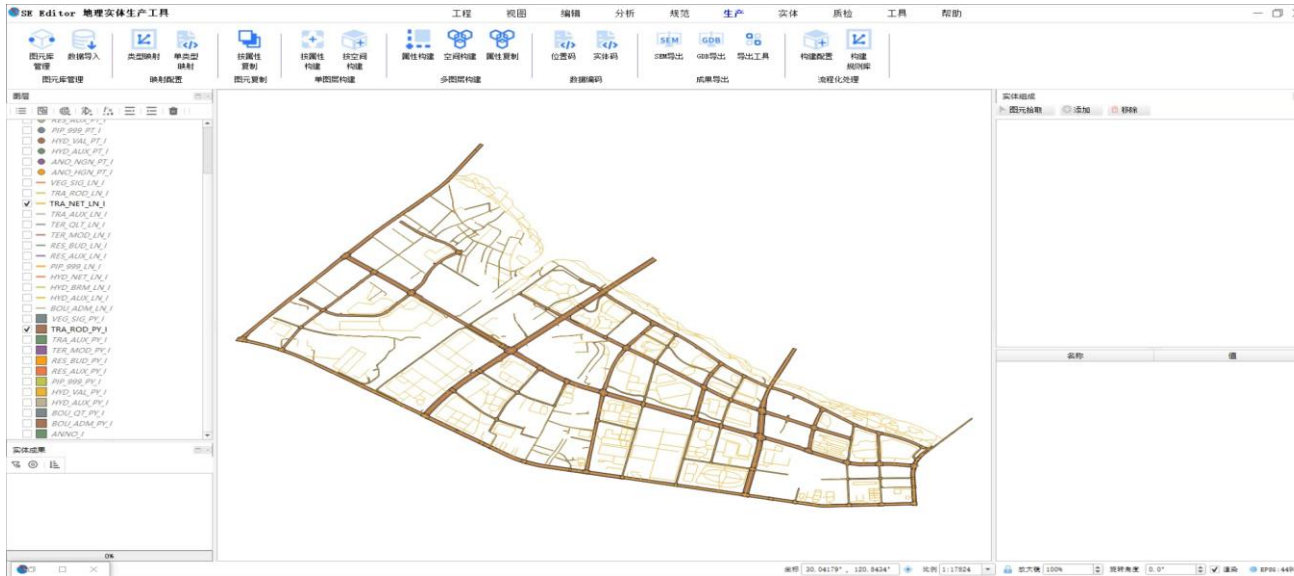➤ Flexibly define and express objects in multiple domains.
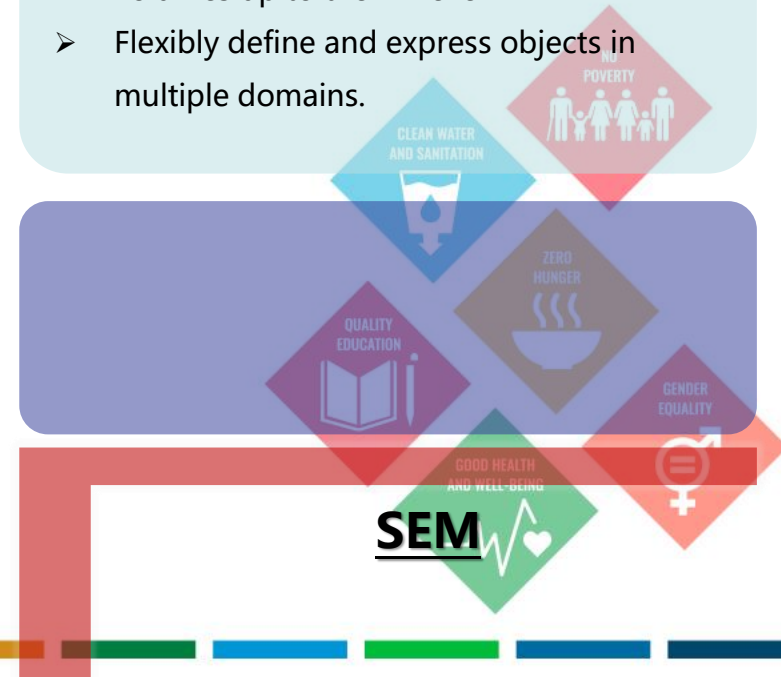
SEM

Smart 2D Processing —Semantic Entity Editor

INPUT

OUTPUT

Product Advantage

- Standardized production, with outcomes of the entity fully in line with departmental standards;
- Collaborative production of conversion， easy to trace and update;
- Flexible and controllable entity construction of multiple modes;
- Processsualized production of entities ,automated data processing ;
- Smart search of semantic of entity Holographic information;
- Comprehensive production control to ensure data quality;
- Efficient output ：Build city-level entities with one click

SEE is a desktop application software designed for the conversion and production of 2D geo-entity data.Production supports the import and management of production specifications of geo-entity， and has automatic and process-based capabilities for topological conversion, entity construction and relationship extraction.

Smart 3D Processing —SmartEarth Semantic Entity Generator

SEG is an efficient 3D modeling tool. SEG uses AI technology to automate the modeling of 3D entities such as buildings, sites, roads, and different floors and dwelling, which can meet the needs of different application scenarios.

Terrain

Building

Indoor

Terrain
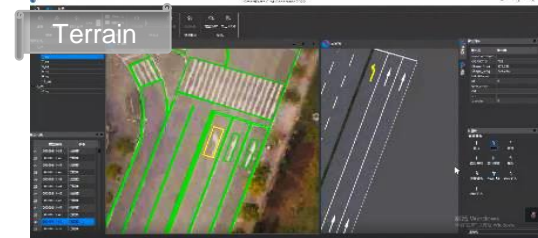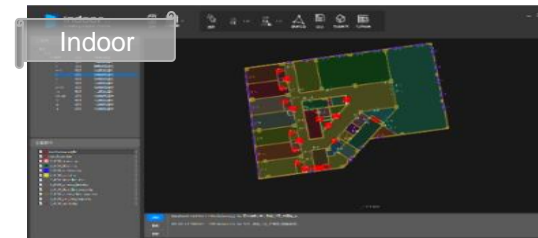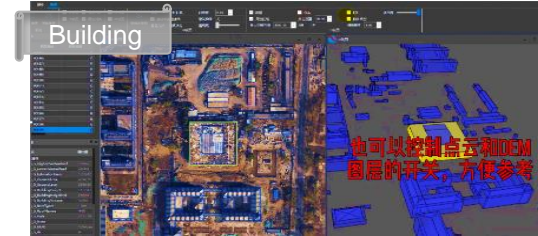
Product Advantage

- Quickly build LoD models of massive data with one click, and model details are refined
- Multiple LoD building modeling with semantic information
- Automated 3D solid modeling with textures and materials in mind
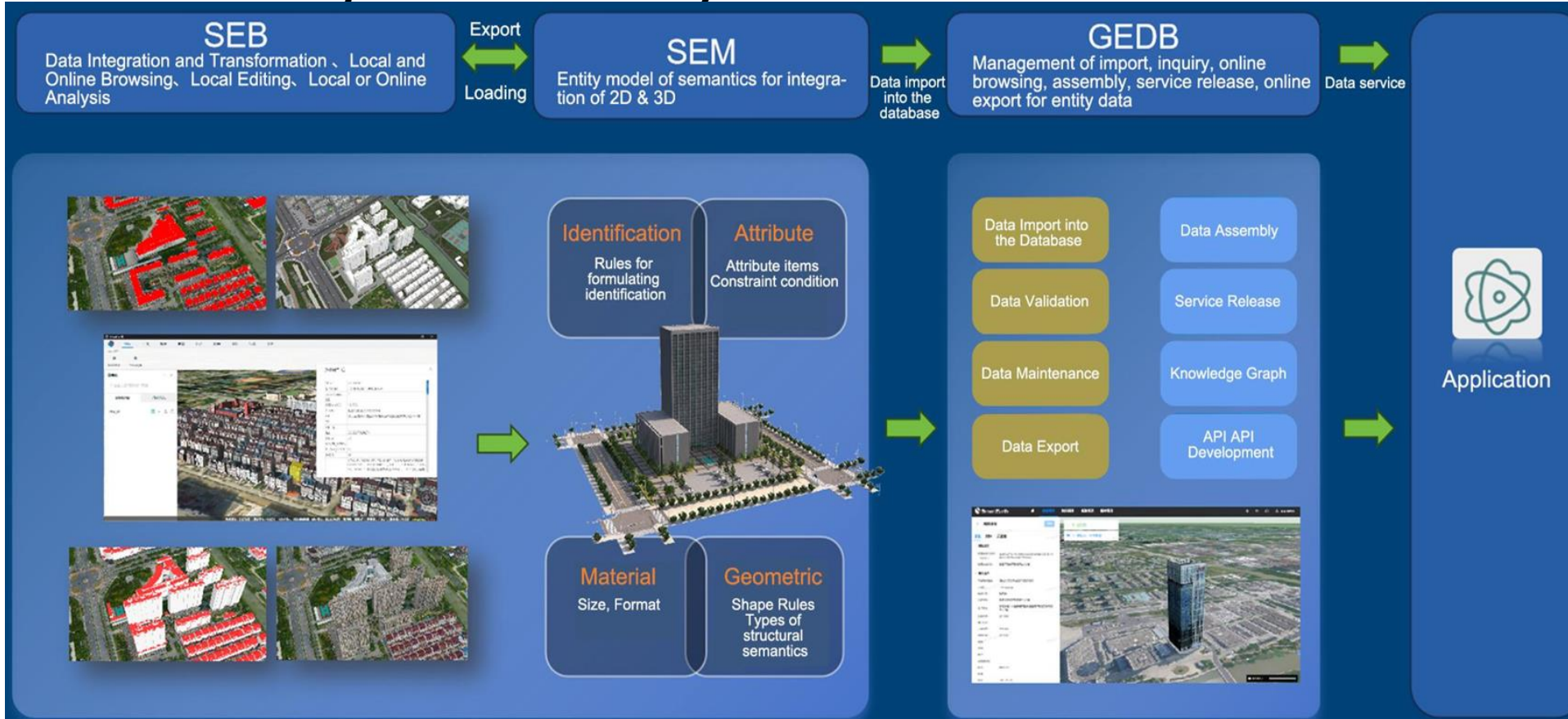- Smart extraction of the semantics of material to improve visualization

Smart Processing —Semantic Entity Builder

SEB is a product that integrates, transforms, edits, and processes multimodal geo-entity data, converting it into object-oriented entity data, and supports the processing of intermediate outcome data obtained during the production process. This tool offers functions for data browsing and editing, and provides a data foundation and support for the geo-entity database system.

Platform Support—SmartEarth Geo-entity Database System

Product Advantage

- A centralized database for managing 3D real scene data
- Meet the requirements of data aggregation management in multiple scenarios
- Standardize the management of database construction
- Support for on-demand assembly of data and dynamic update of services
- Support Construction of knowledge graph
- Supports carrying massive data to improve services
- Seamlessly interconnect dual-engine Platform to meet different visualization applications
- Supports hierarchical management to ensure data security

GEDB is a platform-level system product independently developed by Terra Info Tech (Beijing)Co., Ltd, which meets the needs of unified database construction and unified management for the process of objectifying geo-entity data , and provides relationship creation, attribute extension, on-demand assembly, publishing service functions.


Standard Product

Custom Product

Platform Support—Dual-engine Platform

SmartEarth GeoSpatial Platform

SmartEarth GeoSpatial Platform is a professional 2D & 3D computing platform , which can seamlessly integrate massive multivariate of multi-source heterogeneous 3D geo-entities data, BIM data and IoT data , support a variety of spatial analyses, and provide a professional basic geographic information platform and solution for users in the digital twin industry.
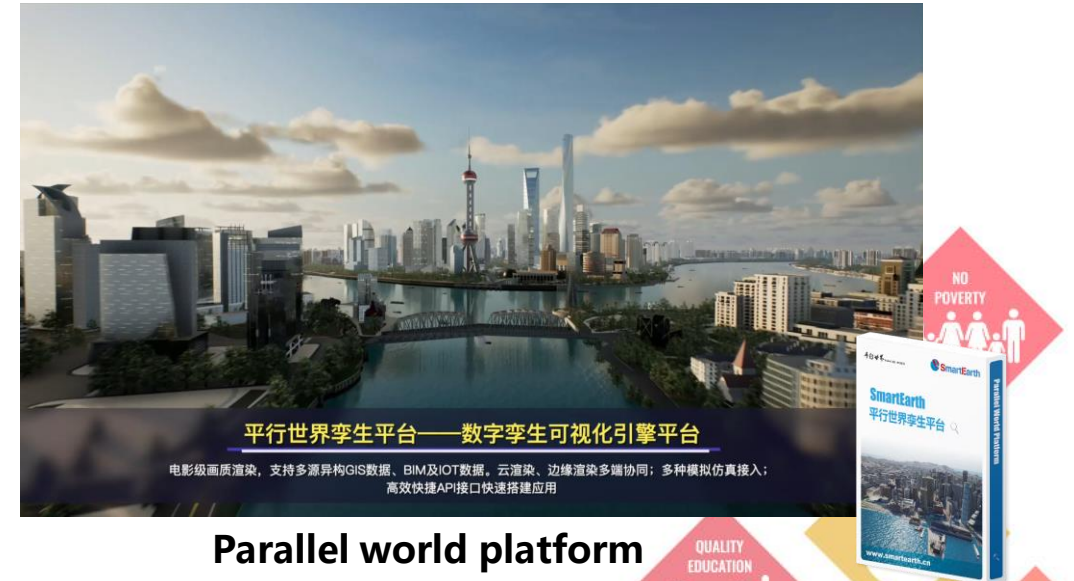
Parallel world platform

Parallel world platform is a visualization cloud platform of digital twin for cities , which can achieve movie-quality scene restoration of the city, support visual presentation of 3D geo-entity data and BIM data fusion, support the access of a variety of simulation, and realize user management with multi-GPU and multi-concurrent .

Range of customers covered

- Terra's customers in the Chinese market have involved **more than 30** industries, including urban big data, natural resources, housing, emergency security, water conservancy, transportation, energy and so on
- Supports **more than 600** developers
- Serves **more than 2,000** customers
- Customers are throughout the whole of **China**
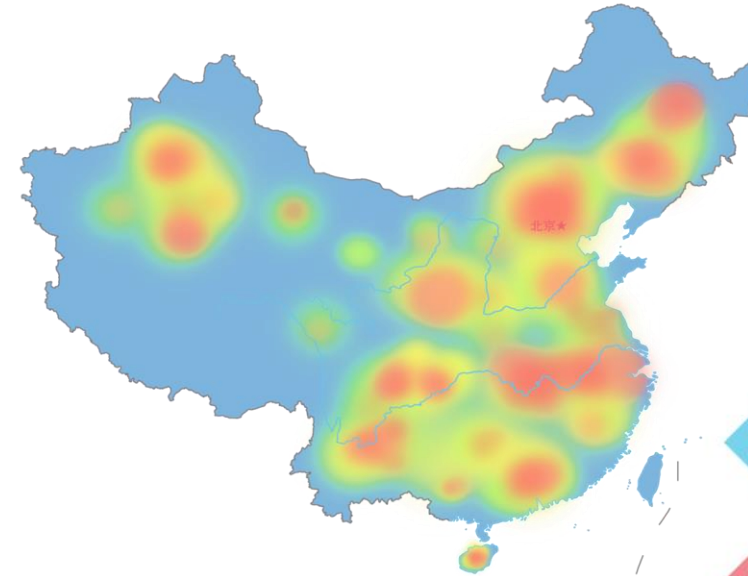
Deeply support and assist in the construction of 3D real scene in China

| ShanXi | QingHai | ShangHai | ShanDong | ZheJiang | YunNan |

Kathmandu, Nepal 14–16 November
REGIONAL CONFERENCE 2024
Climate Responsive Land Governance and Disaster Resilience: Safeguarding Land Rights

Dong-TerraIT
WhatsApp contact

THANKS

【Outlook】A leading provider of digital twin technology and services in China.
【Mission 】Creating Better Worlds
【 Values 】Constantly strive to become stronger
To honor commitment and take practical actions