TOWARDS A “3D+” SPATIAL DATA INFRASTRUCTURE: CASE OF CHONGQING, CHINA

Ms. Xue Mei, Chongqing Survey Institute
ABOUT US

Chongqing Survey Institute

Founded in 1950
Professional surveying, mapping, geoinformation and design institute with a staff of 905

Geoinformation Department of Chongqing Survey Institute

A multi-disciplinary team including professionals in GIS/Geology/Urban Planning/Computer science etc.

Focusing on 3DGIS R/D, data collection and consultant with a staff of 101
CHONGQING: A MEGA-CITY OF 30 MILLION PEOPLE
CHONGQING : A STANDING CITY
CHONGQING
A STANDING CITY
WE STARTED EXPLORING 3DGIS SINCE 1998
NON-SEMANTIC MODELING

3D Max modeling based on 1:500 topographic map

Airborne radar point clouds

Terrestrial laser scanning

UAV tilt photography

Mobile laser scanning
SEMANTIC MODELING

BIM

Road Information Models

Underground pipeline

Rule-based modeling (shape grammar)
NOWADAYS,
WE’RE MANAGING THE 3D GEO-INFO OF
THE ENTIRE CITY
THE BIG CHALLENGE: MANAGING AND PROVIDING 3D GEO-INFO EFFICIENTLY

3D databases of multi-sources, multi-scales are maintained separately
Data redundancy and inconsistency reduce reliability
Restricted applications
THE BIG CHALLENGE:
MANAGING AND PROVIDING 3D GEO-INFO EFFICIENTLY

"3D+" CHONGQING VISION:
To Describe, Design and Manage Our City in 3D Space

- 3D Feature Models
- Digital Surface Models
- BIM
- Underground Pipeline
- 3D Extrude Models
- REGION
- CITY
- DISTRICT
- PARCEL
- BUILDING

“3D+” CHONGQING VISION:
To Describe, Design and Manage Our City in 3D Space
“3D+” CHONGQING

Data Providers
Aggregators
Enablers
Developers
Enrichers
End Users

Database
Toolkit
Platform
Applications

“3D+” STANDARD
storage
provide
exchange
apply
“3D+” MODEL: INTEGRATED, SEMANTIC AND LIGHT-WEIGHTED

The main features are based on CityGML 2.0

- DLG / DRG / DEM / DOM
- UNDERGROUND SPACE
- PIPELINE DATA
- 3D MAX MODELS
- BIM / LIDAR POINTS
- OBLIQUE PHOTOGRAPHY
“3D+”
FEATURE MODELS

<table>
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<tr>
<th>LOD</th>
<th>Coding</th>
<th>Temporary</th>
<th>Geometry</th>
<th>Representation</th>
<th>Semantic</th>
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<tbody>
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<td>Unique Geo-entity coding</td>
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- Water bodies
- Trees
- Vegetation
- Buildings
- Transportation
- City Furniture
- Underground spaces
- Land Use
- Underground spaces
“3D+” FEATURE MODELS

LOD0
LOD1
LOD2
LOD3
LOD4

Automatic generation

Unique Geo-entity Coding

CAD/BIM Based Semantic modeling
GEO-ENTITY BASED REGISTRATION

Individuals → Businesses → Real Property
“3D+” RASTER MODELS

Automatic Projection

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<td>Plane Projection</td>
<td>Unique</td>
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<td>Raster</td>
<td>Texture</td>
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<td>Spherical Projection</td>
<td>Geo-entity</td>
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<td>Spatial Projection</td>
<td>Coding</td>
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Plane Projection

Spherical Projection

Spatial Projection
SCALABLE APPLICATIONS

- Noise Analysis
- 3D Cadastre
- Asset Management
- Traffic Simulating
- Energy Analysis
- Restoration of cultural relics
- Public Security
- Urban Planning
- Travel
- Disaster Response
- Climate Analysis
- Viewshed Analysis
- Urban Change Detection
- Facility Location Decision

LOD0  LOD1  LOD2  LOD3  LOD4
DESIGNING AND SIMULATING IN THE “3D+” SPACE

Road Infrastructure

Metro Infrastructure
SUGGESTIONS ON INTERNATIONAL STANDARDIZATION

GEO-CODING of 3D SPACE

underground & aboveground, indoor & outdoor sensor data integrating

CITYGML 2.0 DATA MODEL

Support multi data sources, such as LiDAR points, rule-based data etc.

Building model: indoor navigation support.

Underground feature models: metro, pipelines and geology.
THANK YOU

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