



OneMap - SuperMap Natural Resources Management

SuperMap Software Co., Ltd

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Regional Manager, SuperMap International

Background

Requirements for Informatization of Natural Resources:

- Full-space, full-factor data management
- Comprehensive, conjunctive application of massive spatial data
- Application of new surveying and mapping results (oblique photogrammetry, point cloud)

Background

The Application Requirements of Natural Resources Informatization for GIS:

- Expression of all spatial data above and below ground
- Large-scale spatial data processing
- Multi-source heterogeneous data fusion
- 3D spatial query and analysis
- Multi-end applications

How to Express Natural Resource Objects in the Whole Space

High
Altitude



Air Pollution



Wind Field

On the
Ground



Forest



Grassland



Mountains



Real Estate

Surface



Wasteland



Tidal Flat



Water Flow

Under-
ground



Mineral

**Rich 2D and 3D Data
Model Expression**

-100m to +50m

Buildings

Interaction between ground and underground

Basement

Cable net

Pipeline

Subway system

Tunnel

Drainage system

Geology

+50m

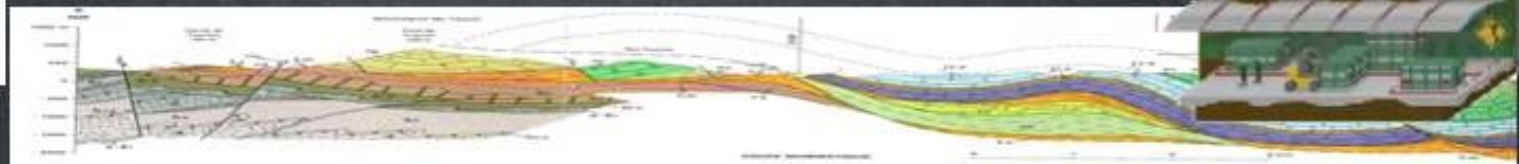
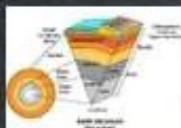
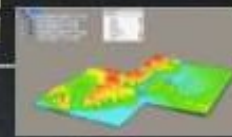
-1~3m

-3~10m

-15~20m

-20~50m

-100m





1. SuperMap 2D & 3D Integration

2. SuperMap OneMap Introduction

3. SuperMap OneMap Solutions

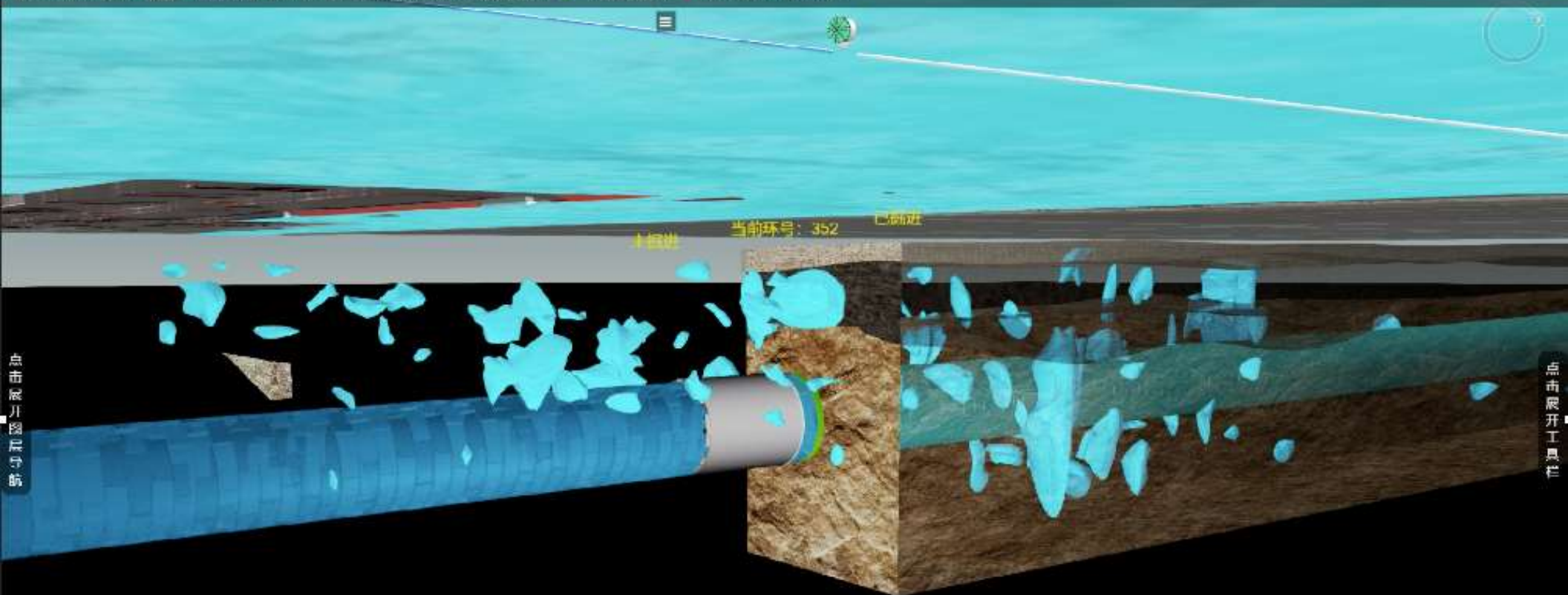


1. SuperMap 2D & 3D Integration

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环号: 347 状态: 未掘进 盾构时间: 2019/10/12 上午10:54:18 上行通信状态: ● 下行通信状态: ● 注: 1Bar = 0.1MPa



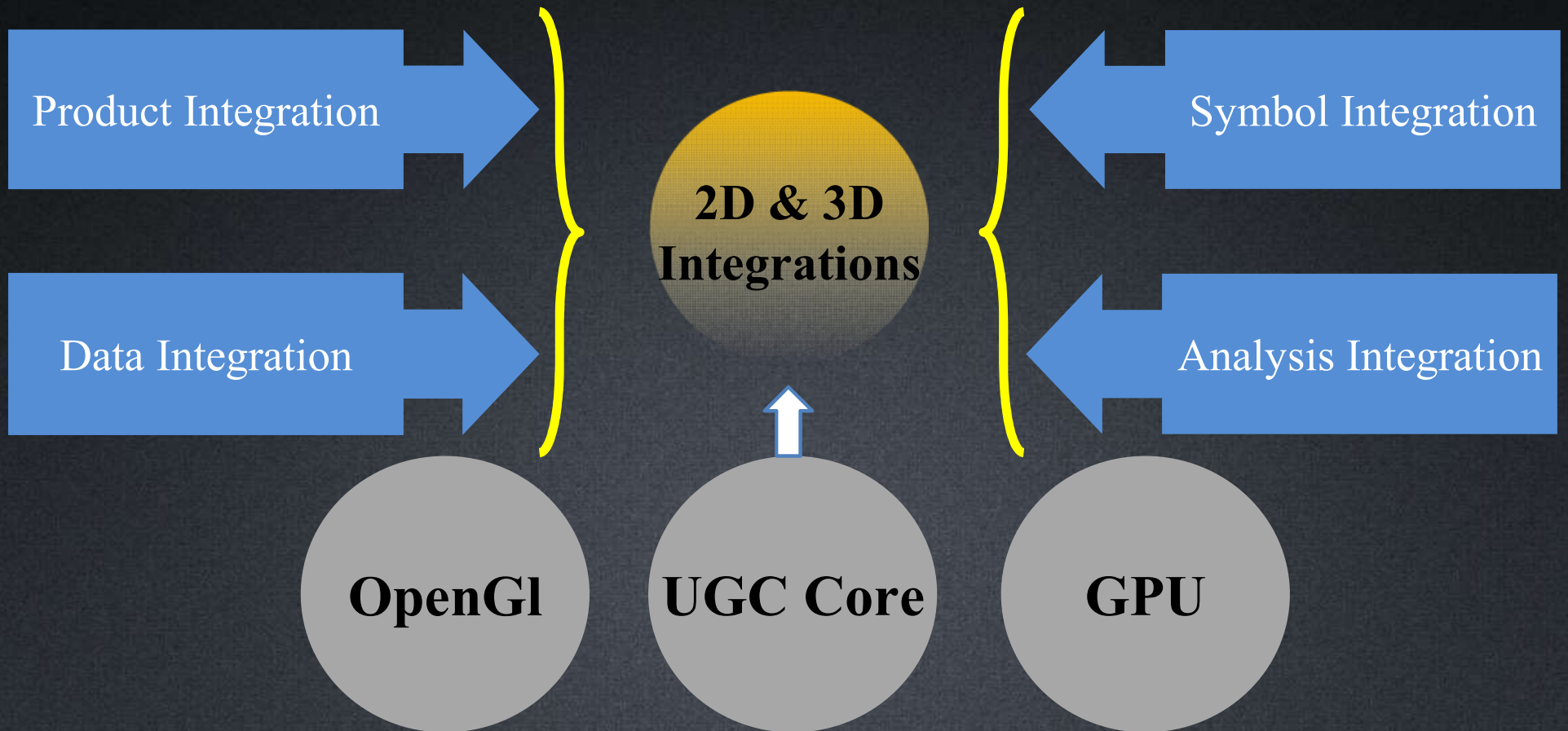
3D GIS Underground Space Application

8

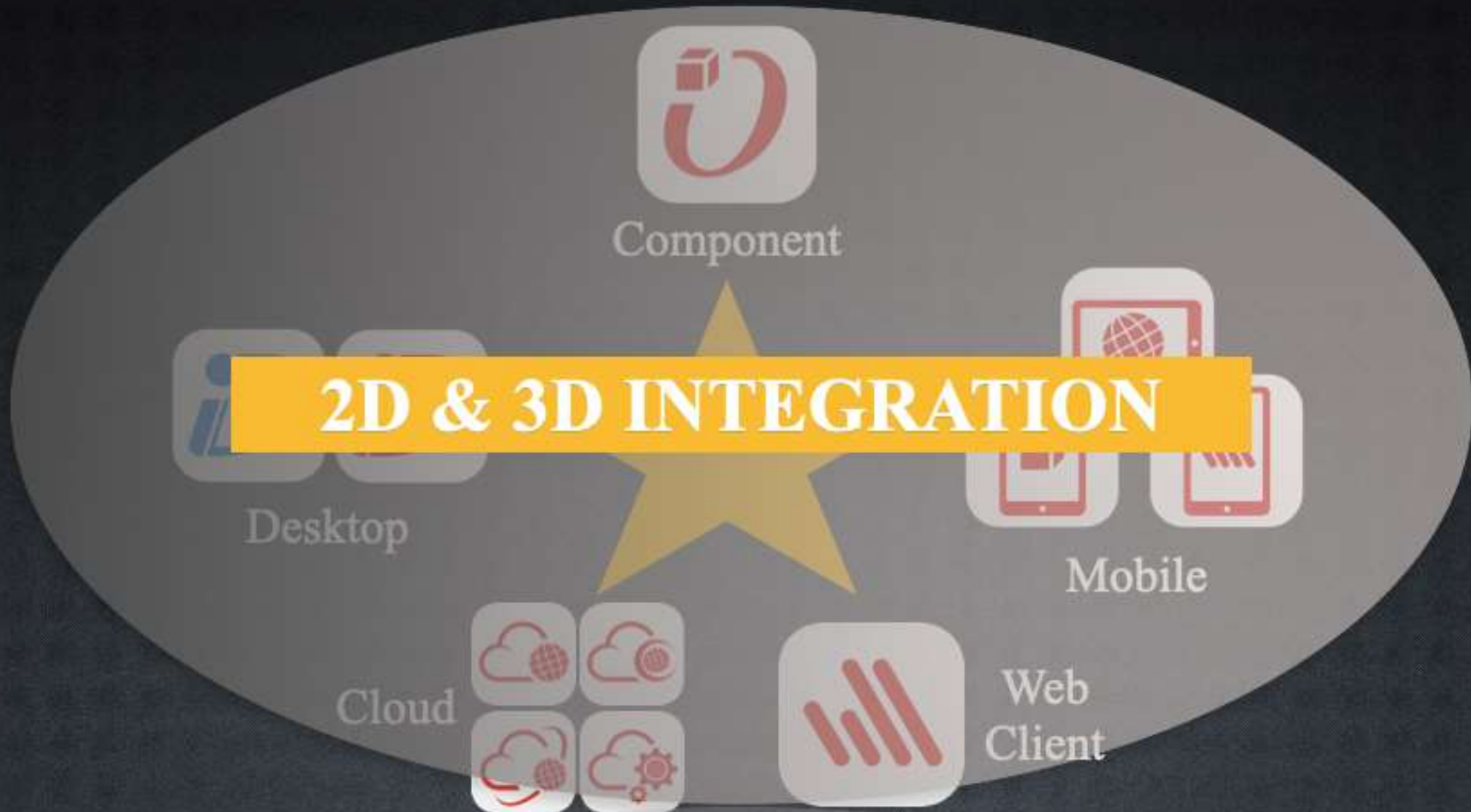
图例说明 停止说明 Q 查询 设置距离 关闭 前进 后退 升起 地面穿透 升起 光源 升起 切面图 退出数据编辑

盾构施工图例: ● 正常施工 ● 穿越特大风险 ● 数据异常 | 施工状态图例: ● 掘进位置 ● 未掘进 ● 已掘进 | ◆ 巡检点 ▲ 监测点 ▲ 隐患点

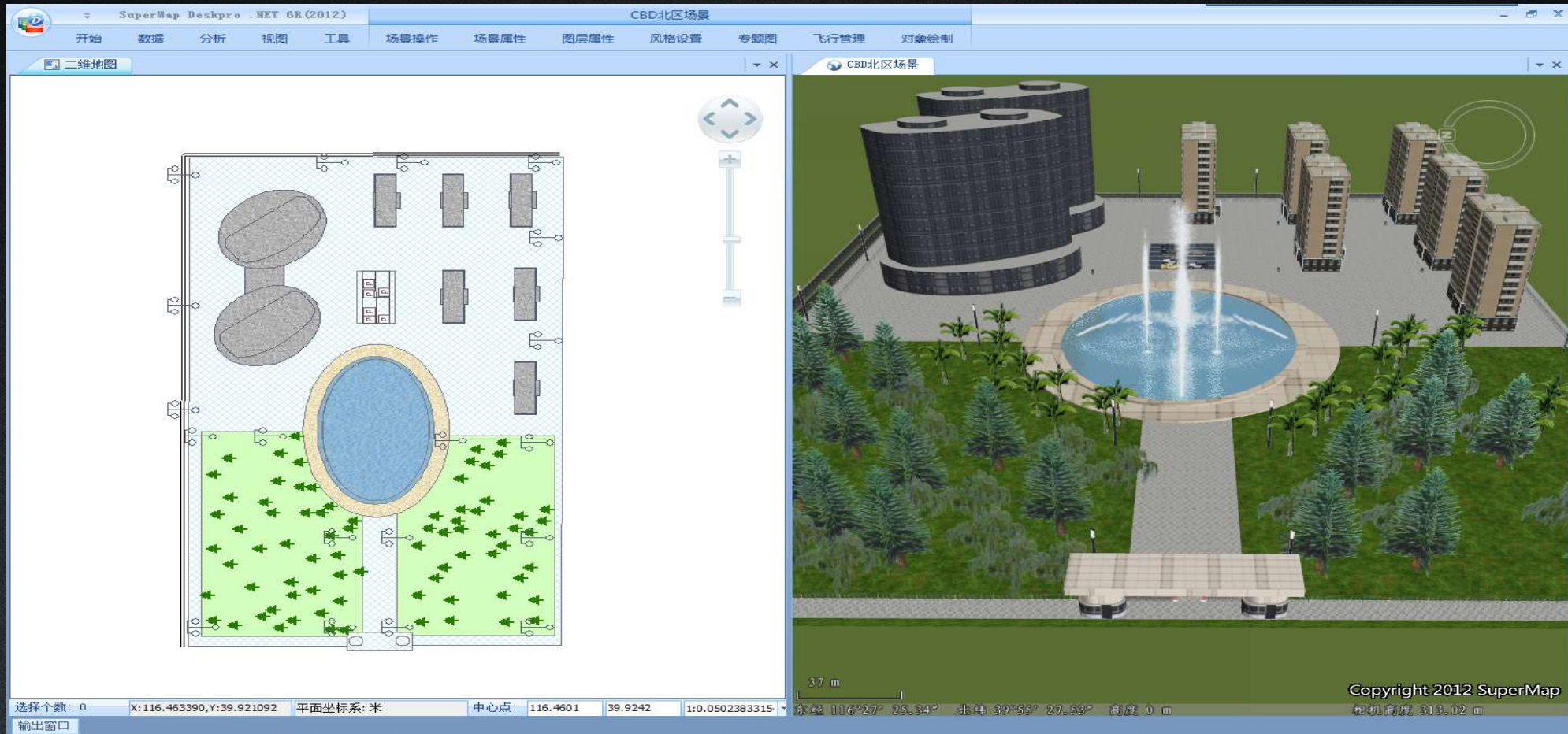
Integrations



Product Integration



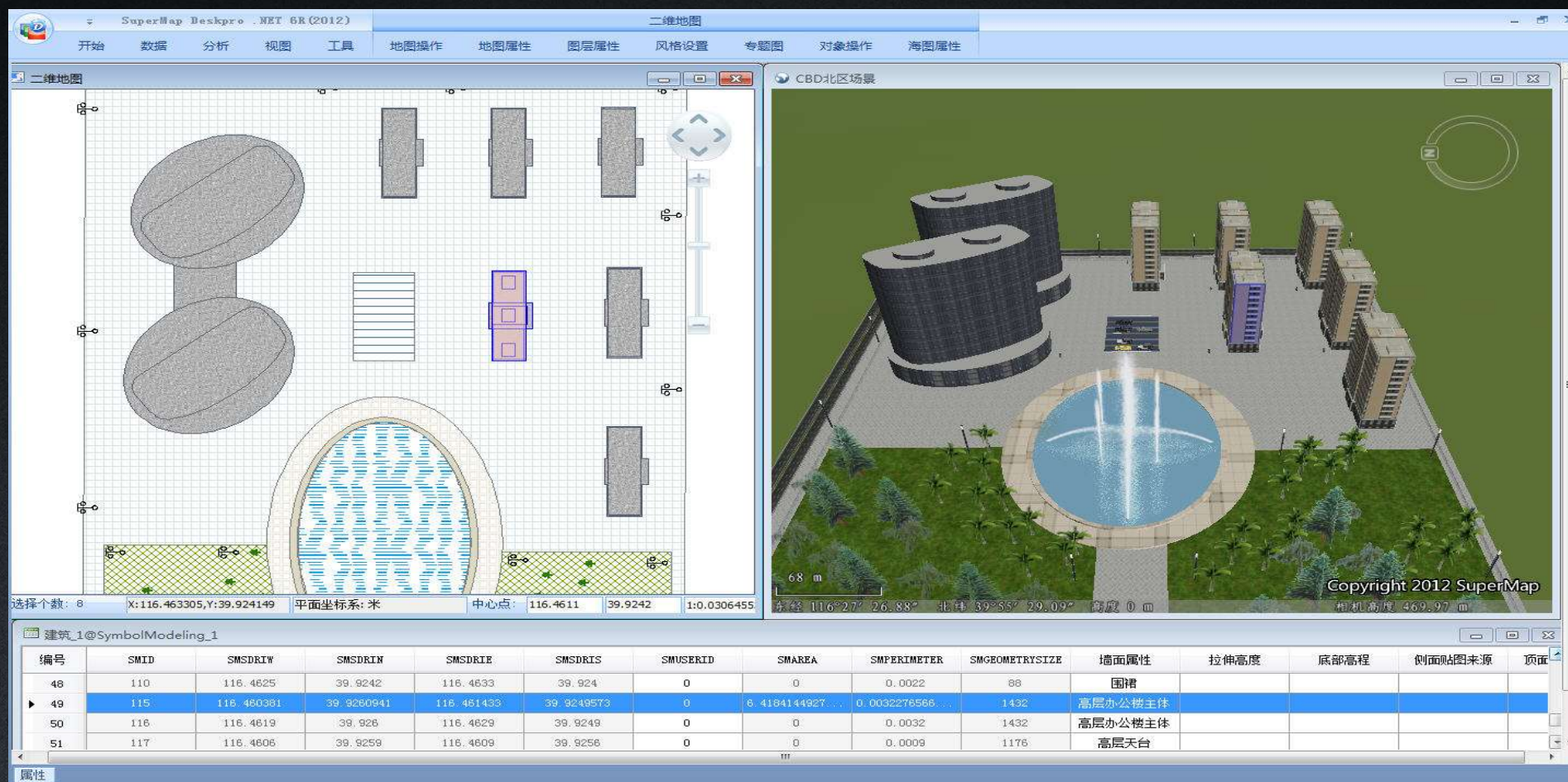
Data Integration — 2D Data, 3D Display



Data Integration — 2D Data, 3D Display

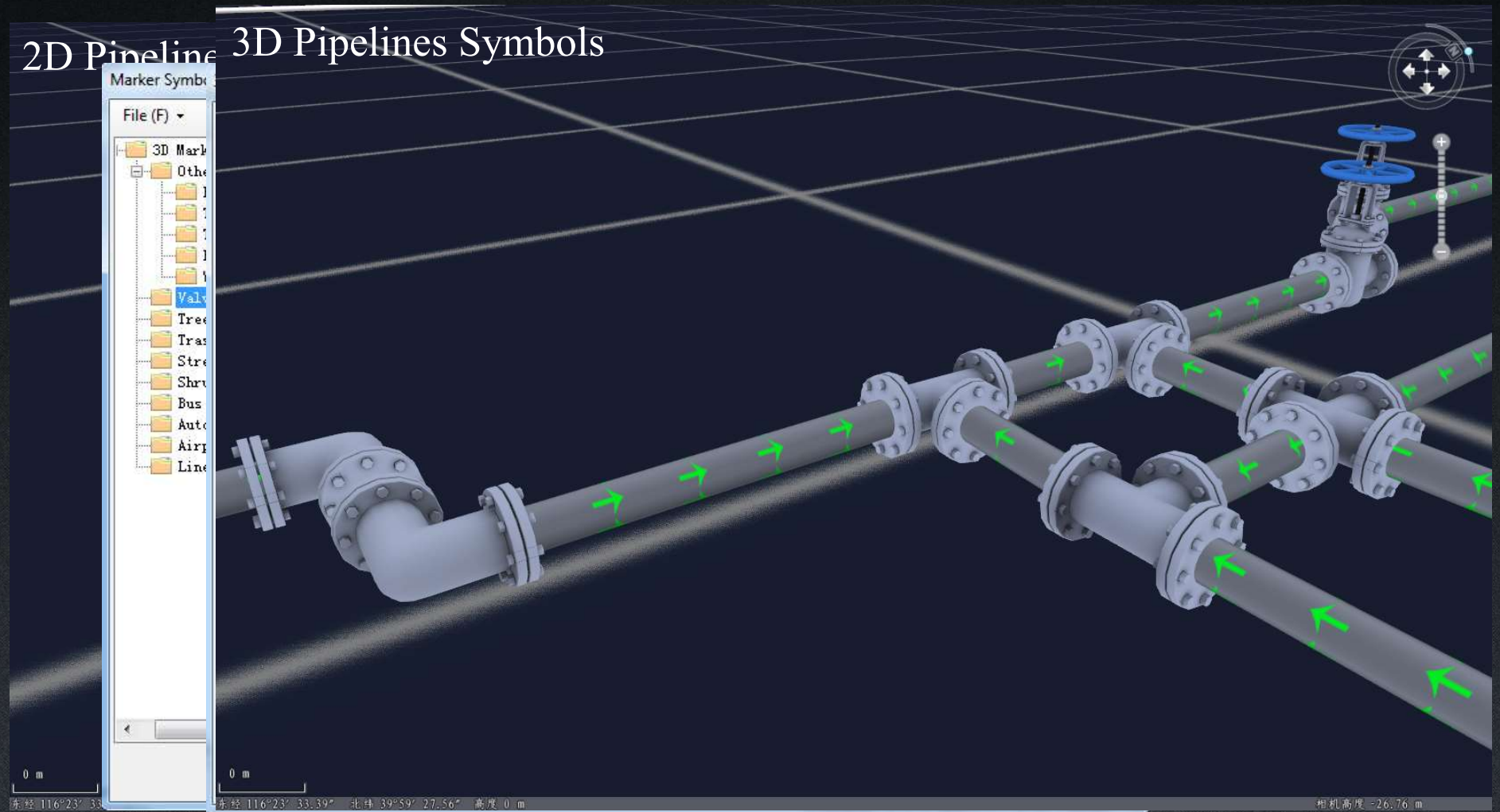


Data Integration — Data and Attributes Linkage of 2D & 3D



Symbol Integration — Pipeline symbol

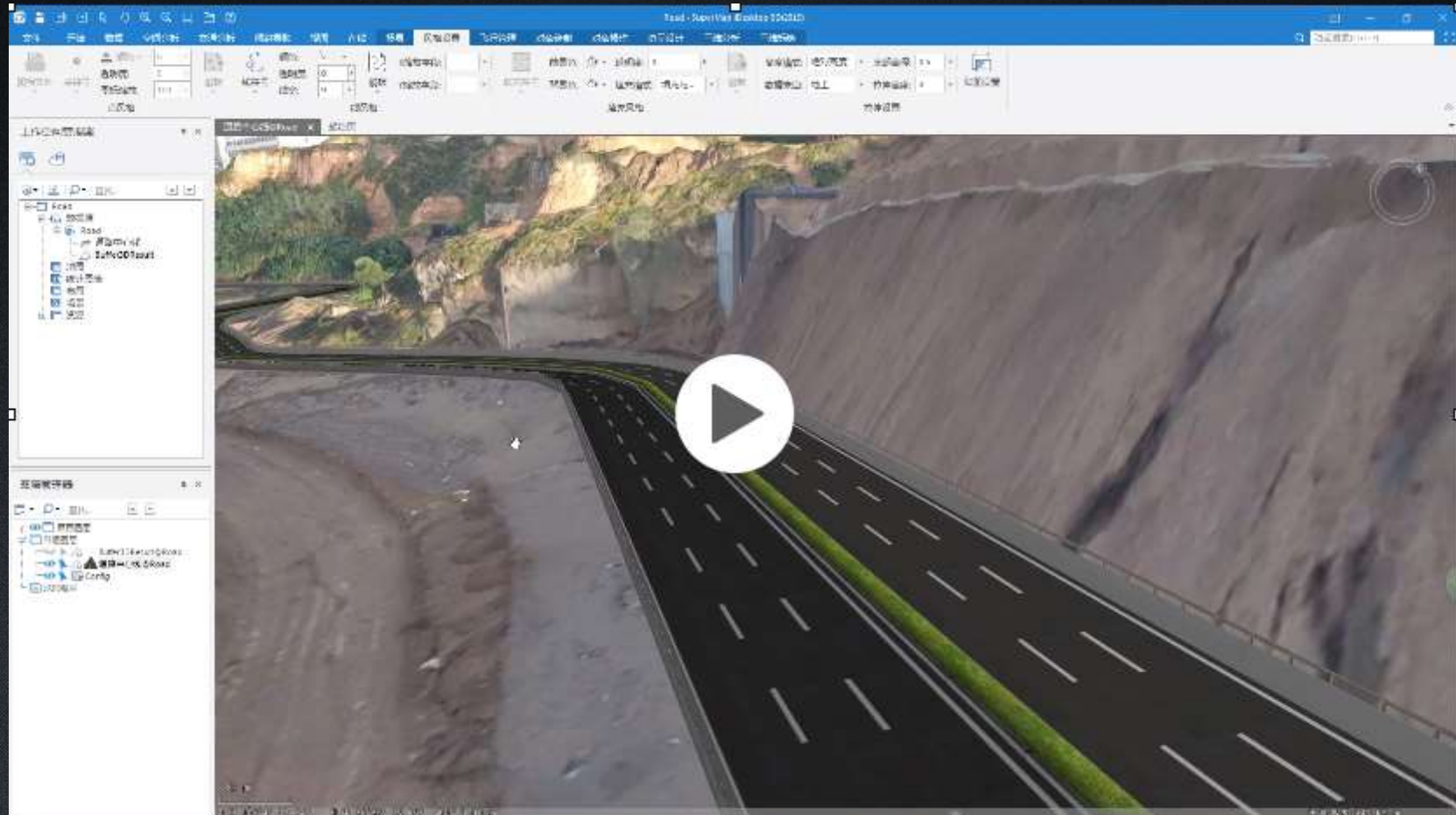
2D Pipeline 3D Pipelines Symbols



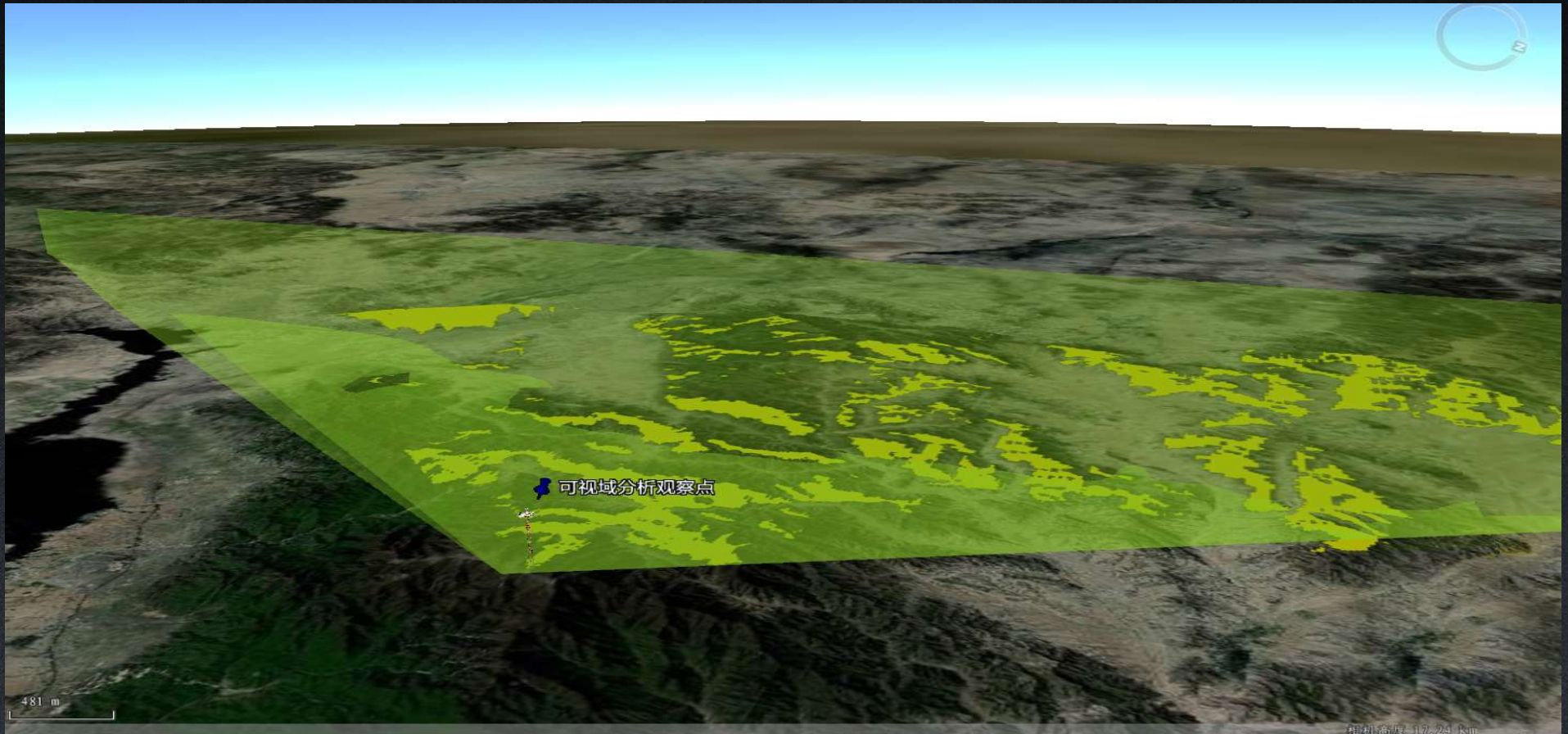
Analysis integration -- Buffer Analysis



Analysis Integration—Build 2D Road on 3D Model



Analysis integration -- Terrain Analysis





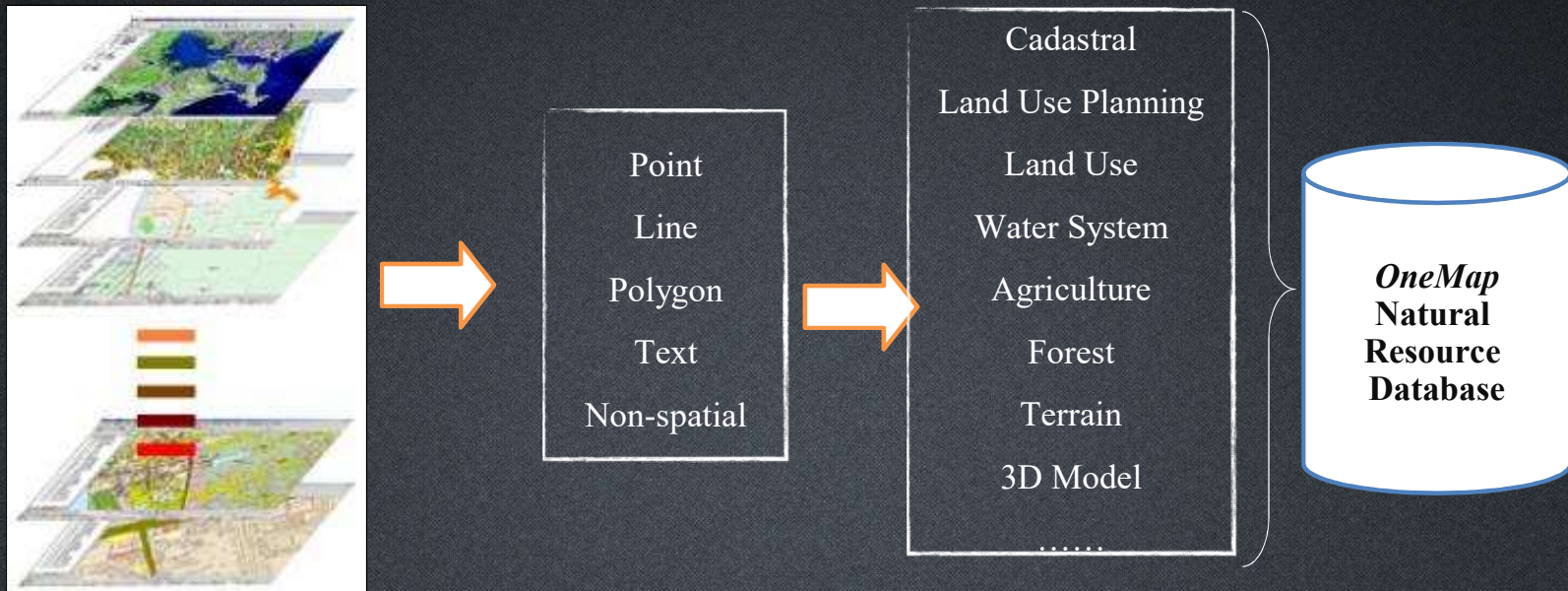
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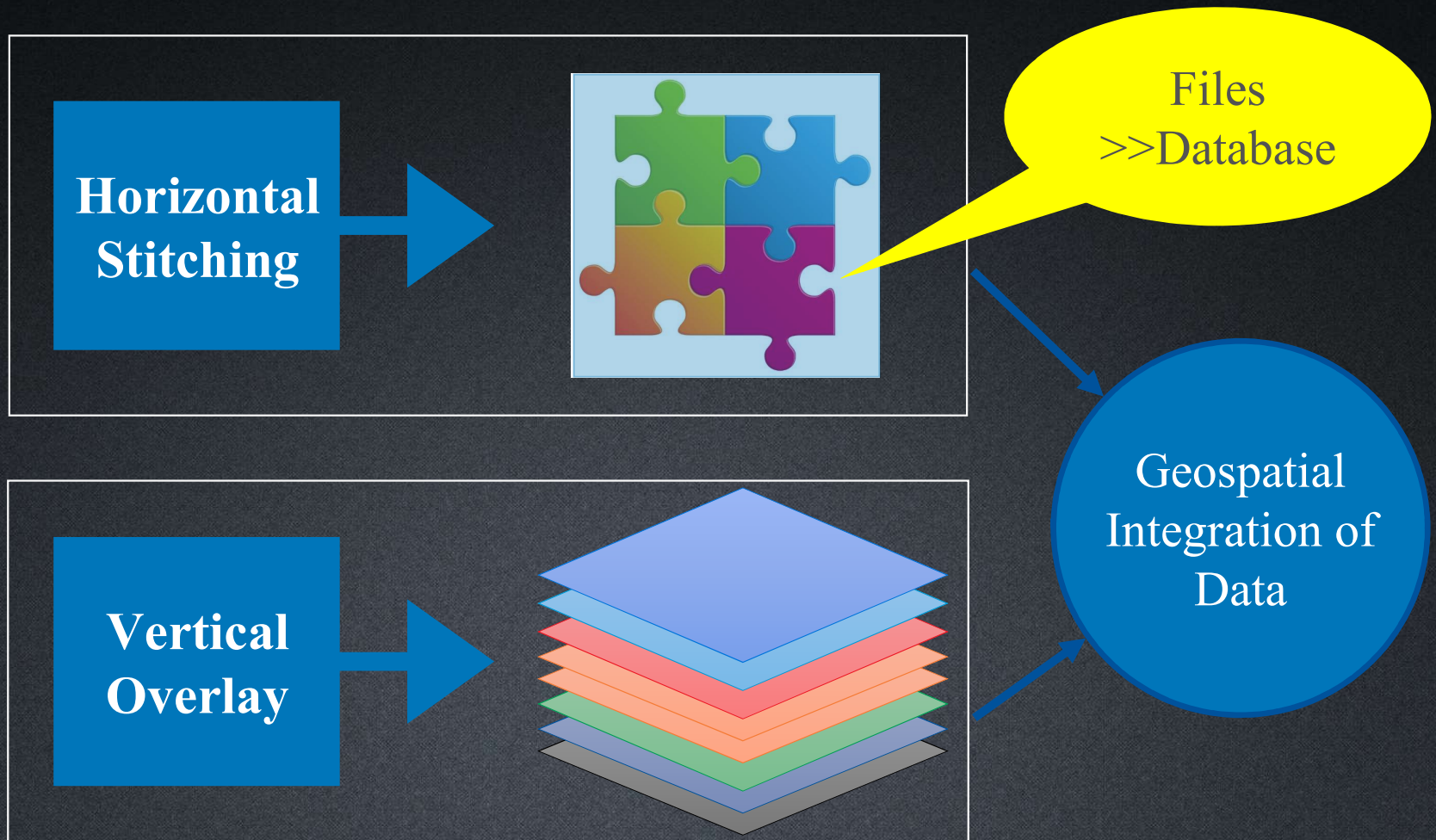
3. SuperMap OneMap Solutions

Core Idea—*OneMap*

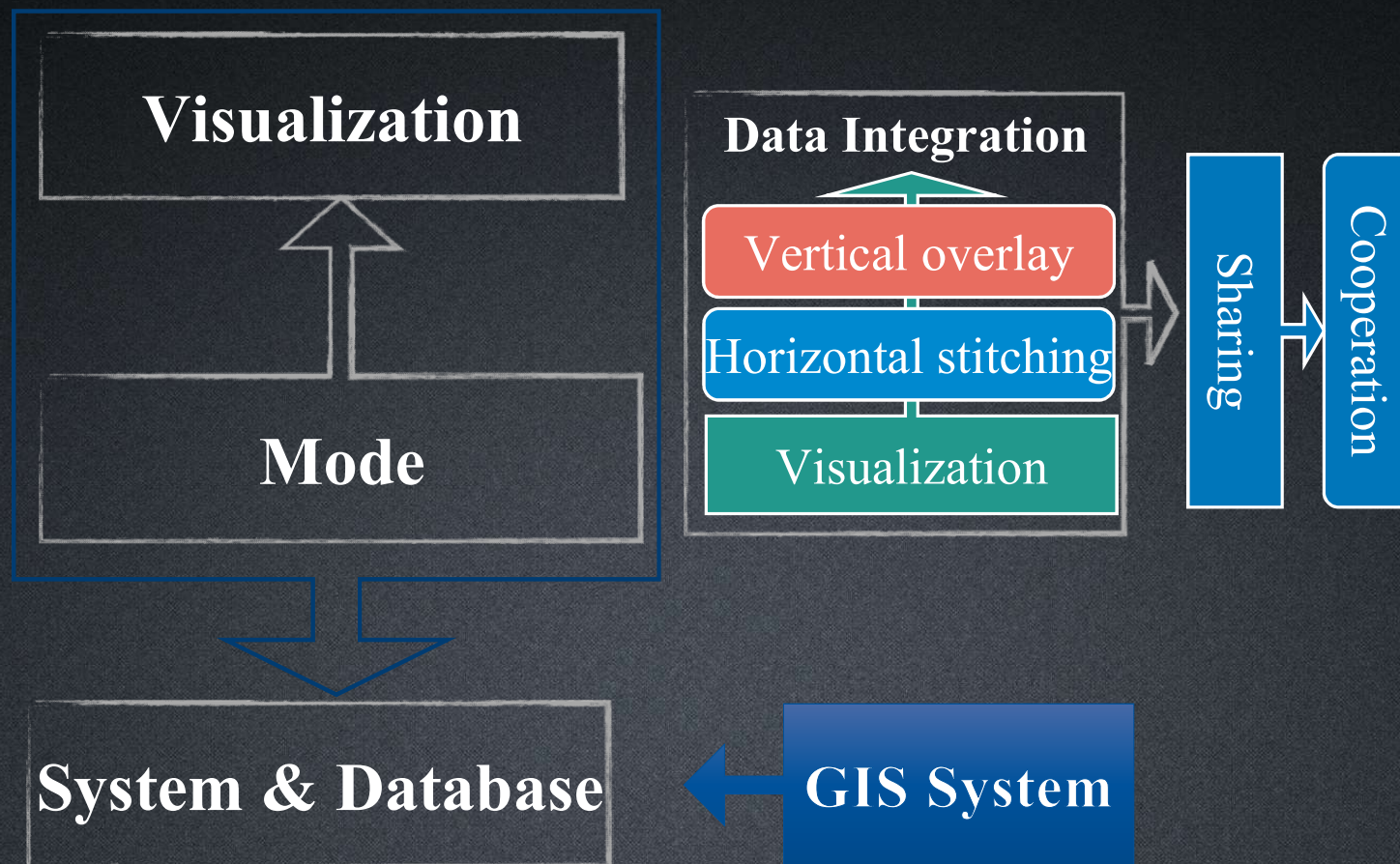
- Build business database according to “OneMap” standards
 - Unified coordinate system, unified data format, uniform classification and coding, unified naming rules.



The Geospatial Integration of Data



Three Levels of *OneMap*



The Problems

01

Disunity
in Data

02

Isolation

03

Separation of
Spatial Data
and Industrial
Data

04

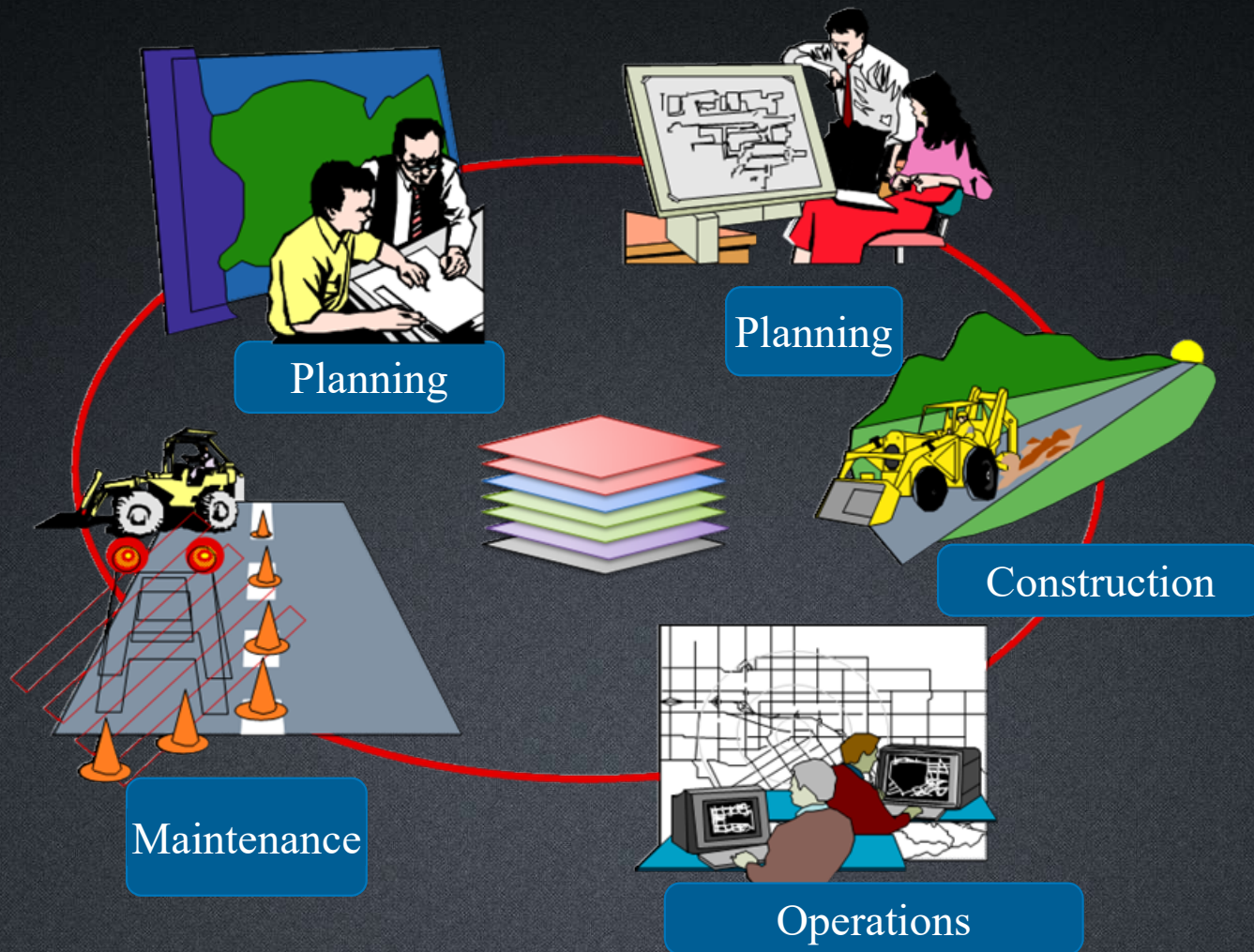
No Big
Data
Application

05

More
Profession
Less
Supervision

Land OneMap

Full Life Cycle Dynamic Management of *OneMap*



Application Platform & Solutions for Different Industries



International Applications



Many National Government Projects

National Development and Reform Commission	National Administration of Surveying, mapping and Geoinformation
China Earthquake Administration	China Meteorological Administration
Ministry of Culture of the People's Republic of China	Ministry of Housing and Urban Rural Development of the People's Republic of China(KOHURD)
State Administration of Work Safety; State Administration of Coal Mine Safety	State Administration of Cultural Heritage
National Bureau of Statistics of China	Ministry of Transport of the People's Republic of China
State Oceanic Administration, People's Republic of China	Ministry of Environmental Protection of the People's Republic of China
The State Administration of Radio, Film and Television	The Ministry of Water Resources of the People's Republic of China
State Forestry Administration, P. R. China	Ministry of Health of the People's Republic of China



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OneMap



Land Use



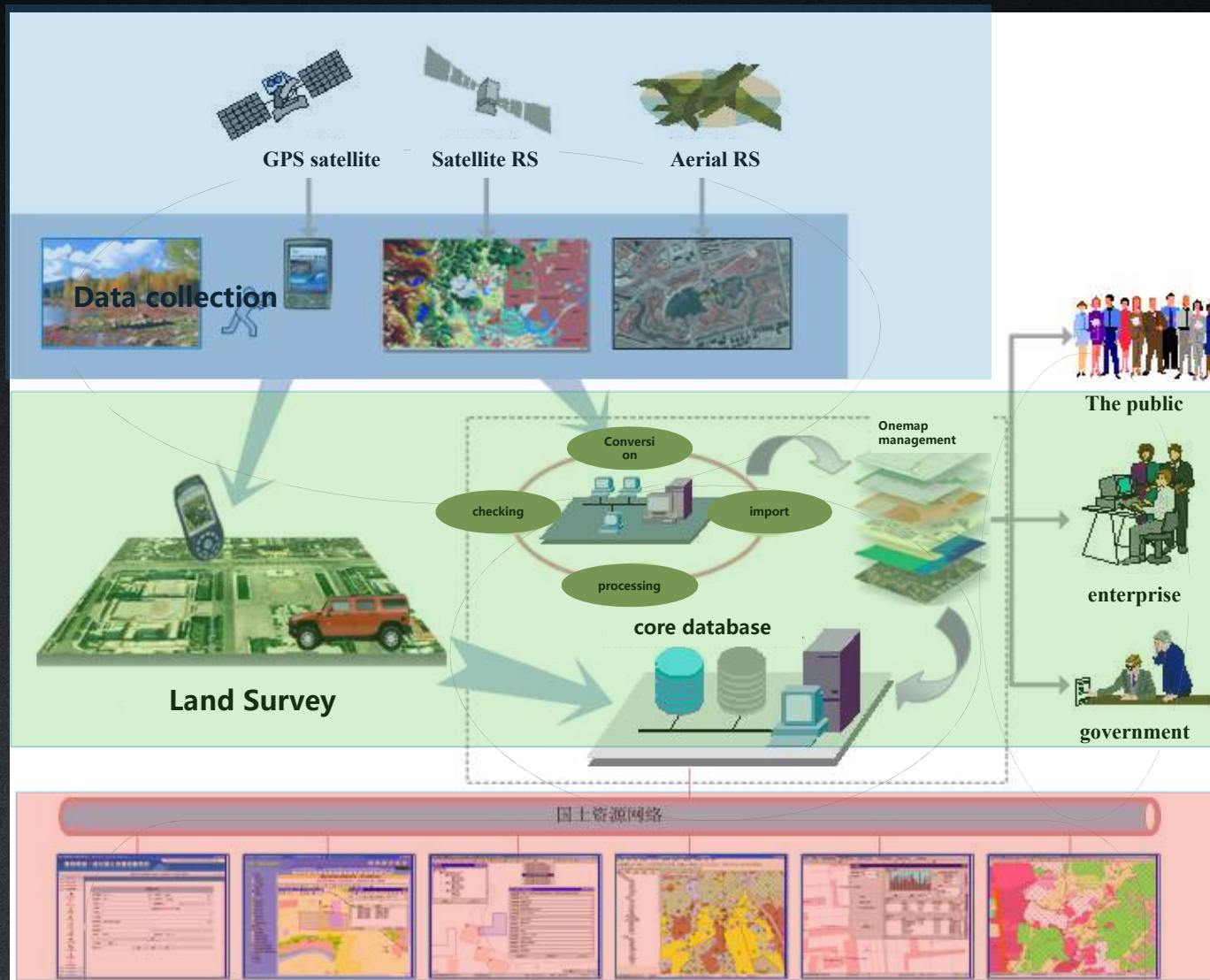
Water System



Agriculture



3.1 Land Use



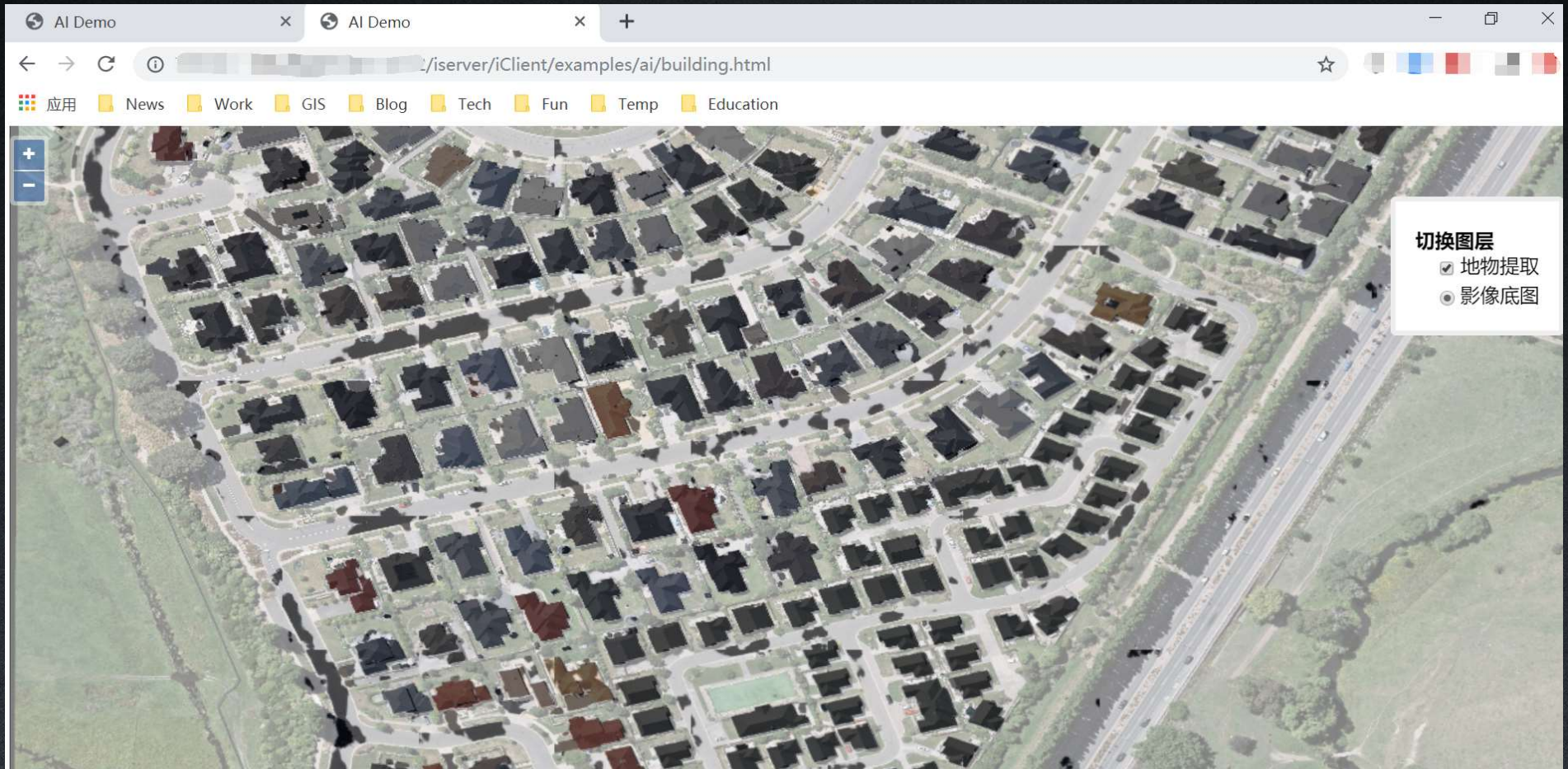
Data Collection

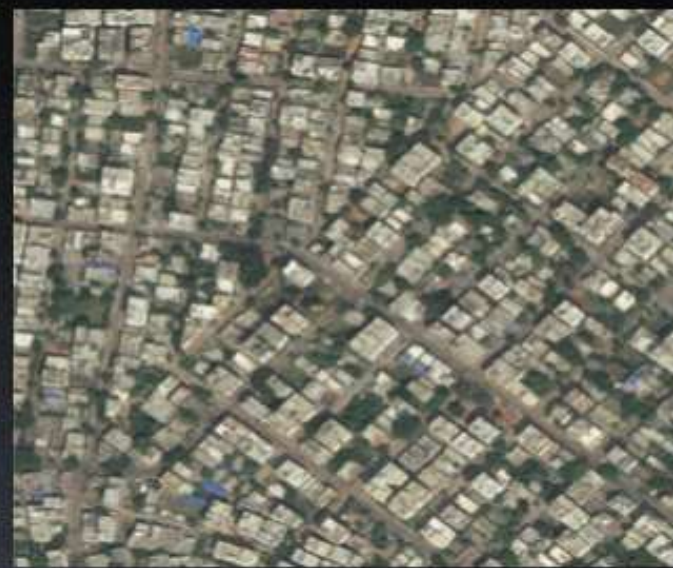
Information Management

Application

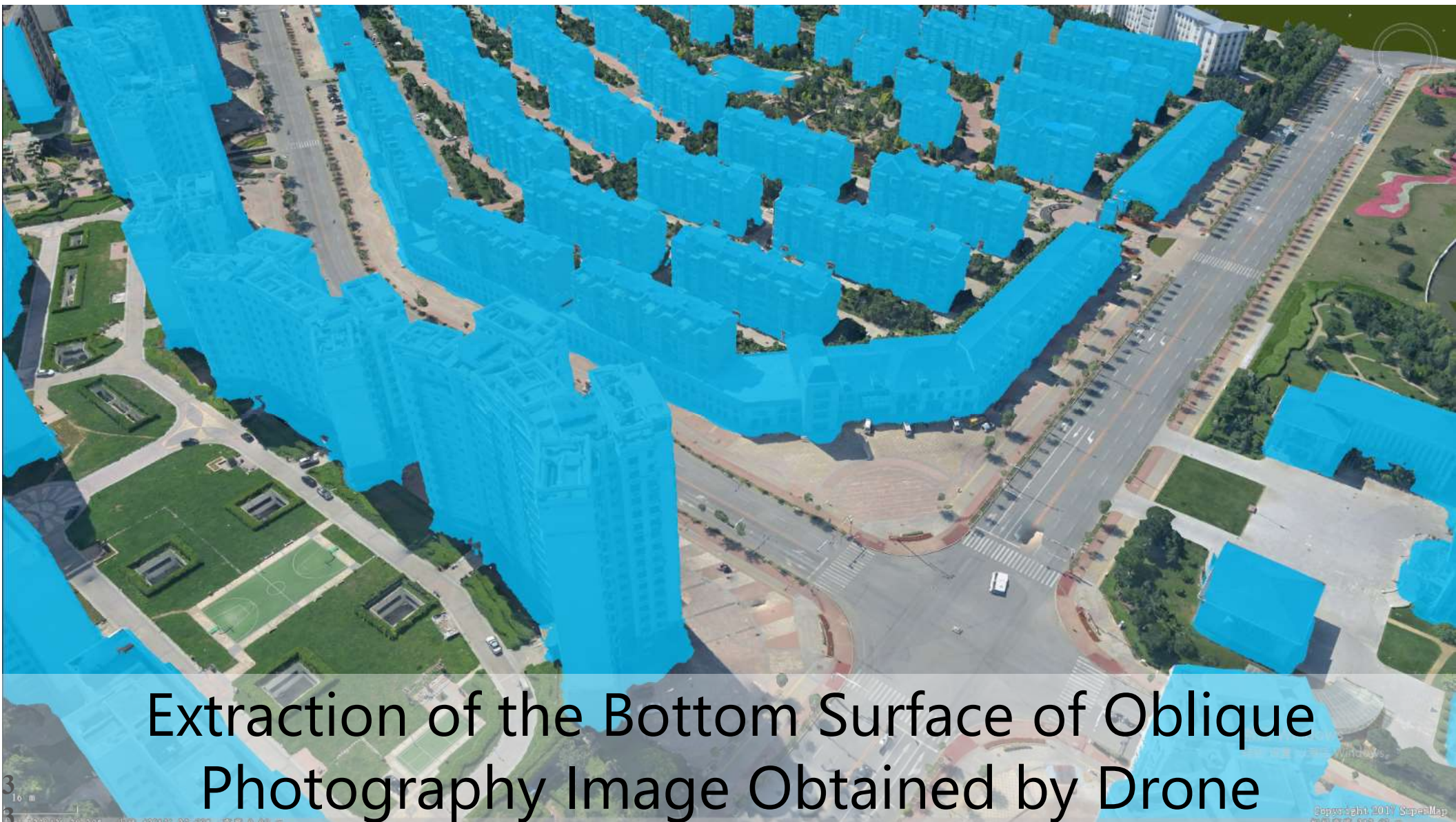
Framework ↔

Building Detection on Remote Sensing Images





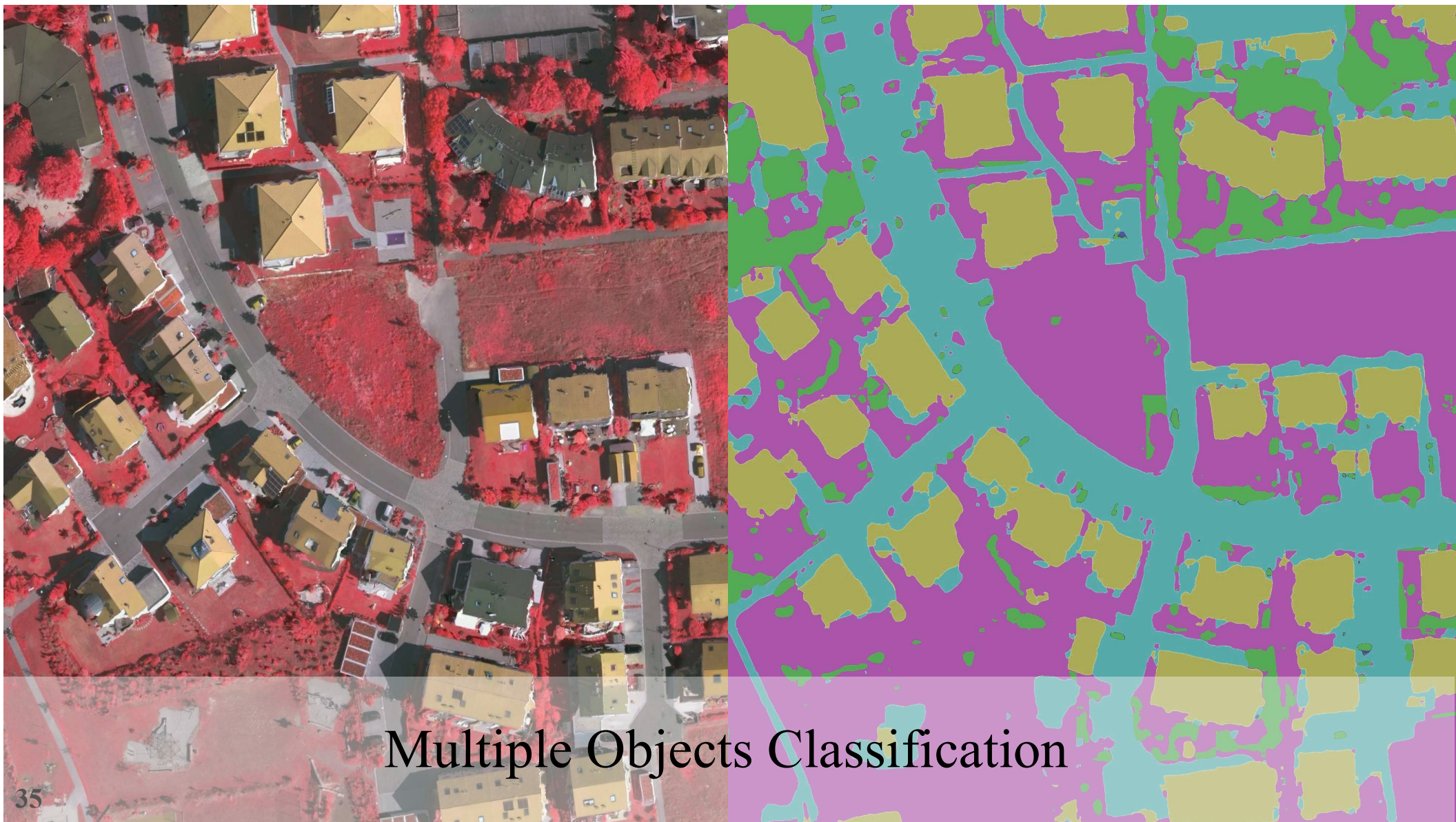
Road Extraction on Satellite Image



Extraction of the Bottom Surface of Oblique
Photography Image Obtained by Drone

Feature Classification: Land Use Classification on Remote Sensing Images





Multiple Objects Classification

Multiple Objects Detection Based on Remote Sensing Image Classification



- IOU(Intersection-Over-Union)

$\text{IOU} = \text{Intersection Area} / \text{Union Area}$

$\text{IOU} = 0.5163$

Database Construction Process

Establishment of relevant technical standards and specifications

Data synchronism

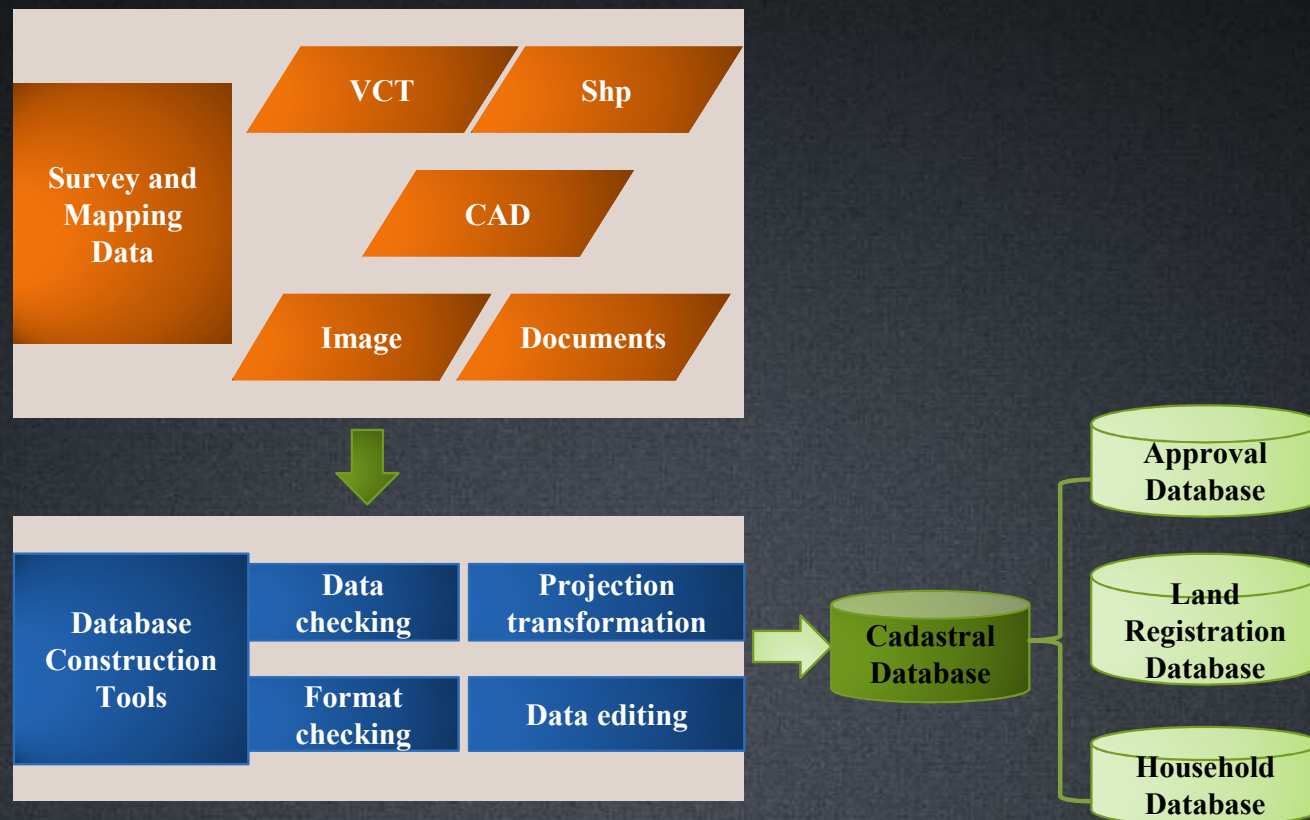
Data integration

Develop database management system

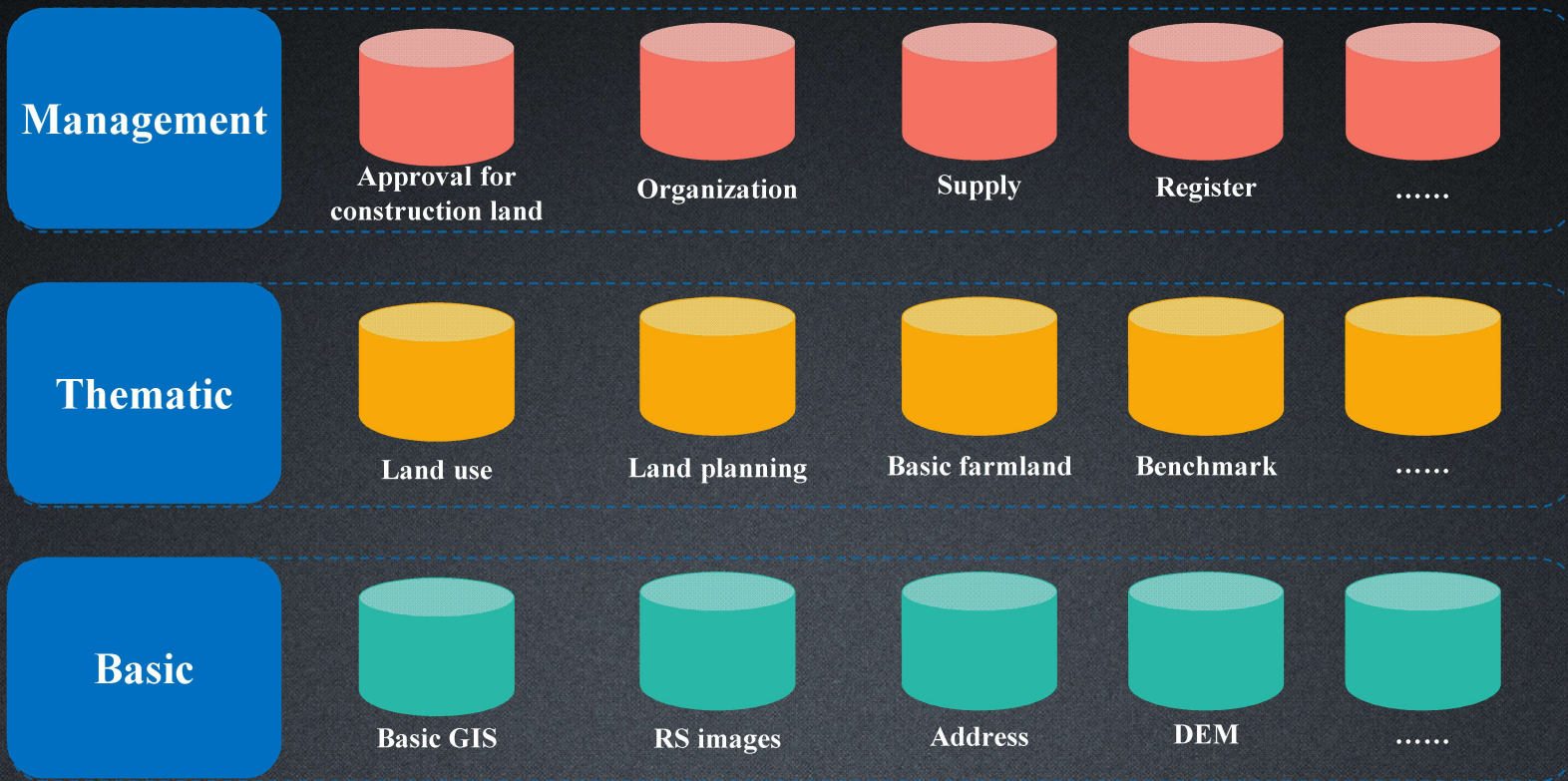
Form data management and updating mechanism

Establish data running environment

Database Construction



Core Database

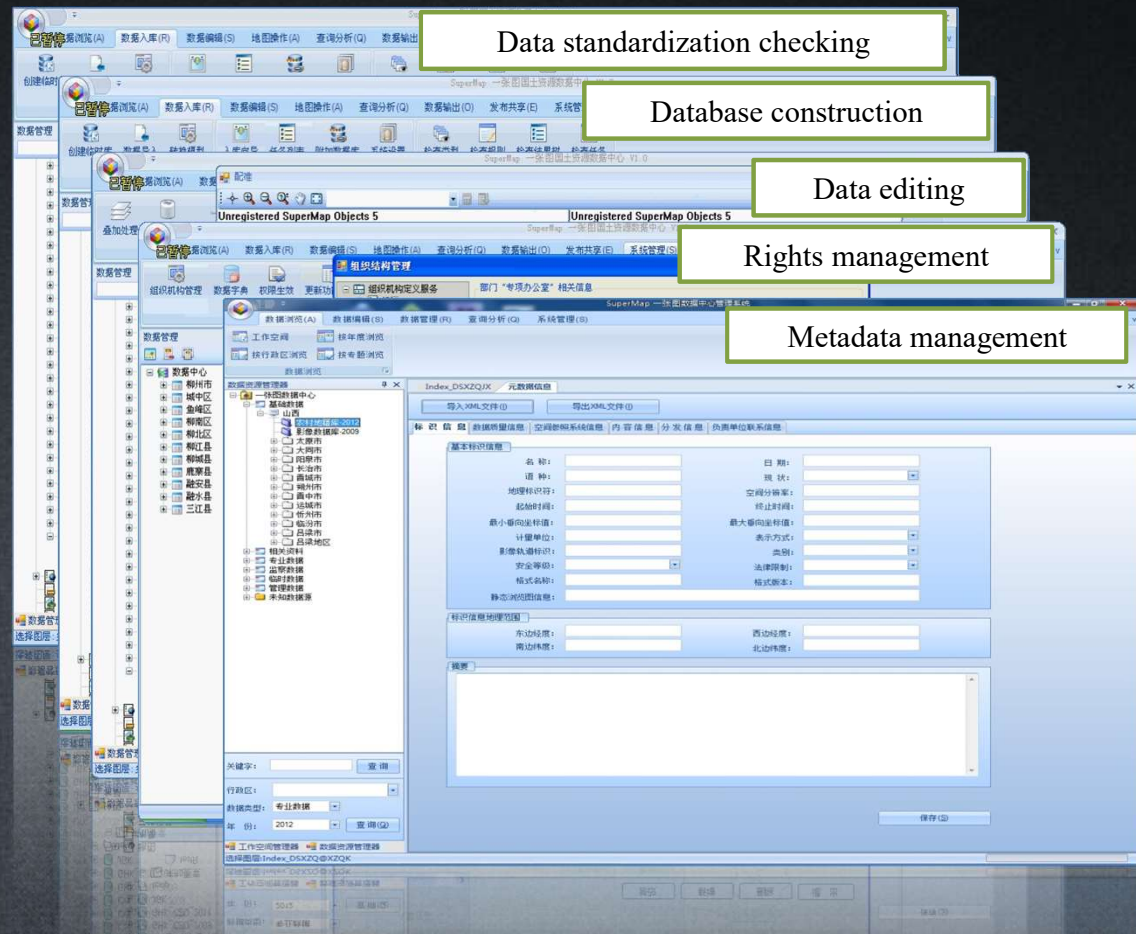


United standard of spatial location, classification & encoding, data format

Database Management

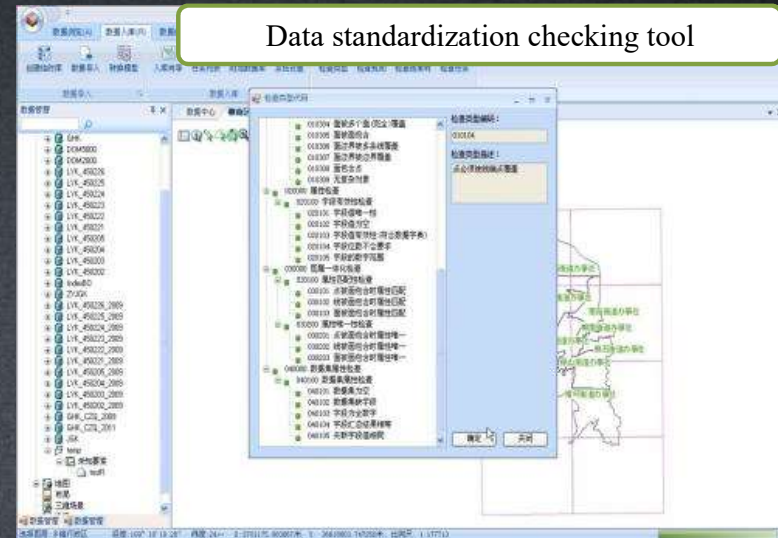
System Functions

- Data editing
- Data quality check
- Query and statistics
- Mapping management
- Report management
- Image management
- Rights management
- Metadata management
- ...



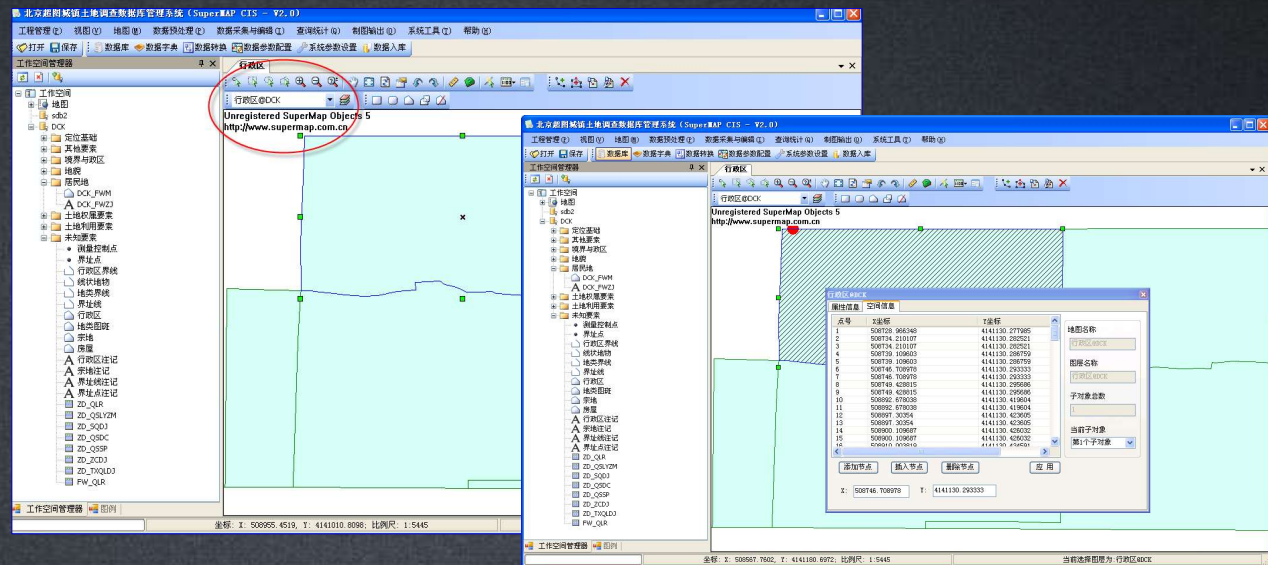
Data Quality Check

- Topology check
- Support custom topology rules
- Support graphical and attributes consistency check
- ...



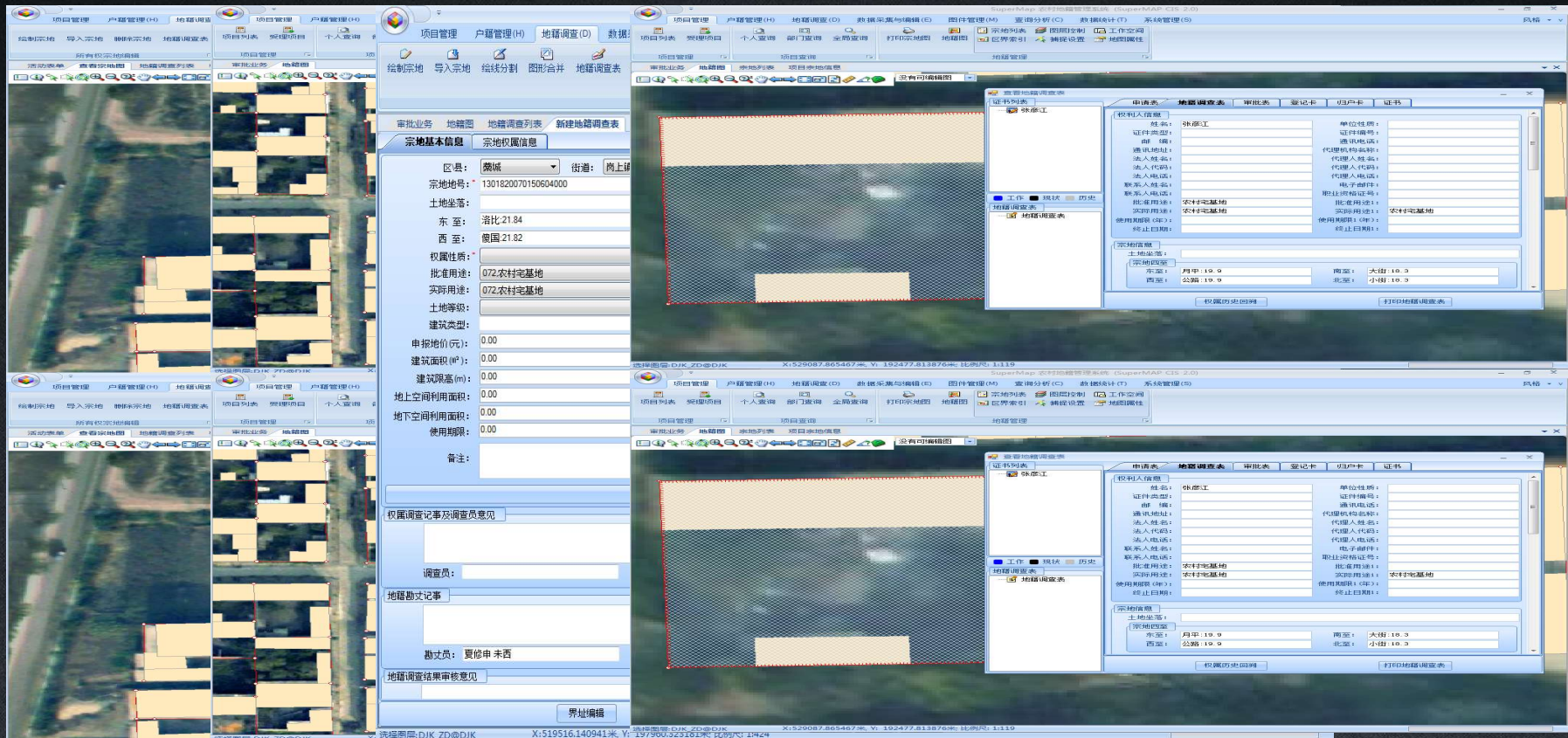
Data Editing

- Spatial data editing
- Attribute editing
- Input attribute value, generate attribute data, maintain attribute fields
- Input archive data



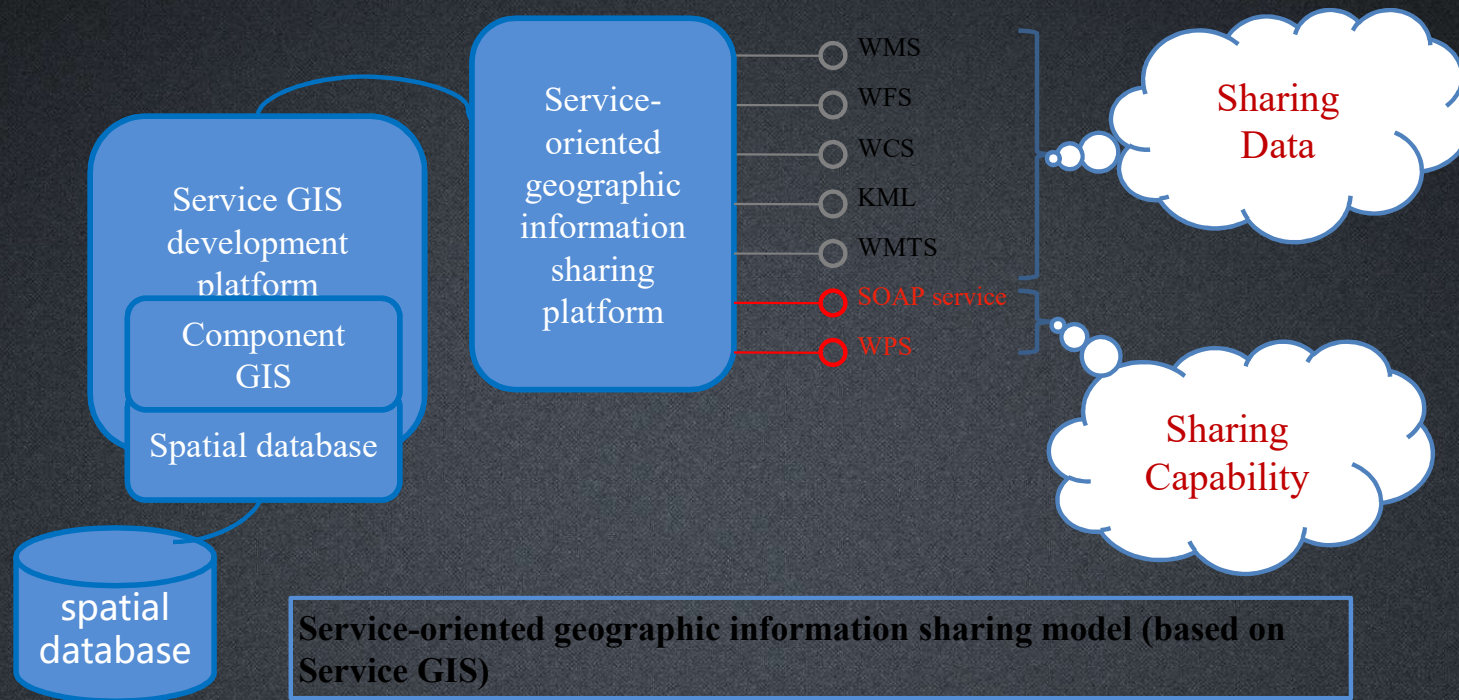
Data Change

- Graphics input and editing
- Attributes input



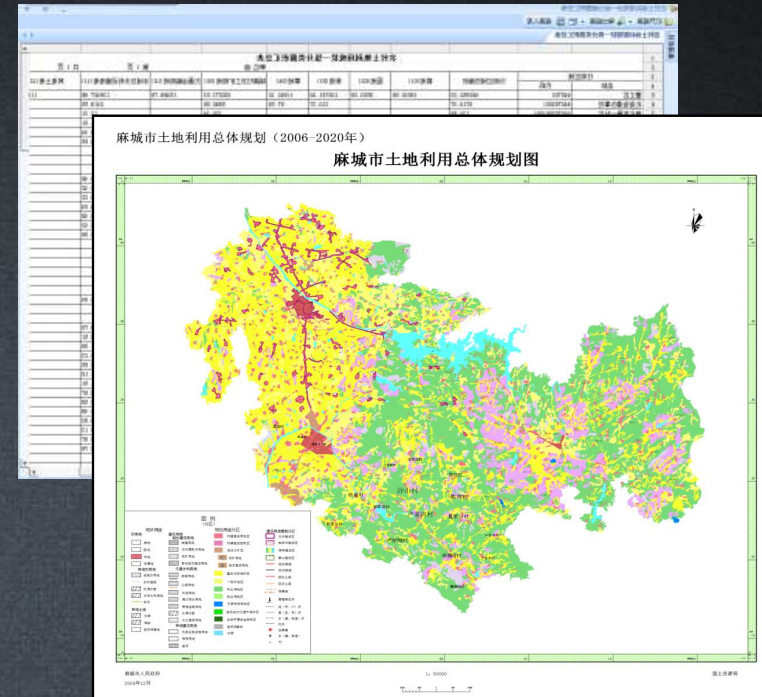
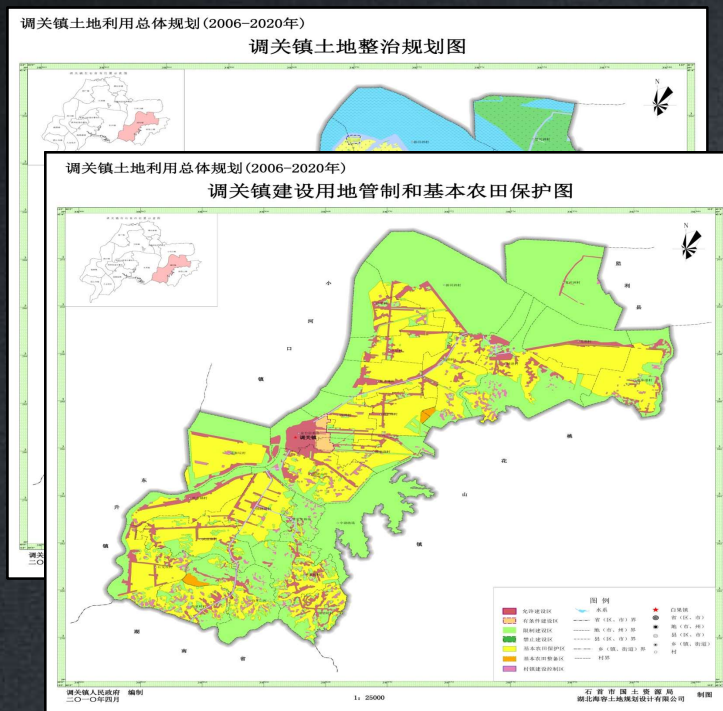
Data Sharing

Provides a wide range of Web services or OGC standard services based on *OneMap* core database in data center, so that various business departments, other business units and subordinate business units can use the sharing services.

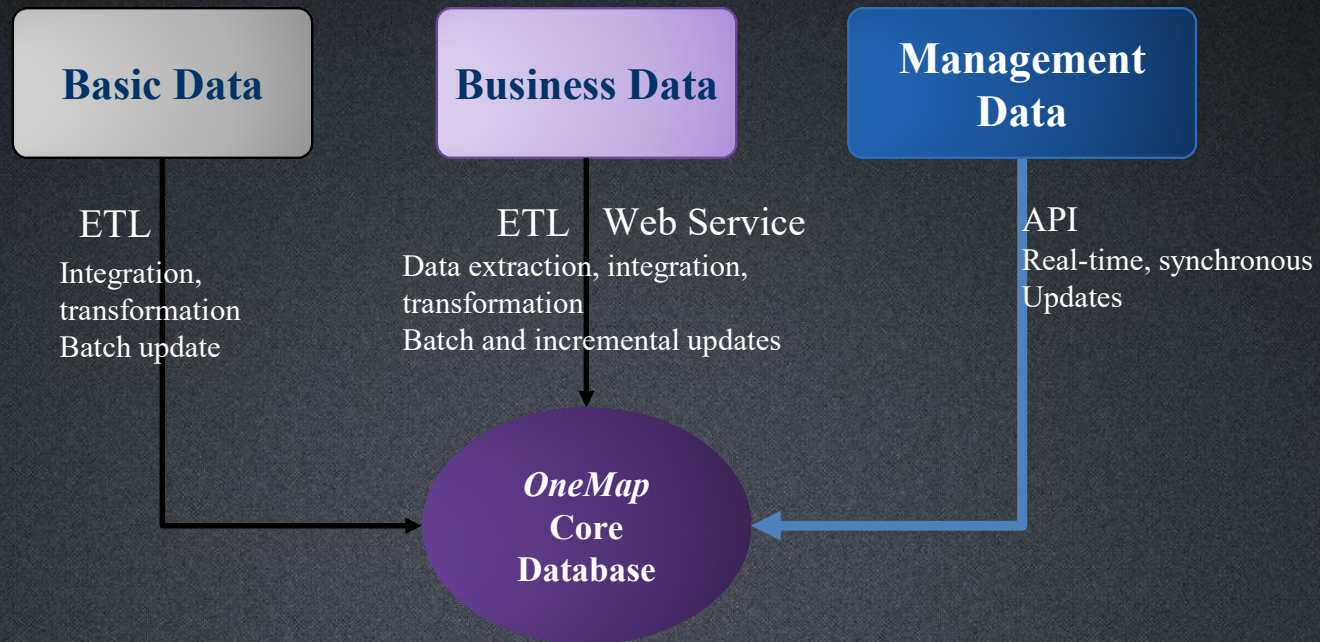


Results Output — Maps and Reports

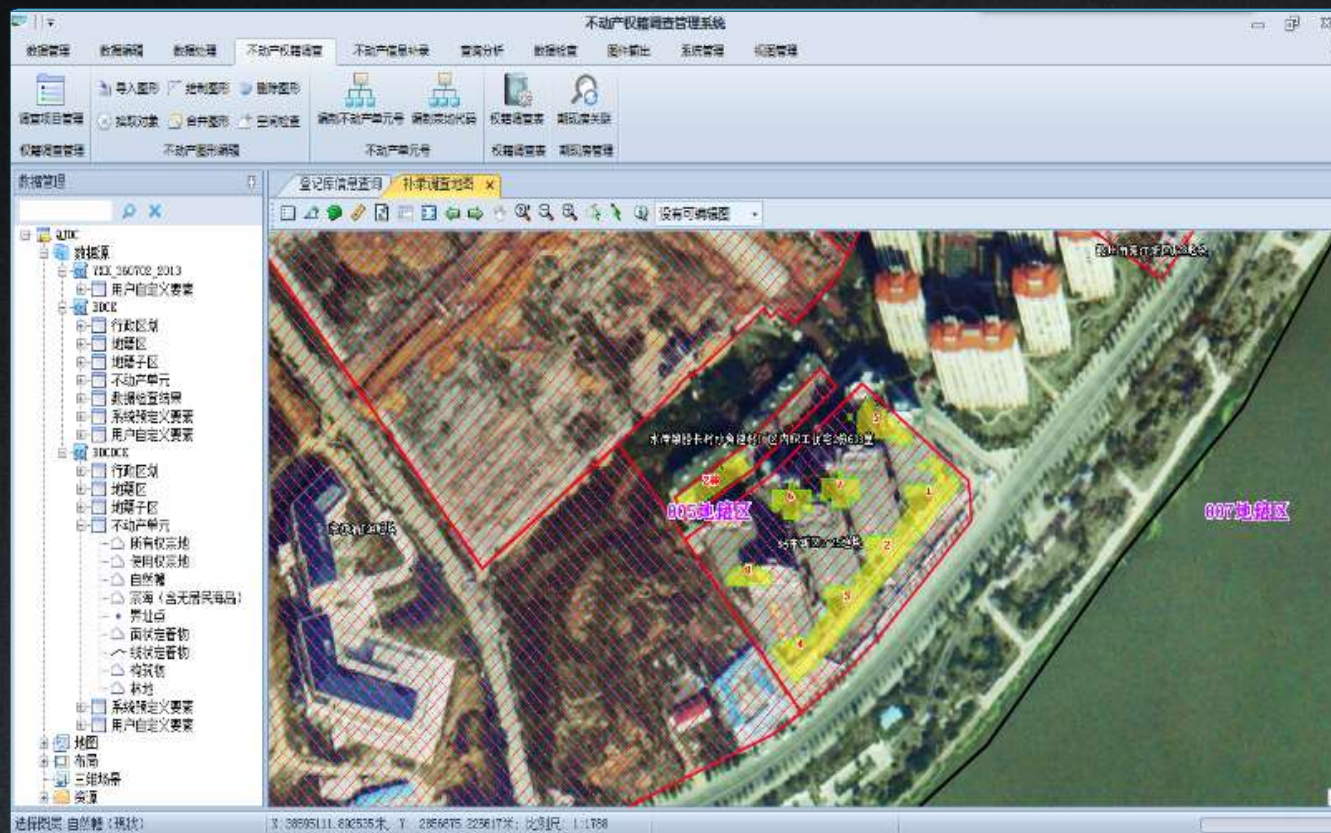
- Provide statistical charts output function
- Output maps by administrative district, map sheet, any range at any scale



Data Submission and Updates



Land Rights Management



Right data management

Right data editing

Right data processing

Right data checking

Visualization management

Unified coding

Data query and statistics

Mapping and output

Data Update Frequency

Database	Data source	Data Update
Land registration database	City and county land registration business	Real-time
Construction land database	Provincial, city and county land approval business	Real-time

Process of Land Registration

Parcel number

Location

Boundary

Area

Ownership

Nature of ownership

Using purpose

Land type

Land price

Update time

...

活动表单

办理 转出 退办 直接驳回 跳转驳回 延期 挂起 转办 注销 项目信息 办理进度 返回业务箱

1301820050020023000转让-->[宅基地变更登记]->中心所科员初审

活动表单

- 项目基本内容
- 初审
- 项目资料
- 项目信息

项目名称: 1301820050020023000转 登记类型: 集体土地使用权变更登记 权属审核

宗地基本信息

宗地地号: 1301820050020023001 老宗地地号:

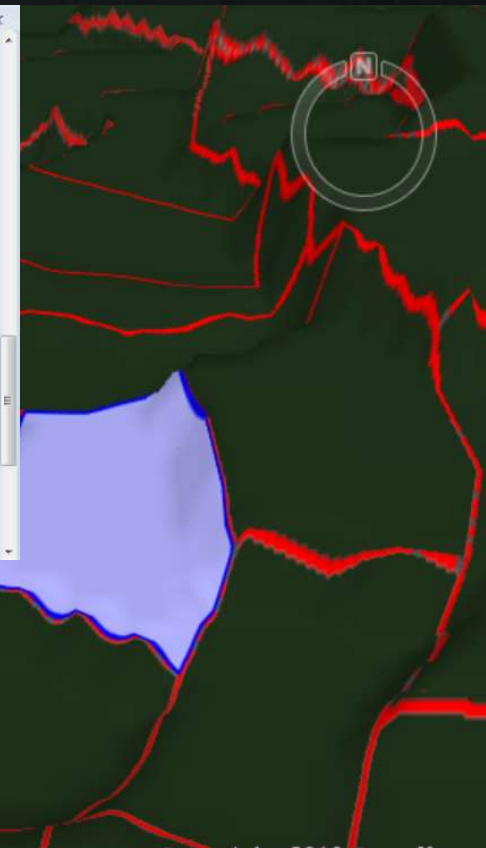
土地坐落: 权属性质: 40, 集体土地使用权

图斑编号: 批准用途: 072, 农村宅基地

宗地面积 (m²): 162.63 实际用途: 072, 农村宅基地

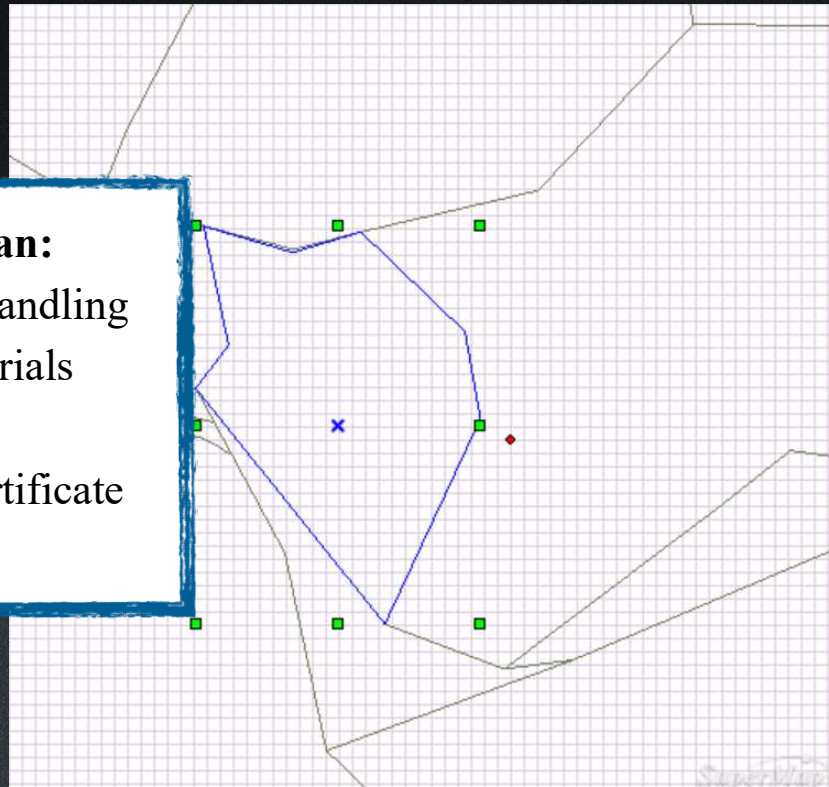
查看宗地

权利人	土地证号	使用权面积 (m²)	实际用途	楼层编号
转让人1		123.00	农村宅基地	1#单元2...



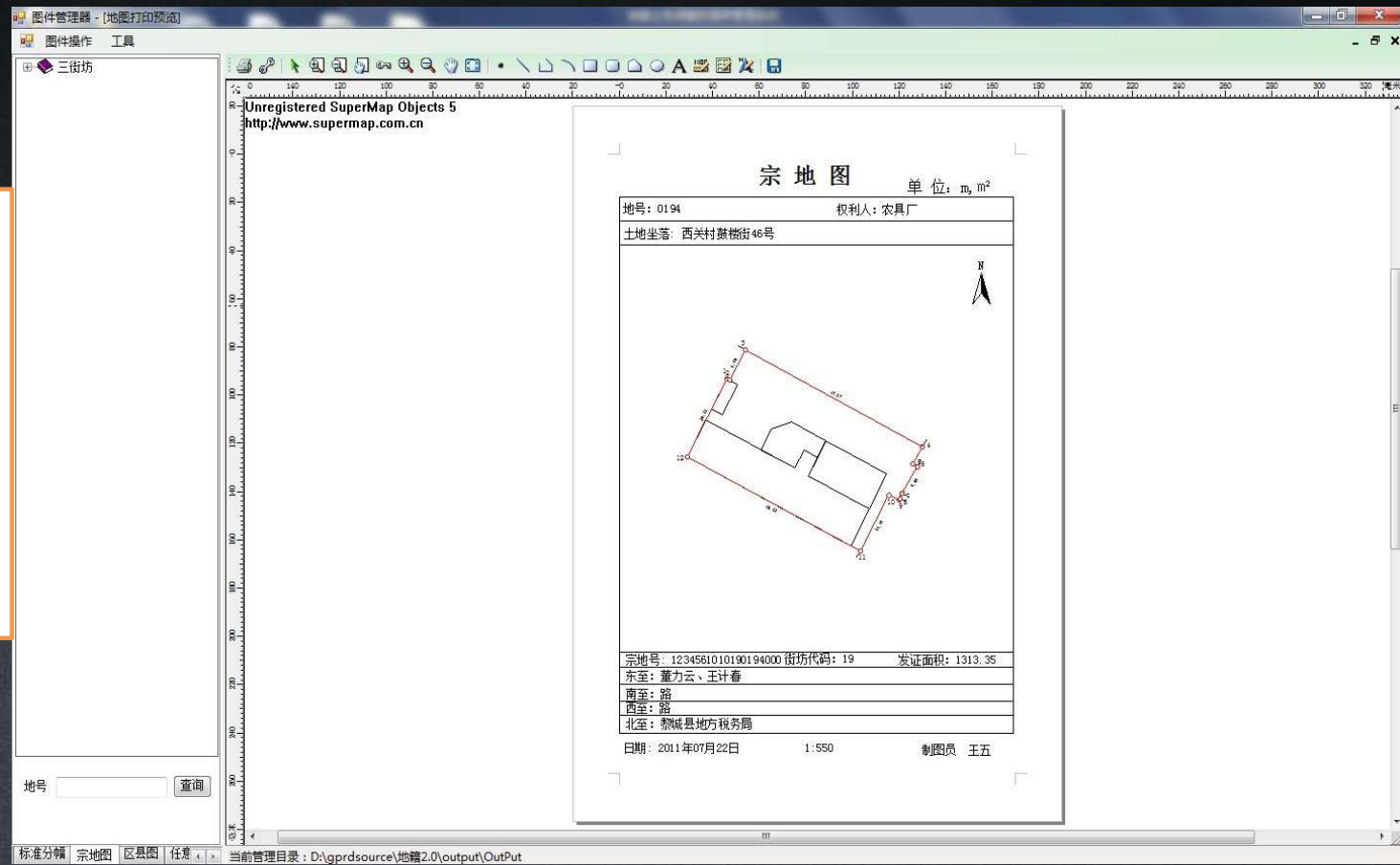
In this process, you can:

- Monitor business handling
- Query project materials
- Graphics editing
- Map output and certificate output



In this registration process:

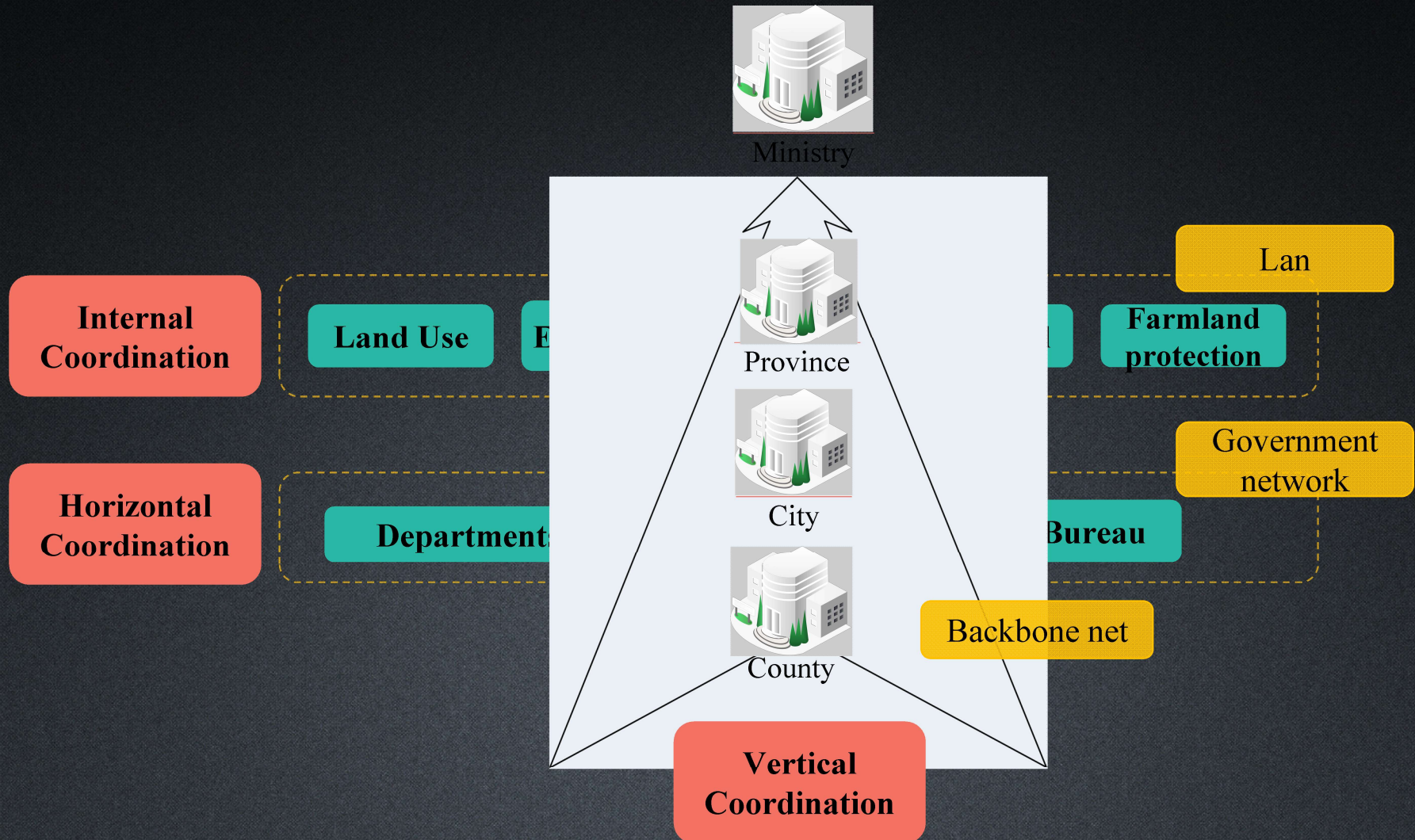
- Land certificate number generation
- Registration card production and printing
- Land certificate production
- Cadastral map printing
- ...



Data Source

Land Data	<ul style="list-style-type: none">✓ Land survey data✓ Cadastral survey data✓ "OneMap" resources✓ Surveying and Mapping CD✓ Archives achievement
House property data	<ul style="list-style-type: none">✓ Transaction registration data✓ Archives achievement

Internet Coordination Under Multi-management



Natural Resources Information Service Development

- Offers both government and the public the land information through Internet, touch screen, big screen, SMS services, social media, etc.



SuperMap Land E-government Platform

- Organization Modeling: Land units, personnel, roles, authority can be flexibly customized

Organization Definition

Staff "C" related information

Basic Information

Name	C	No.	
Status	在岗	Work Status	优秀
Start Time	2013年12月 6日	End Time	2013年12月17日
Staff Code		Birthday	2008年 1月 1日
Mobile Phone		Office Number	
Contract Address		Photo	
Contract Number		Password Sett	
E-Mail			
Certificate Number			
Description			

Department

Name	Description
国际	

Role

Name	Name	Department or Role	Description
国际	审核审批人		

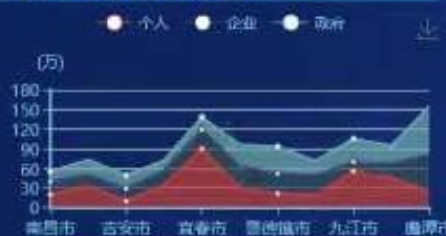
Modify Create Delete Exit

JiangXi Real Estate Registration Platform

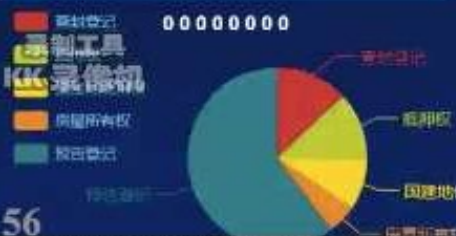
不动产监控



不动产权利人总数统计



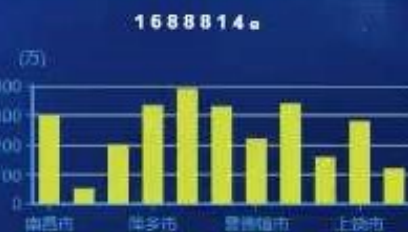
不动产权利总数统计



增量数据接入

江西南昌县	权/房屋所有权	首次登记
江西省南昌	国有建设用地使用权/房屋所有权	首次登记
江西省赣州	国有建设用地使用权/房屋所有权	首次登记
江西省吉安	国有建设用地使用权/房屋所有权	首次登记

不动产单元总数统计

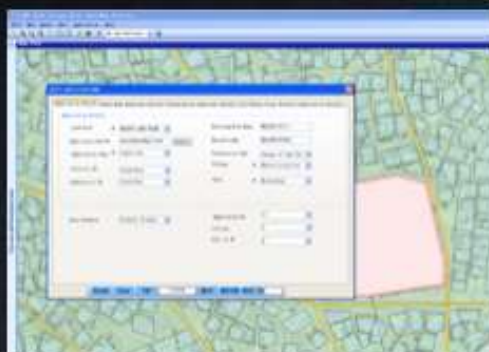


存量数据入库

行政区	总县数	整合县数
南昌	10	6
鹰潭	6	5
赣州	18	14
九江	12	9
上饶	9	5

Selected International Land Management Systems

Geographic Information System of
Ministry of Land and Housing of Botswana



Housing Management System for
Botswana



Mountain Development Supporting
System for Cuba



Laos Land Resource Information System



Land Property Management System
for Egypt



Japan Land Resource Information System



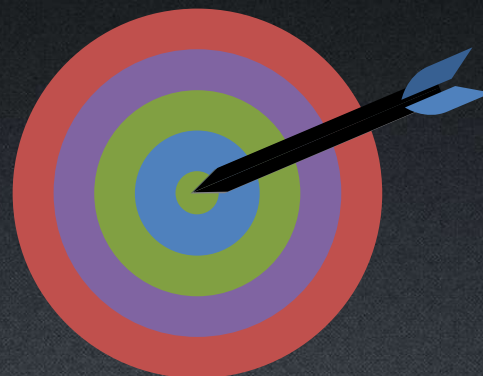


3.2 Water System

Current Condition

- ✓ **Low degree of data sharing**
The data resources are scattered, the data of each system is independent and can not be shared
- ✓ **Scattered informatization construction, difficult to integrate**
Water supply management system of each city is independent
- ✓ **High operation and maintenance costs**
High cost in data maintenance, interface program development, system operation and maintenance

Construction Goal



Smart Water-affair Management



**Automatic
control**



**Collaborative
management**

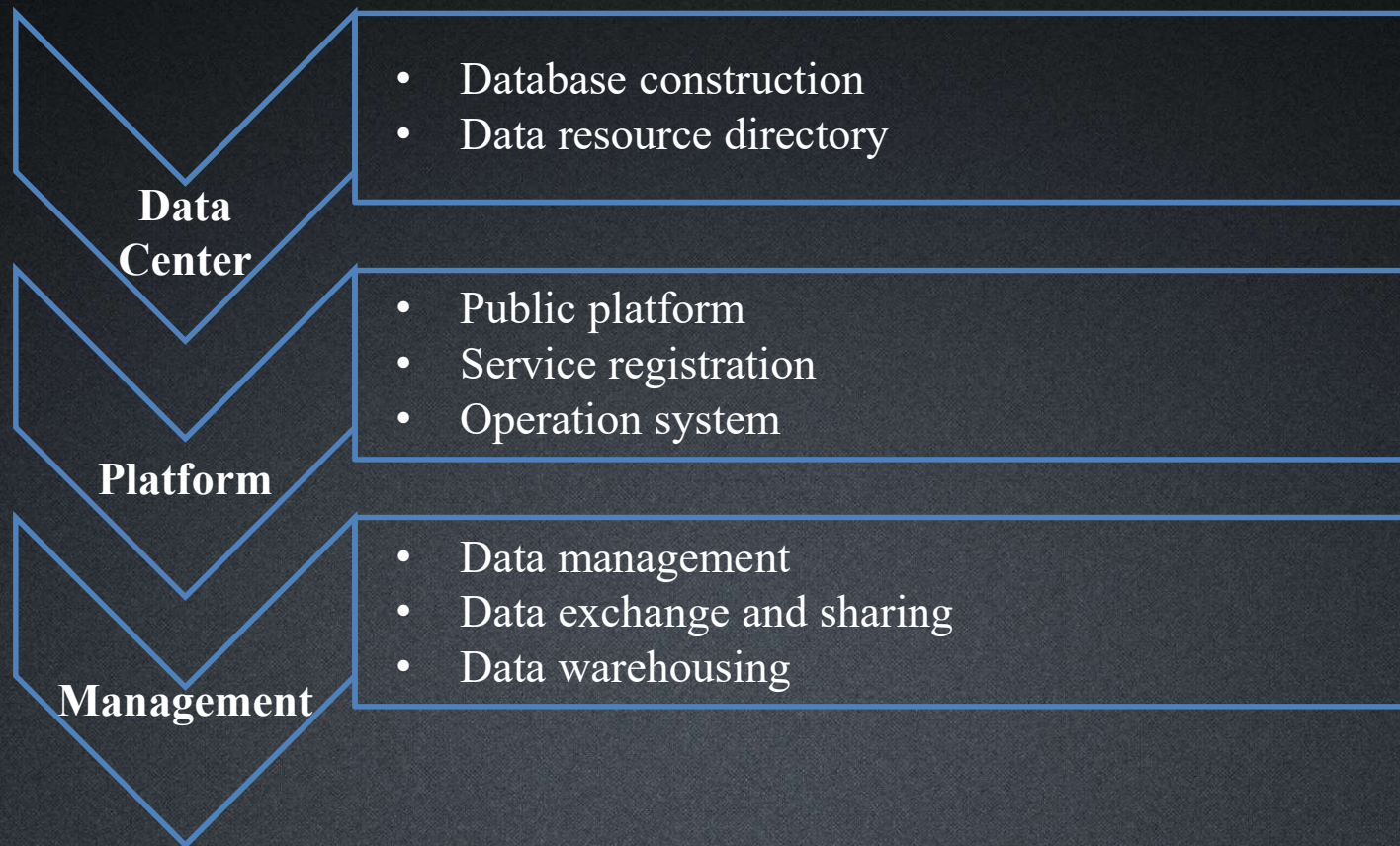


**Scientific
decision**



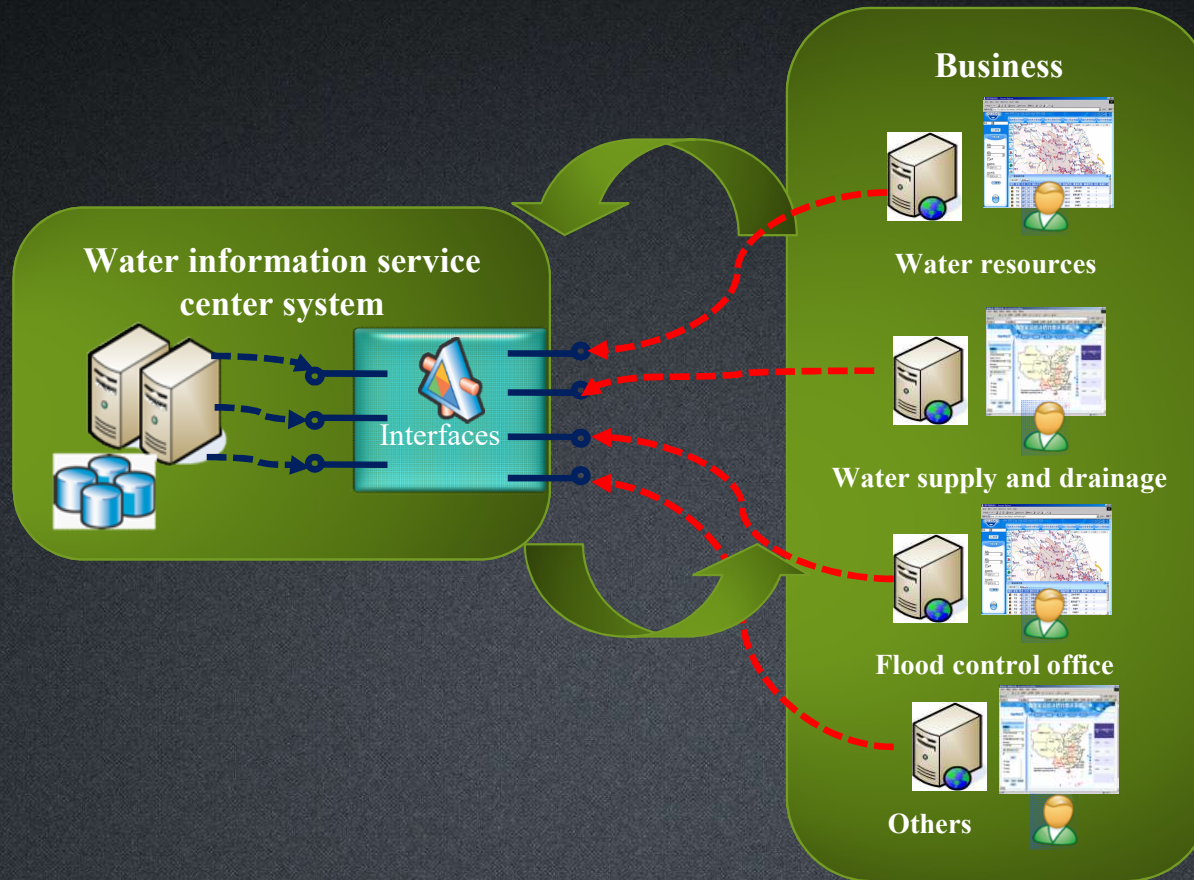
**Initiative
service**

Construction Content

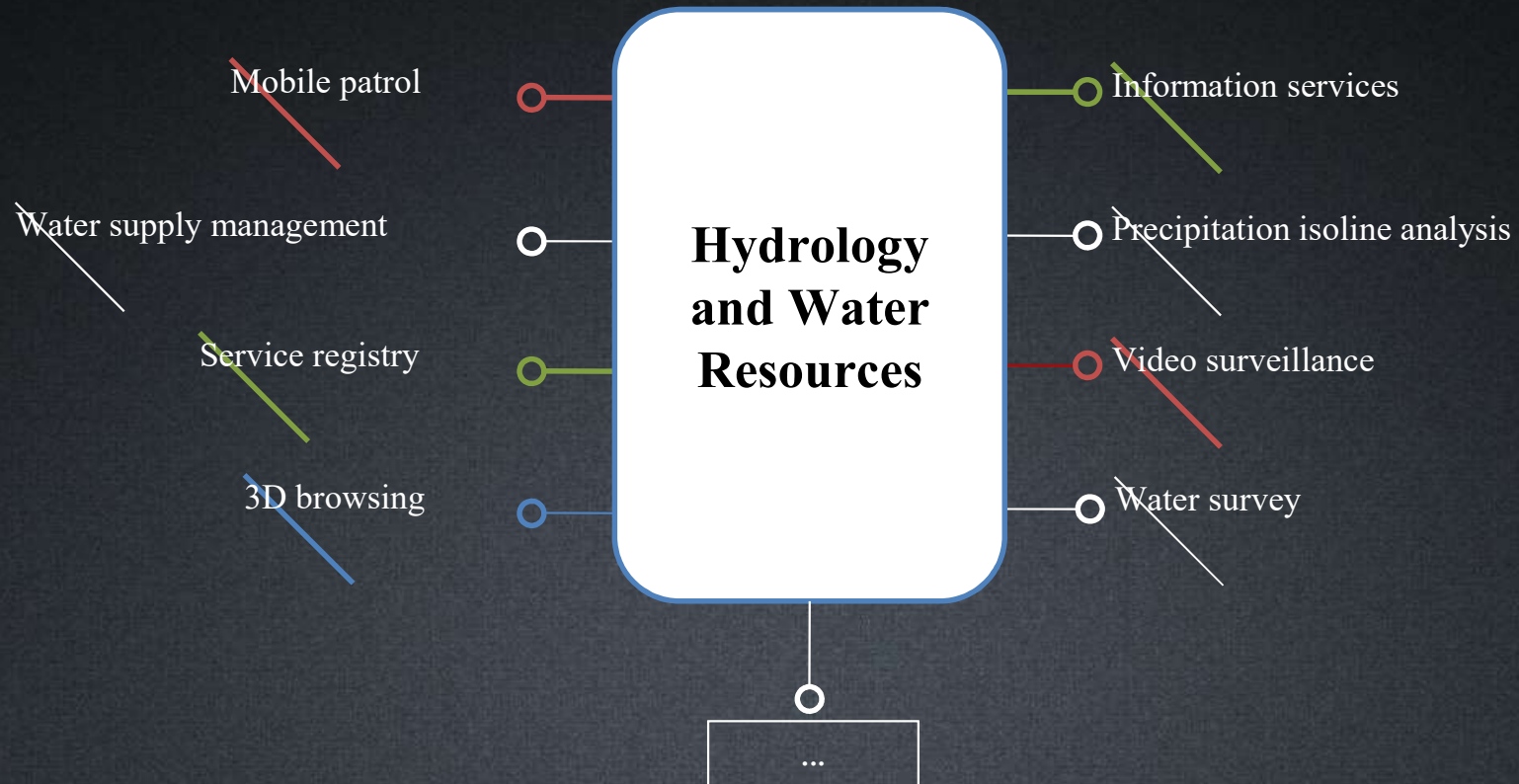


Technology Roadmap

The relation with other bussiness



Water Resources



Sewage Management Business

Urban Sewage Management System Portal

Sewerage user management

Sewerage pipelines management

Pump station management

Sewage treatment plants management

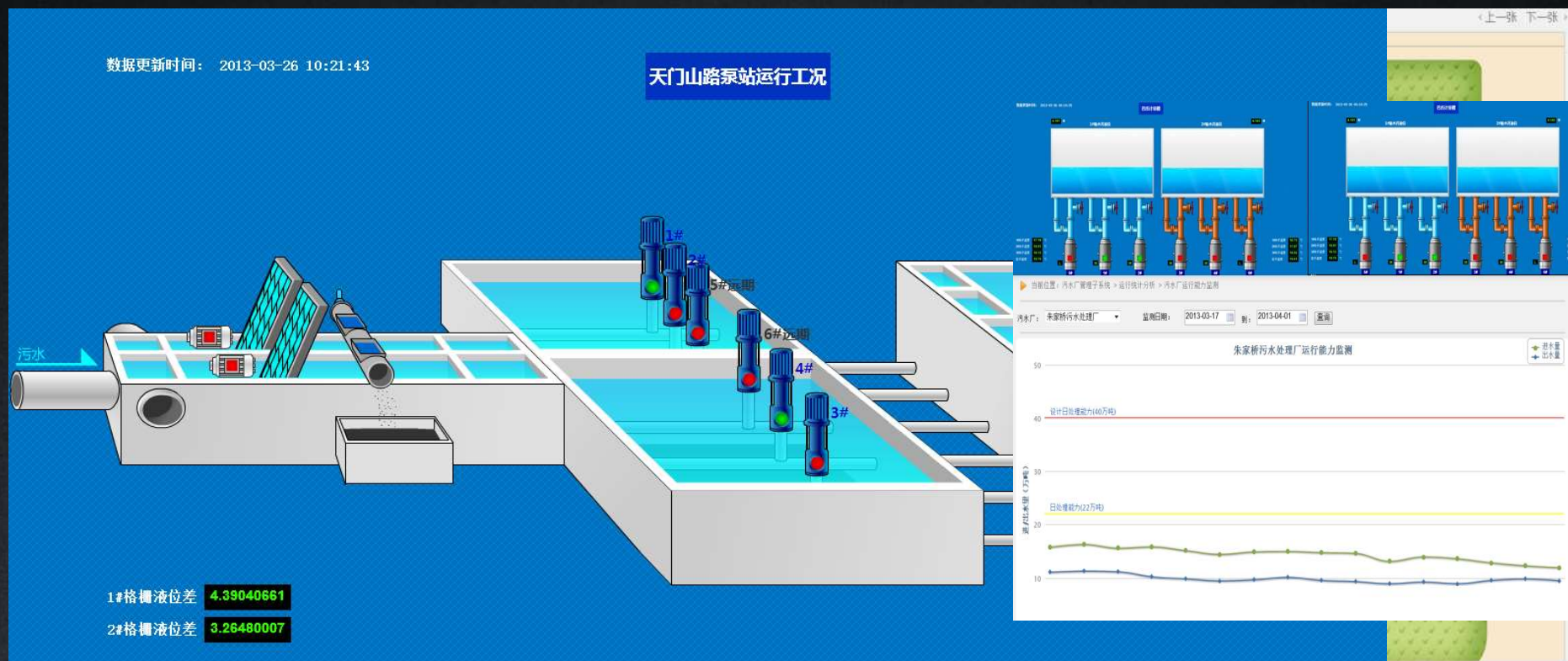
Supervision center

Mobile inspection

Operation management

Planning and decision support

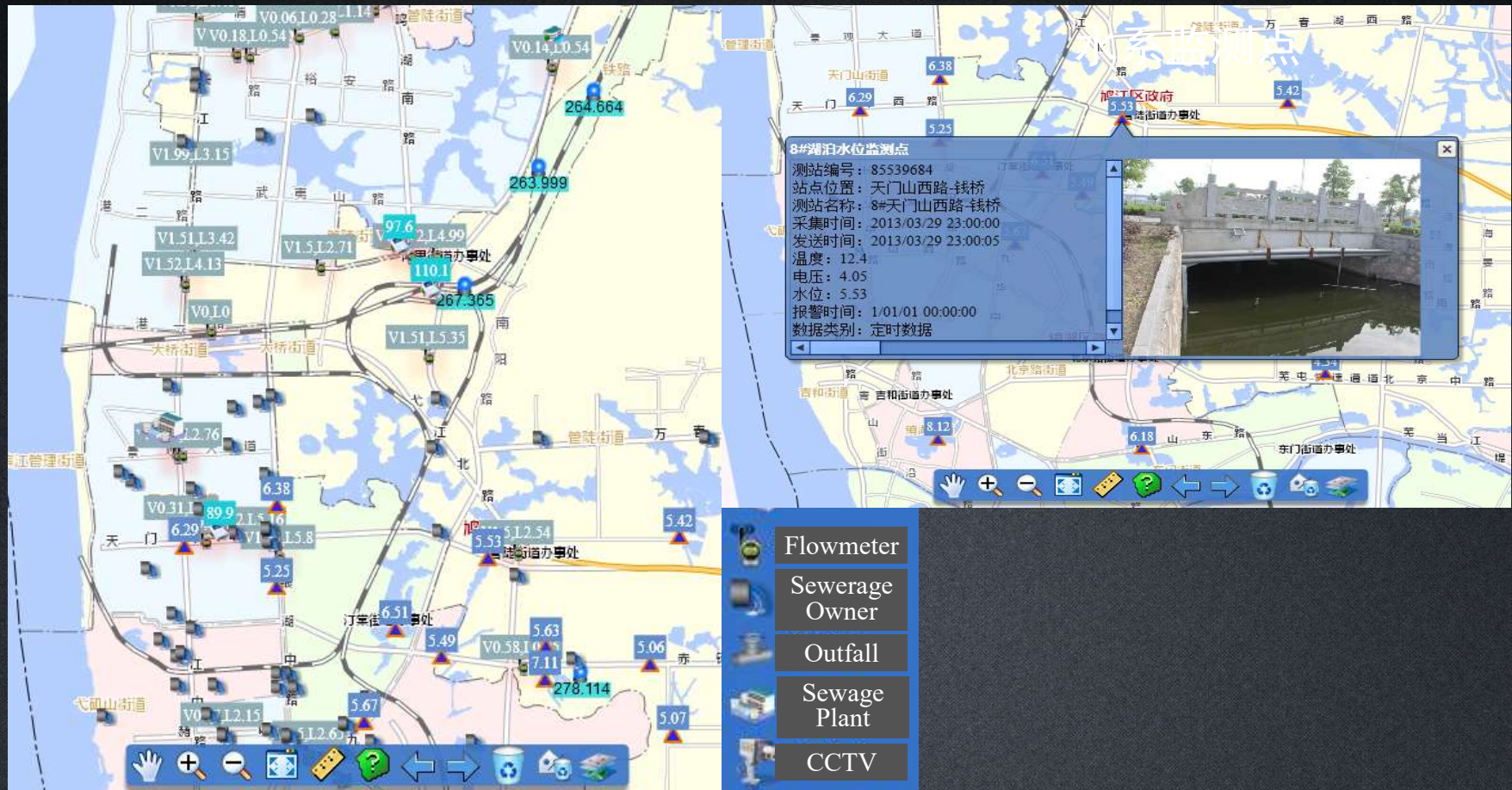
City Water System—Pump Operations Monitoring



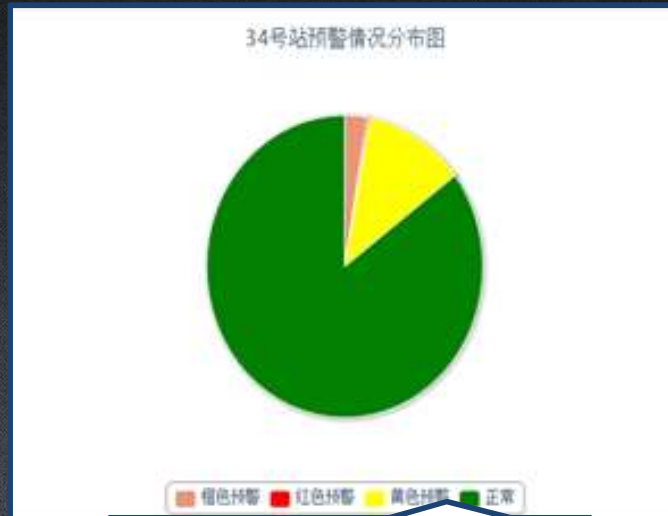
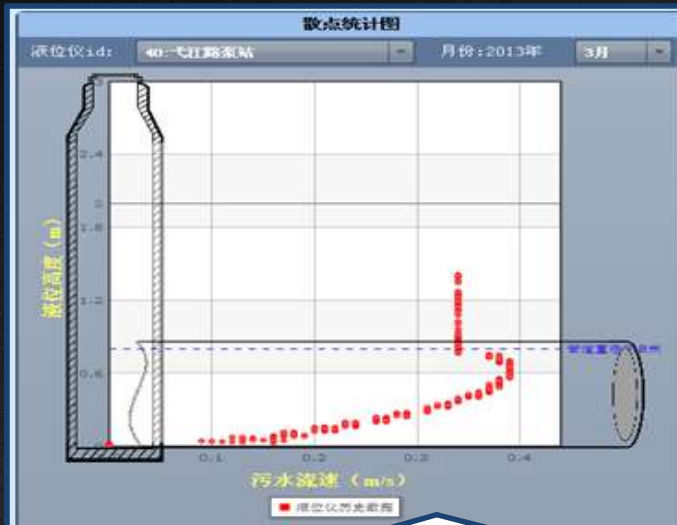
Pump query

Pump condition monitoring

- Monitoring and Command



- Data Analysis



a. Water quality analysis for upstream/downstream

b. Fault analysis of pumping station

- Drainage Enterprise Management

Basic information

Drainage types

Abnormal drainage alarm

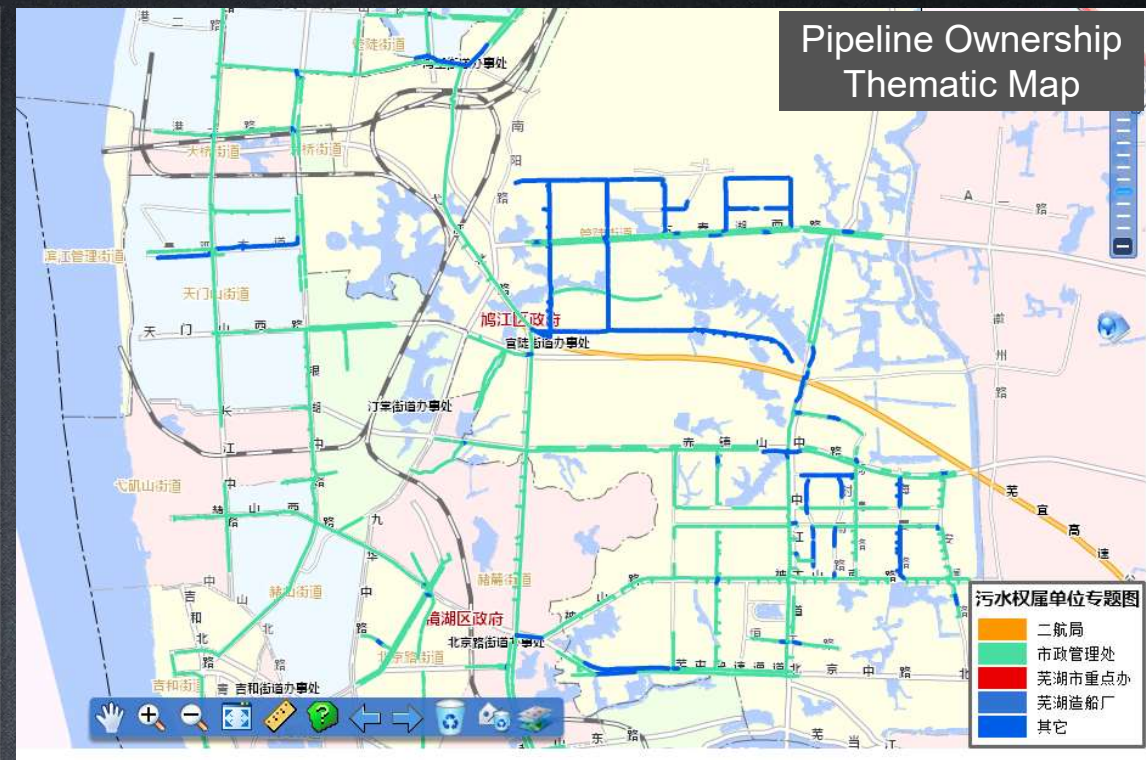
Excess drainage unit tracking



Drainage approval, displacement data and water quality data monitoring for alarming automatic and highlight on map

• Pipeline Thematic Map Displaying Module

Shows the pipeline data intuitively in the form of thematic map with the attributes of ownership, materials, water quality, construction time, etc.



- Task Management

Report

Acceptance

Processing

问题上报

类型: 污水溢出

是否需要工程处理: 是

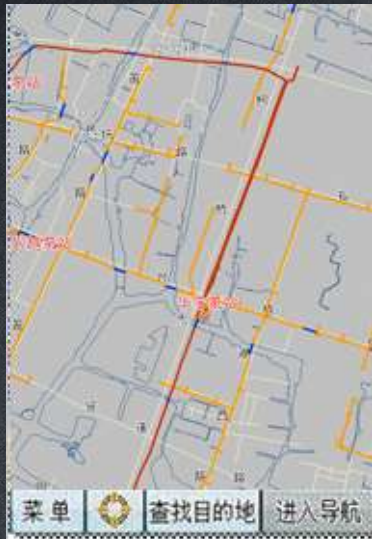
坐标: 定位

地址:

描述:

基本信息 附件

上报 拼 返回



当前检查井: 花洲路88号

开始时间: 10年02月03日 结束时间: 10年03月05日

养护工单编号: 2010031002 委托单位: 审核人: 张薇薇

检查井编号: 89 X坐标: 1234.5 Y坐标: 4031.2

养护状态: 已养护 养护时间: 2010/03/10 养护备注: 添加井盖

拍摄时间: 2010/03/10

拍摄位置X: Y:

当前照片备注: 原井盖缺失后添加井盖。

第一张 上一张 下一张 最后一张 自动播放

菜单 查找目的地 进入导航

养护历史记录	记录时间
清除垃圾	2009/09/10
添加井盖	2010/03/10

Support history records search

Water Platform

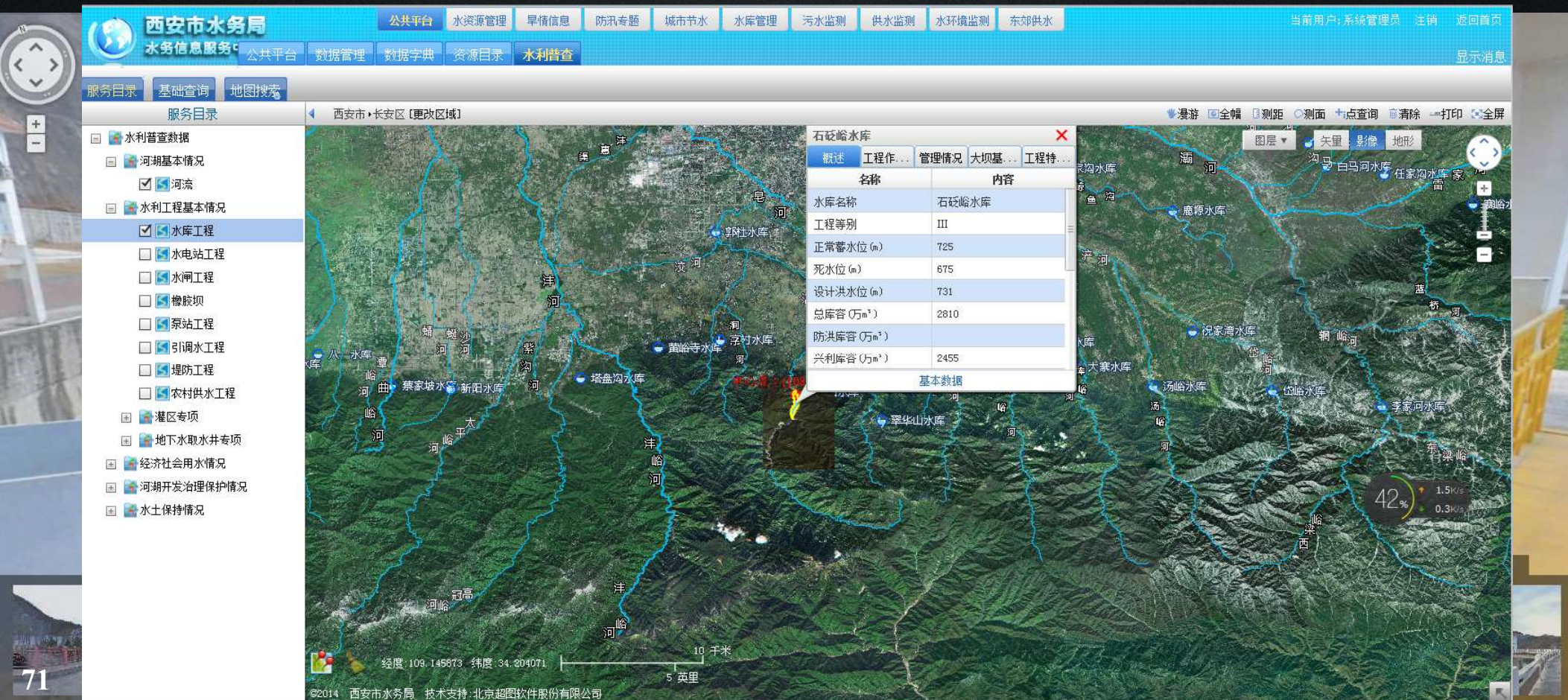
Portal

Precipitation analysis

3D Panorama

Video surveillance

Water survey



Integration

Water resources

Drought information

Flood control system

Sewage Monitoring

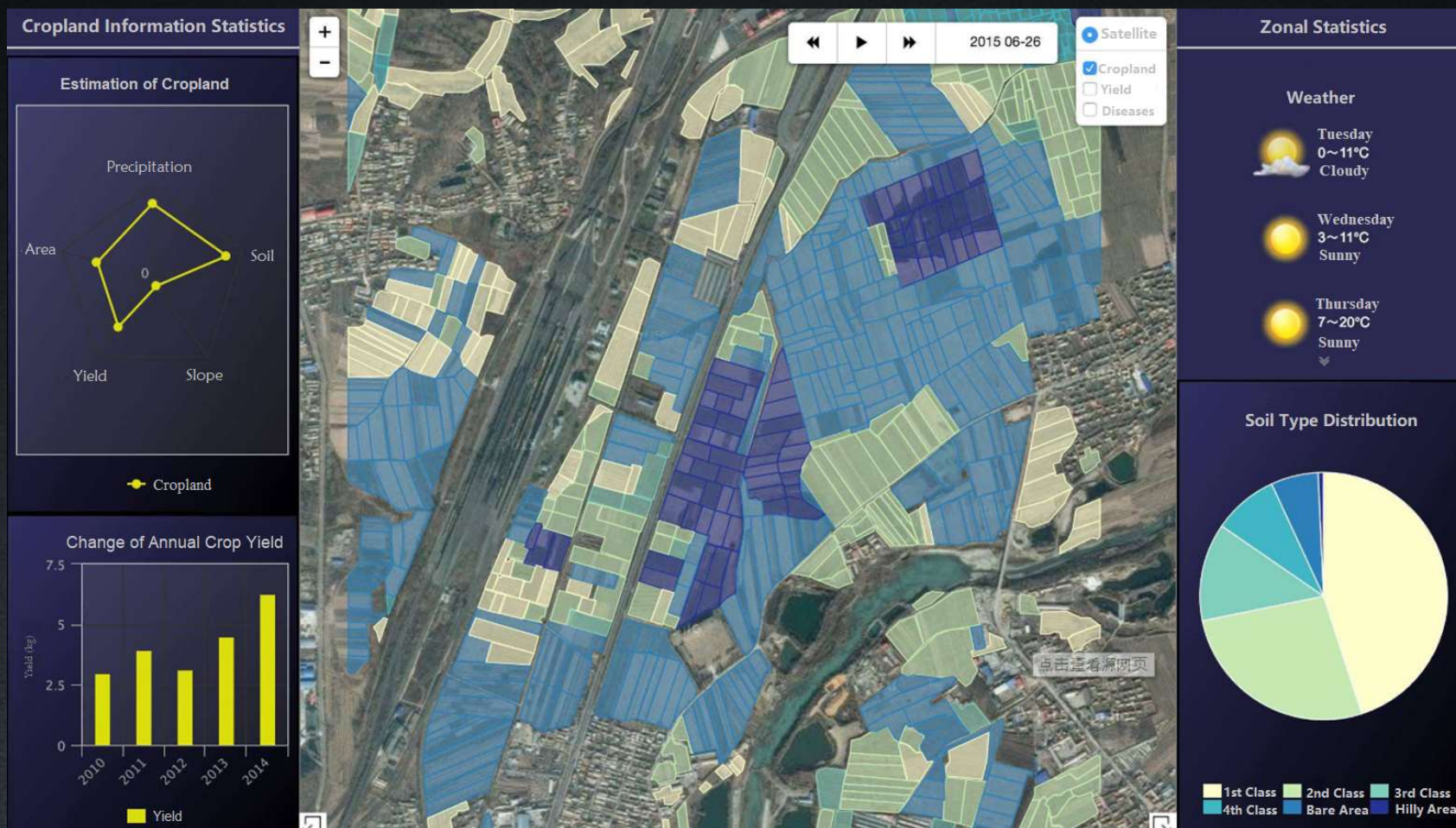
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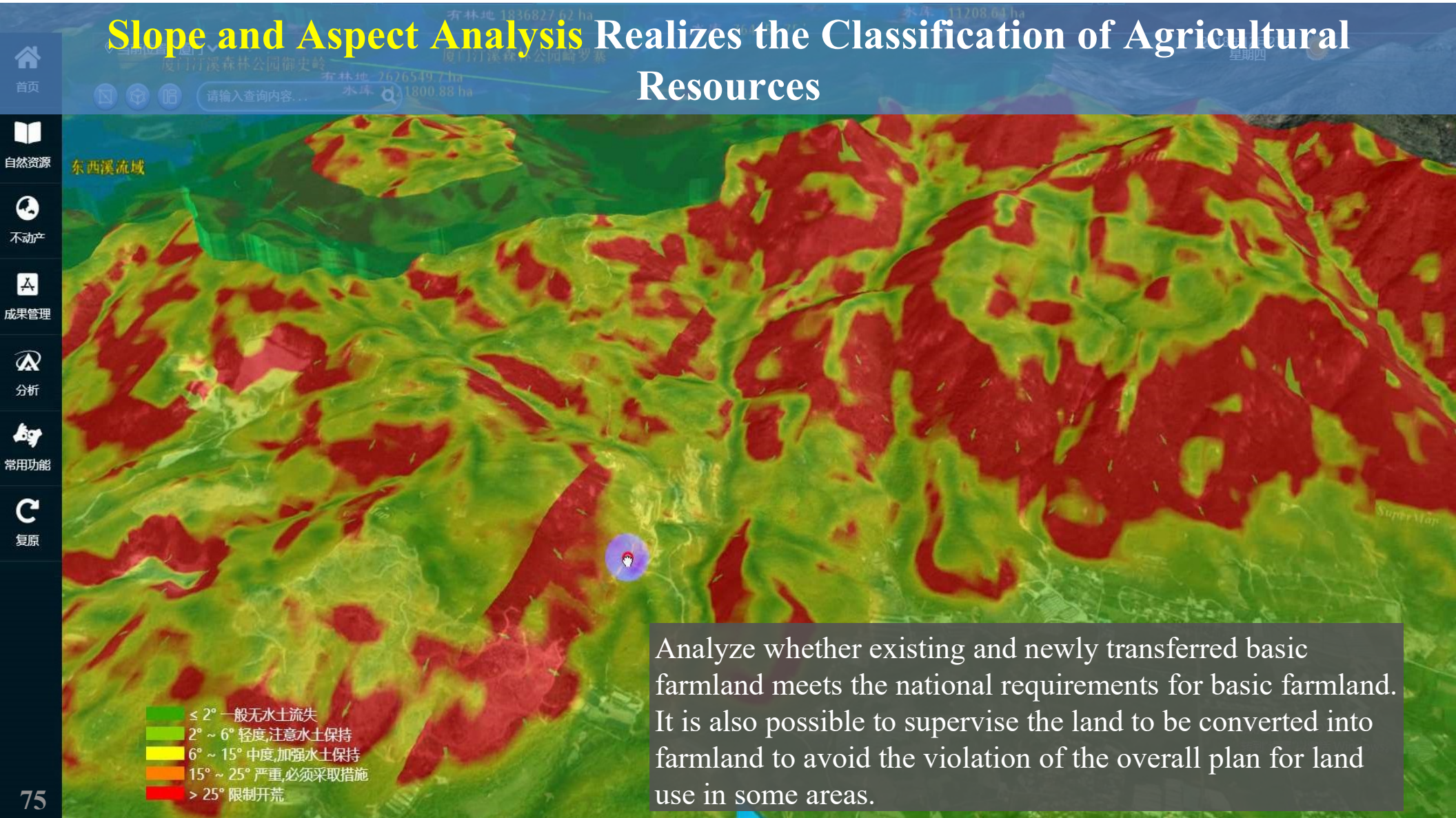


3.3 Agriculture

Web Dashboard of Agriculture



Slope and Aspect Analysis Realizes the Classification of Agricultural Resources



Skyline Analysis Assesses the Degree of Destruction of Natural Resources

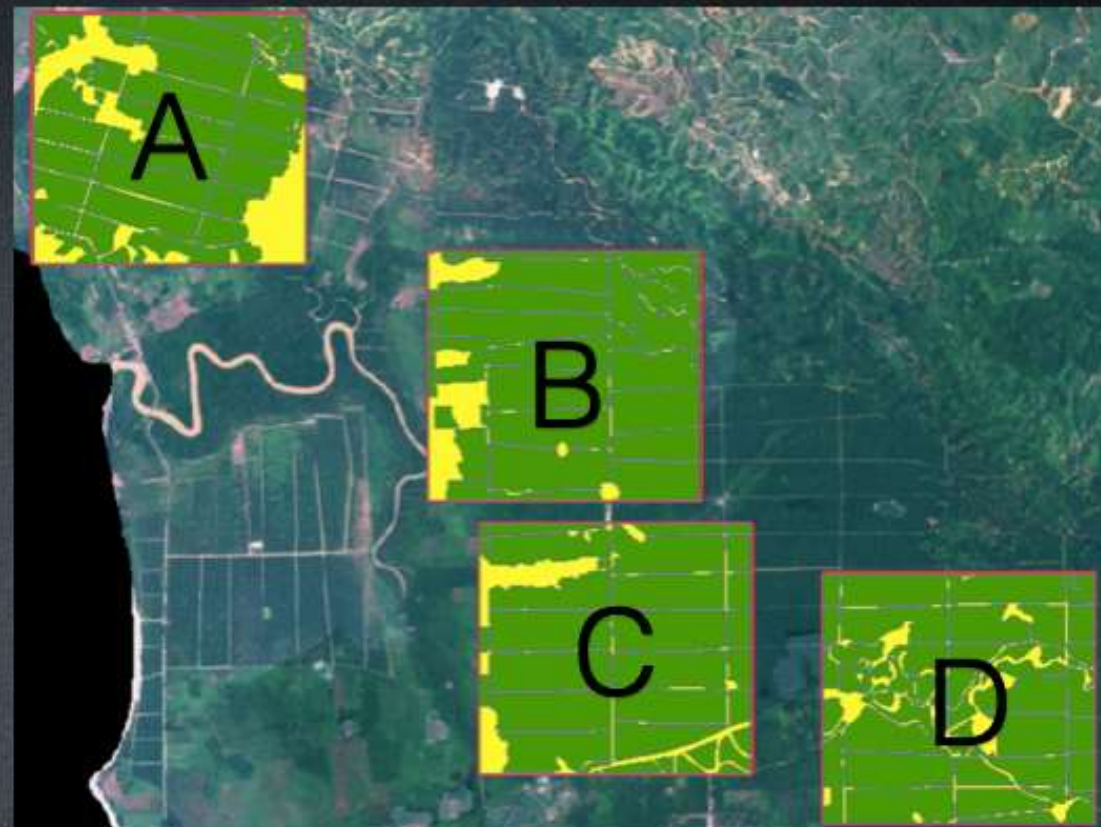
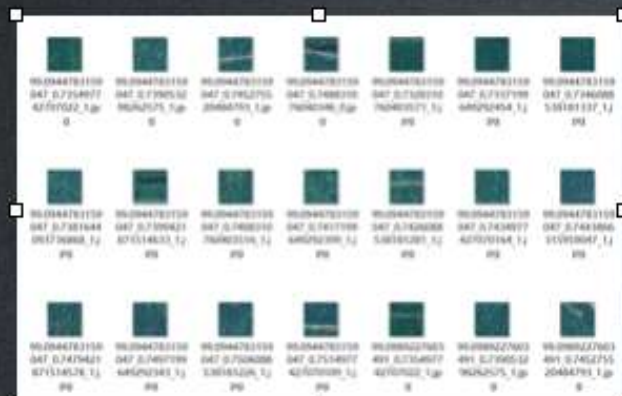
The skyline is an important factor in the natural environment. Some man-made changes to natural resources and the ecological environment are factors that affect the changes in the skyline. Therefore, the analysis of the multi-year skyline changes can also be applied to natural resource supervision. Through the comparison of the skyline in the area for many years, view the changes in the skyline, analyze the reasons for the changes, and avoid illegal land use affecting the overall landscape effect in the area, even the natural ecological environment.



Area Calculation Based on Remote Sensing Image Classification

Choose the region A and C as training data, B and D as testing data.
Green Is the Planting Area, Yellow Is the Non-planting Area.

Generate the training data and testing data as 64 * 64 pix pictures based on the raw data. (1:5,843.54282379527, the scale of raw tiff data)



Detection Result

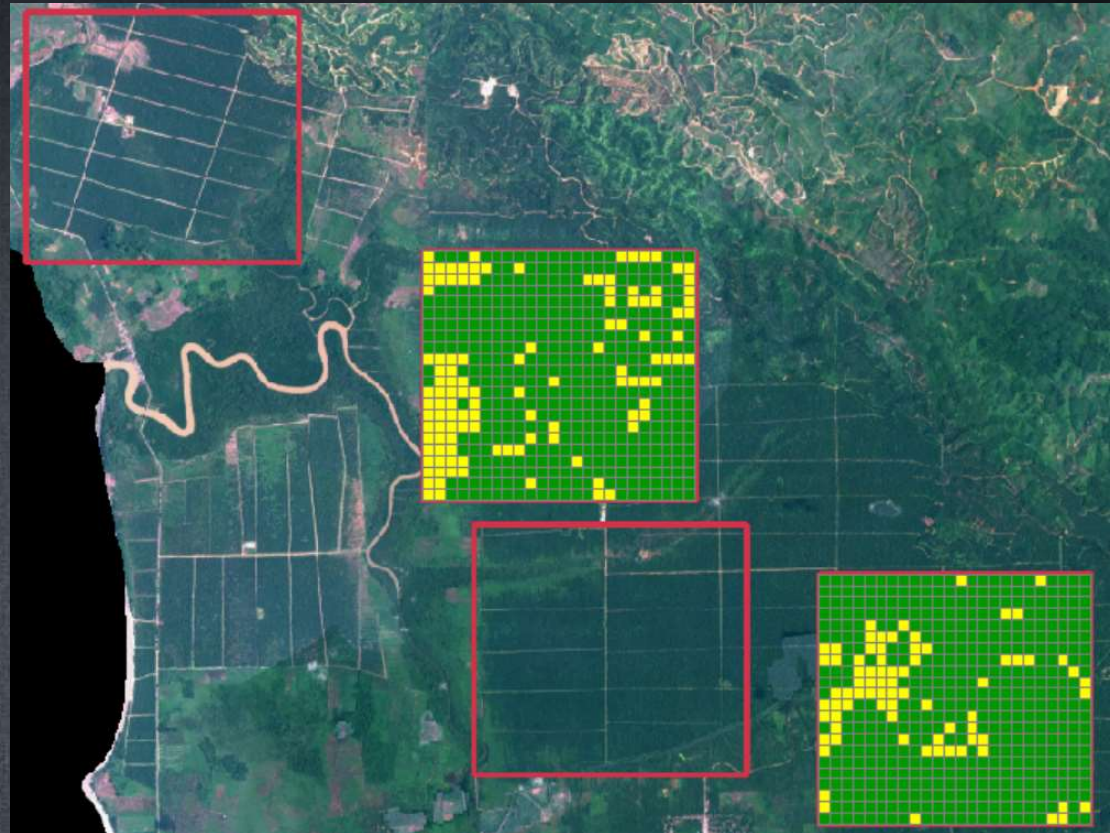
The green area is planting area, the yellow area is non-planting area.

Result statistics (for region B and D):

Label Area = 8685290 m²

Result Area = 8450517 m²

Accuracy Rate = 97.296%



Palm Tree Detection Based on RS Image Data and DEM Data

The raw data are mainly remote sensing images, supplemented by DEM data.



The Detecting Result of Palm Trees



Result Analysis

Statistical analysis of detect results:

Compare the detect result box with manually drawn label box, the hit criterion is that their IoU is greater than 0.01.

$\text{IoU} = \text{Intersection area} / \text{Consolidated area}$

Statistical results:

Label box = 1709

Result box = 1637

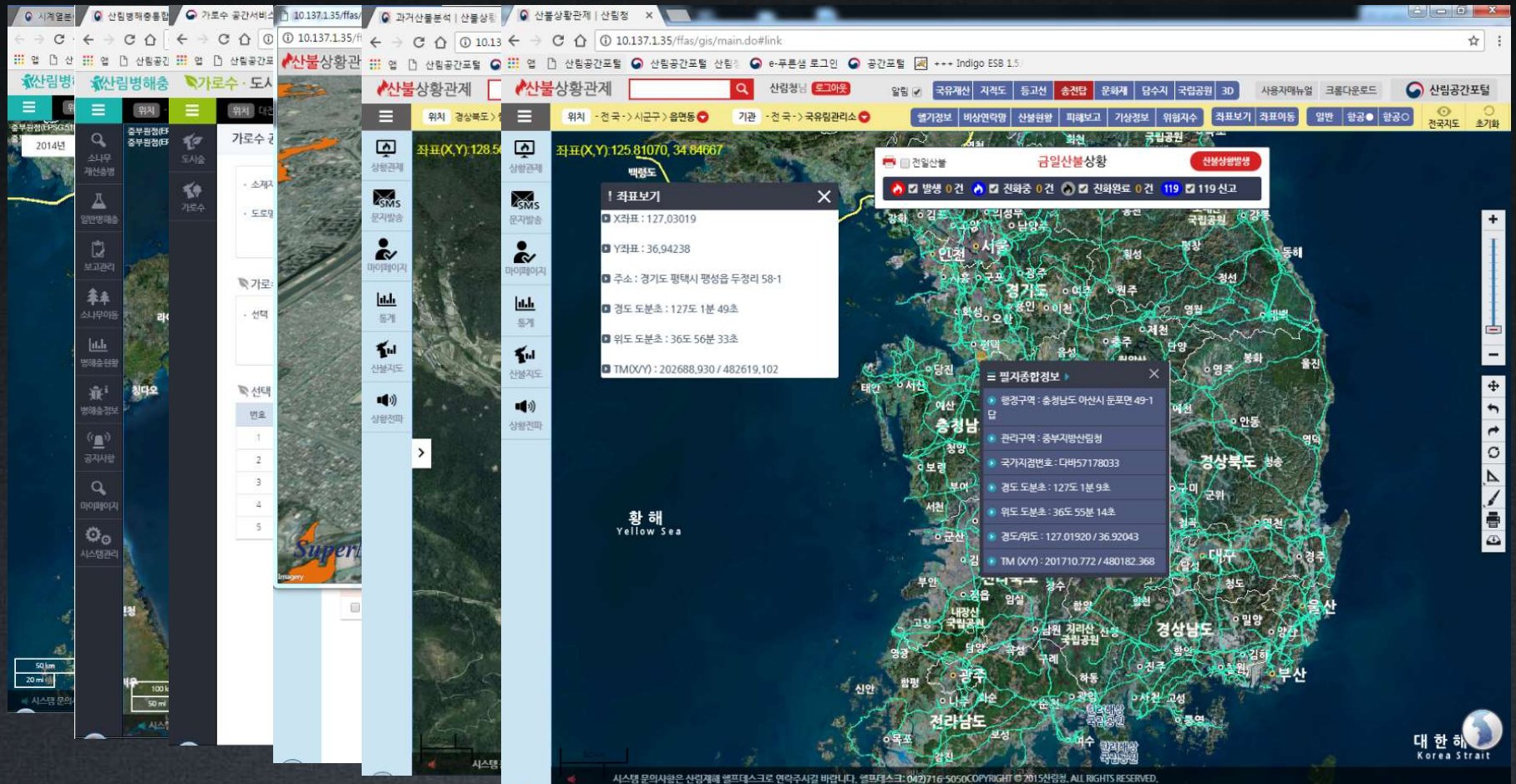
Correct box = 1567 (95.72%)

Wrong correct box = 70

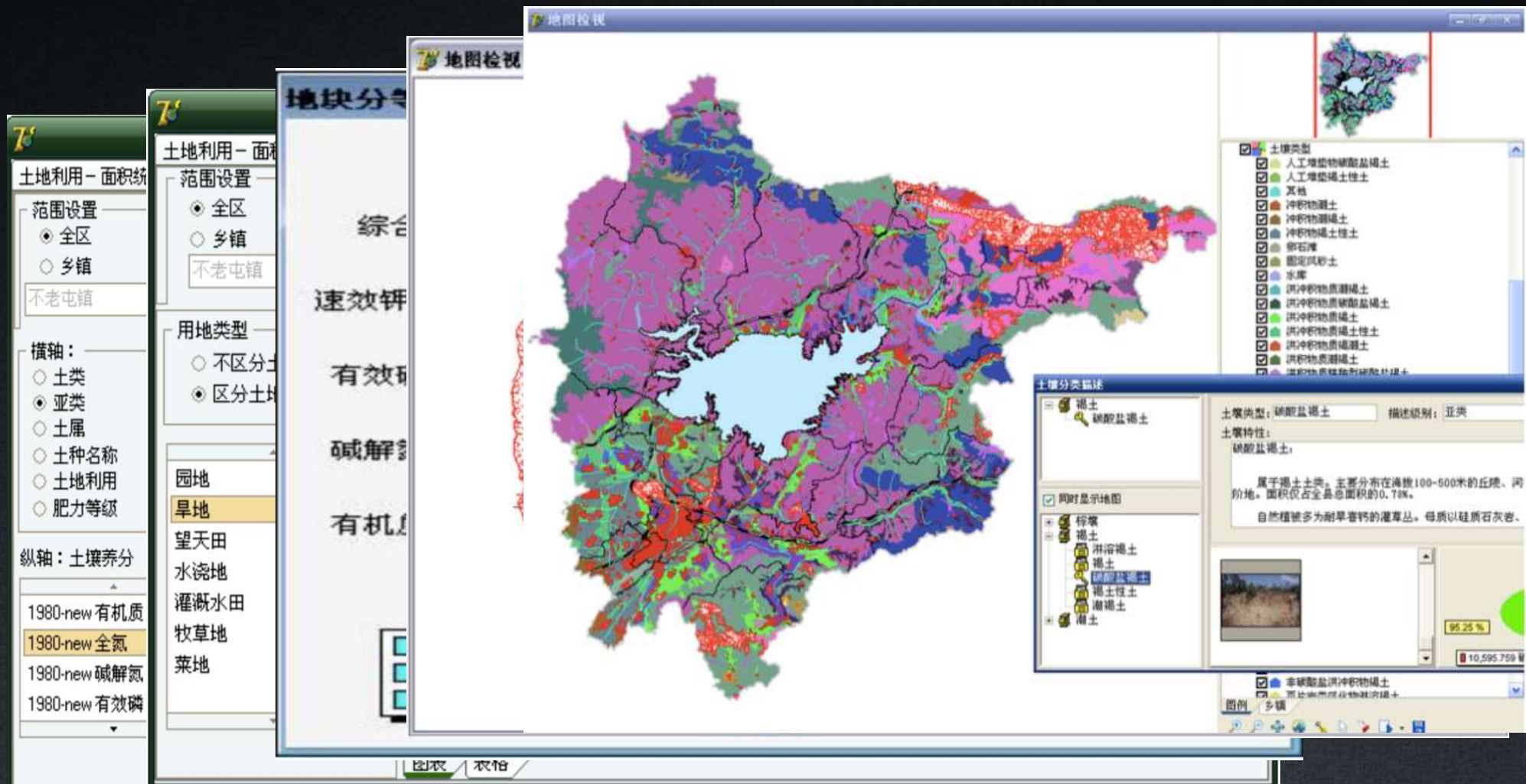
Detected tree = 1647 (96.37%)

Undetected tree = 62

Korean Forest Pest Management System



Plating Field and Soil Quality Monitoring



Review



OneMap Database & Sharing Platform





Asia and Oceania Center

Thank You!

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