Application of High-speed Railway Digital Asset Management Based on Spatial Information Technology

Zhe Xu CEO

Beijing Innovation & Intelligence Technology Co., Ltd

E-mail:xuz@intoview.cn

Web:www.intoview.cn

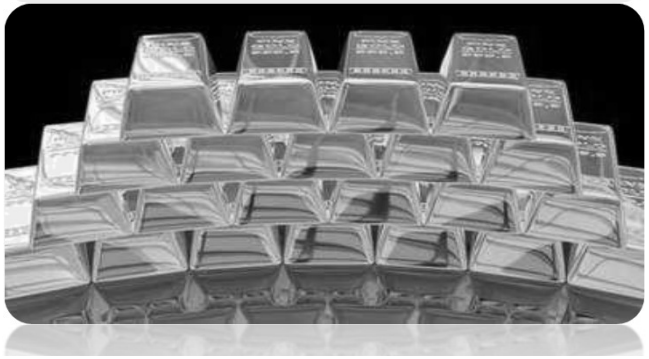
Content

01 Introduction

Our Team

- A group of young people with geographic thinking to explore the application of railway industry from the perspective of geospatial big data.
- Start from 2013,We focus on Natural Resources, City's Construction & Management.
- From 2015,We focus on Transportation, Road and High-speed Railway,especial Digital Asset Management.

High-speed rail asset management is becoming more important



- In 2020, China's high-speed railway operation mileage will reach 30,000 kilometers, forming a high-speed railway network of eight vertical and eight horizontal, covering all cities with a population more than 500,000.
- The scientific management of high-speed railway assets is the main task of enterprises. How to improve operational capacity and reduce costs have become an urgent need of enterprises.
- High-speed railway asset equipment management is a multi-disciplinary integrated management system,is the basis for efficient operation,scientific operation and maintenance of railway enterprises.

02 Railway Digital Asset Management Platform Based on Spatial Information Technology

Effect of Spatial Information Technology

Unified coordinate

Provide the basic information, technical information, equipment status information and surrounding environment information to unified coordinates

Unified dimention

Building three unified dimensions of components, equipment and assets

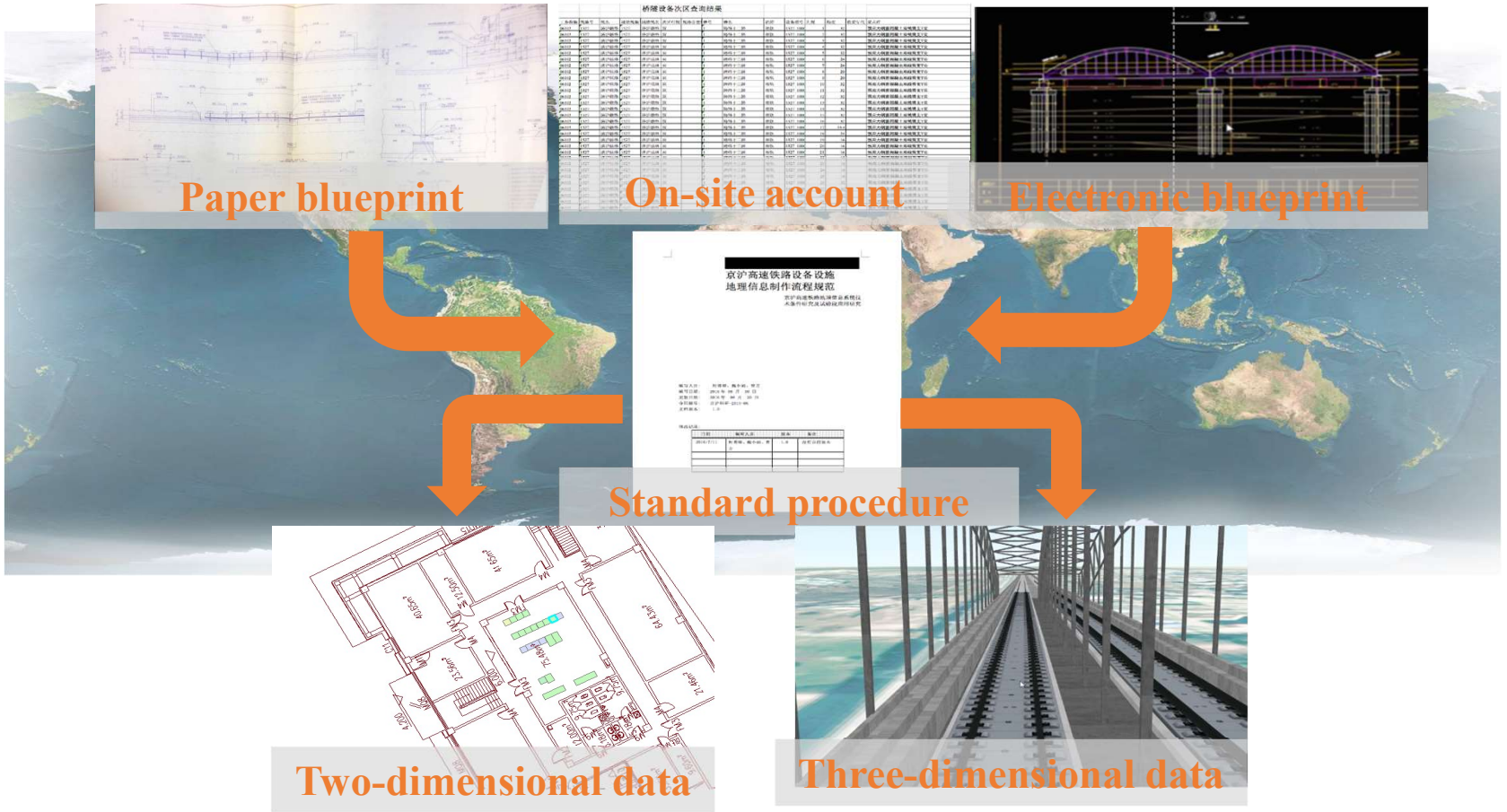
Unified integration

Provide unified integration of information on the basis of unified coordinates

Unified analysis

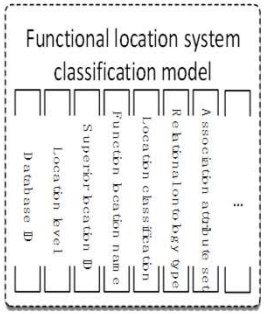
Based on information integration, Perform spatio-temporal analysis of multi-source data , to provide a basis for asset science management

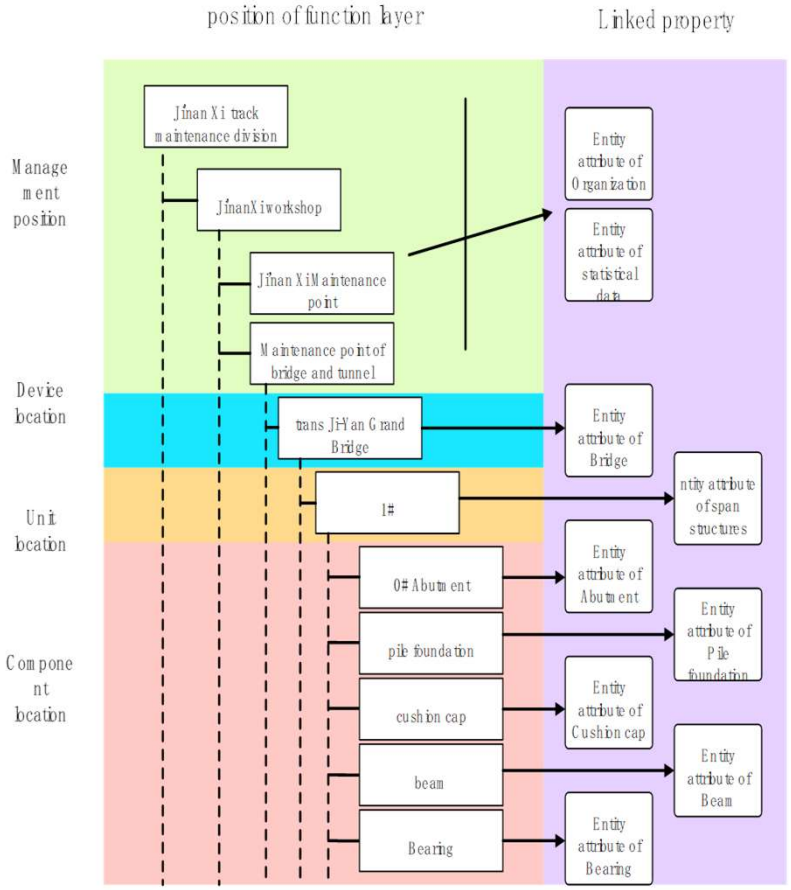
Data Collection



Spatial information collection based on basic data

Data Structure of Railway Digital Asset Management Platform





Data Integration

Equipment ledger

Basic data

Associated device

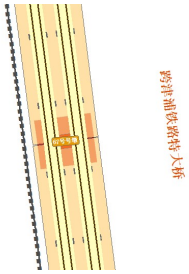
Inspection and maintenance records

All kinds of basic information are integrated through the unified spatial position coordinate system of equipment facilities. Providing quick and efficient access to basic information for overhaul monitoring, event handling and maintenance decisions.

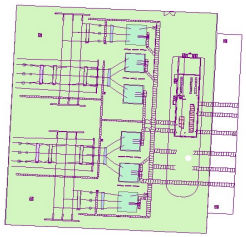
What Our Platform Do

1. Basic Data integration
2. Quickly Data Search
3. A wealth of related information

Data Results



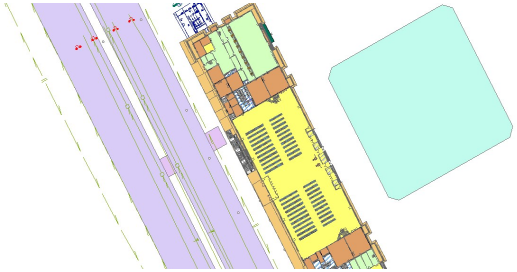
Public service



Electricity service

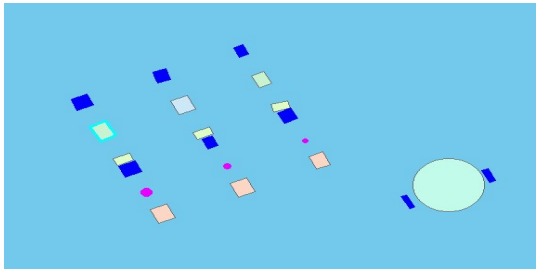
Communication

Signal



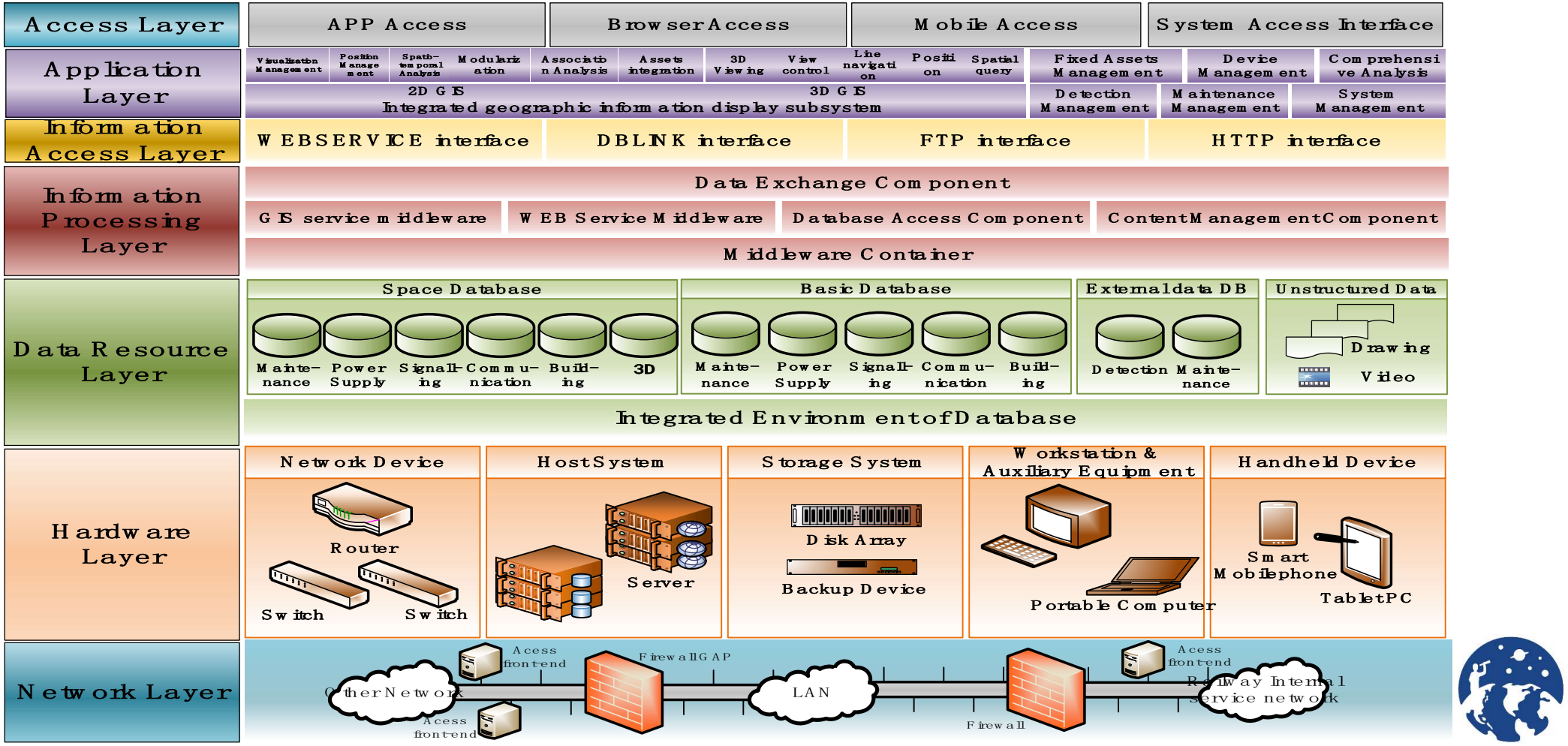
Housing construction

Land

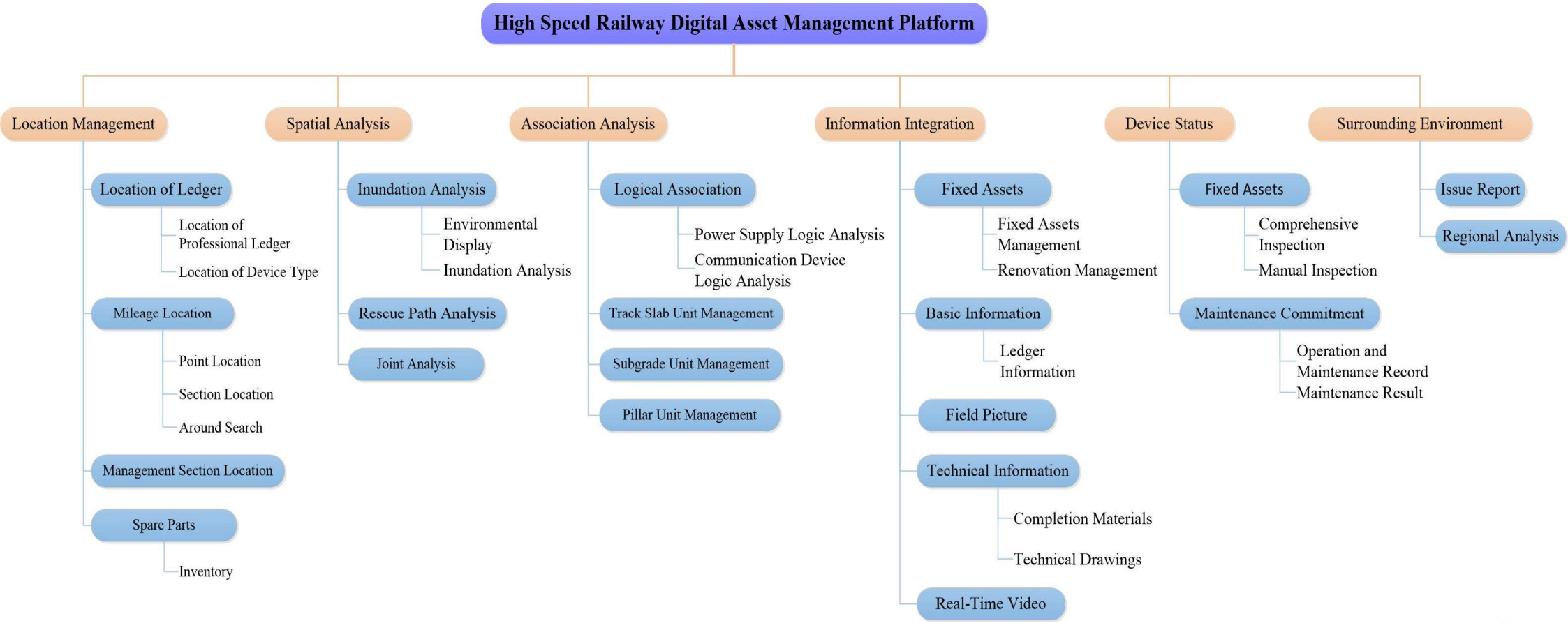


Water supply and drainage

System Architecture of Railway Digital Asset Management Platform



Functions of Railway Digital Asset Management Platform



03 Application and practice of asset management in high speed railway enterprise

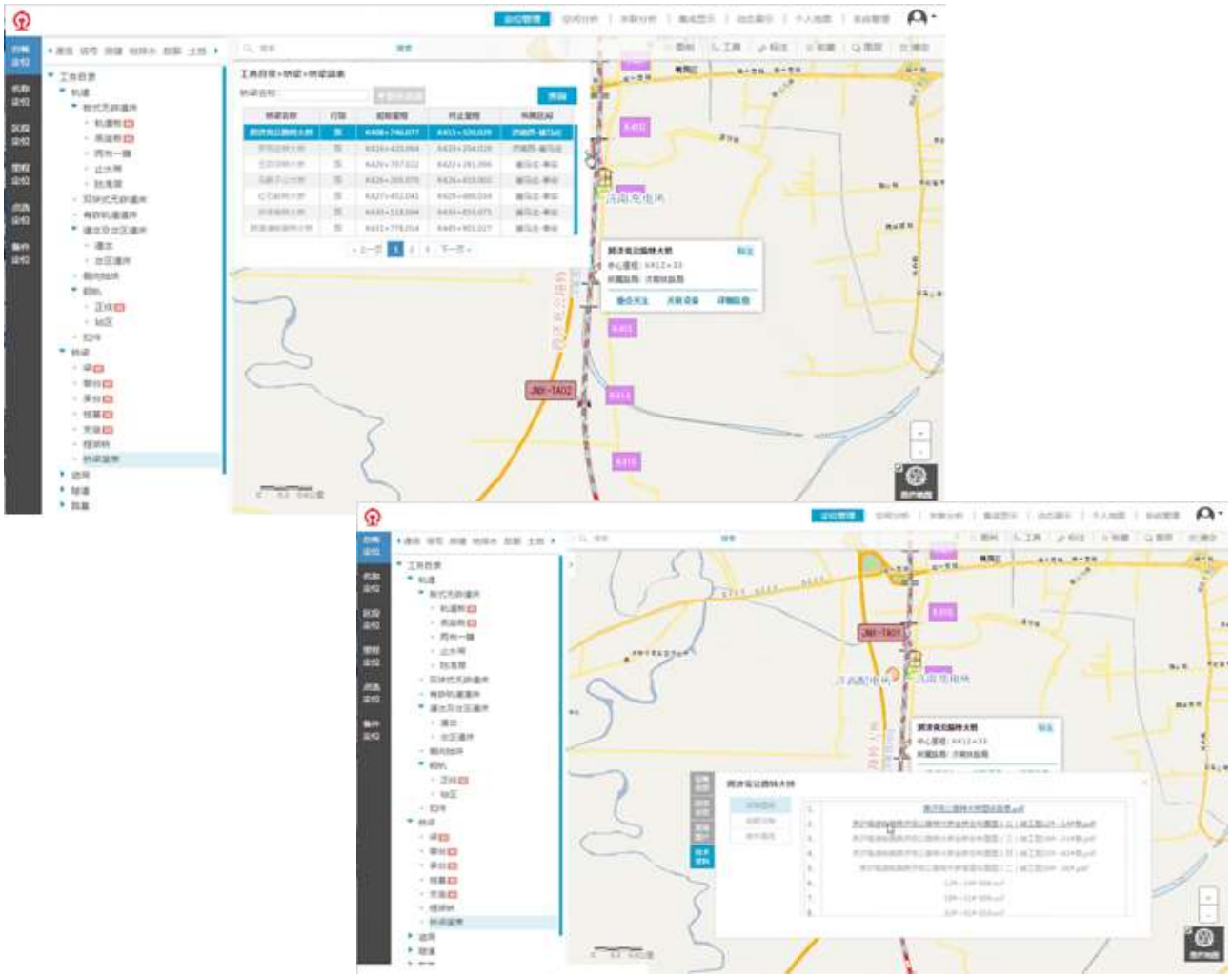
Function Implementation

7 First-level Functions 、 **23** First-level Functions 、 **614** Function points

Function Implementation

Device Management, Query,and Location

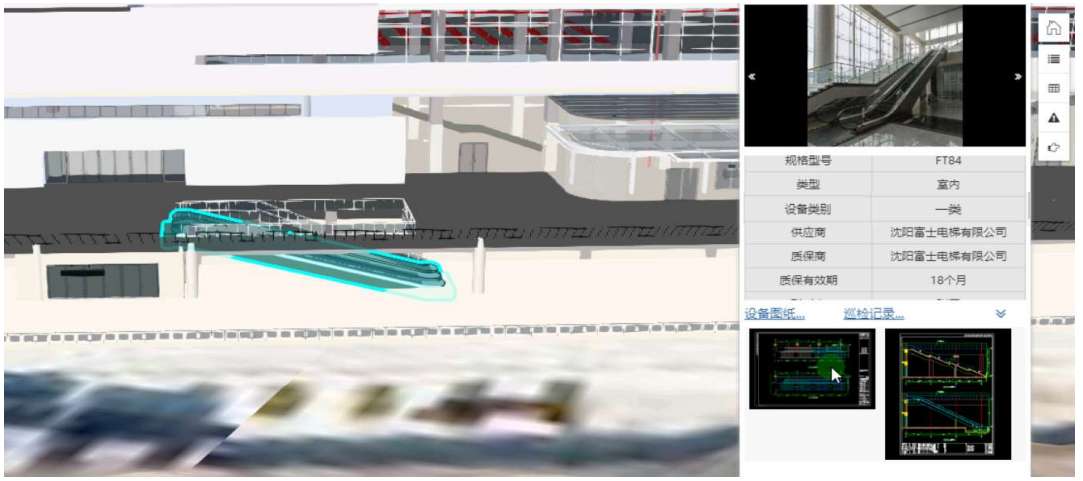
- **Device Management, Query , and Location**
- **Device Interrelationships Association**
- **Detecting and monitoring Dynamic States**
- **Supervision of Maintenance**
- **Spatio-temporal Analysis**

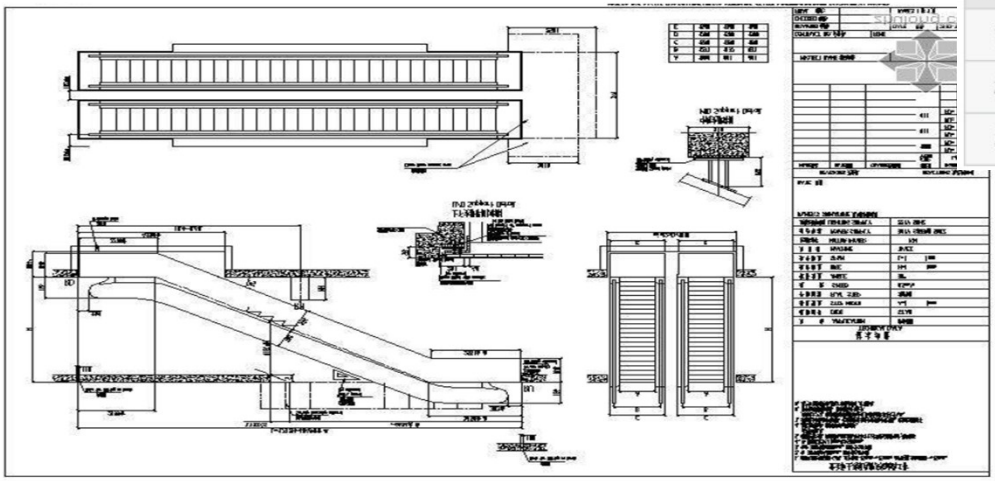


Function implementation

- Device Management, Query , and Location
- **Device Interrelationships Association**
- Detecting and monitoring Dynamic States
- Supervision of Maintenance
- Spatio-temporal Analysis

Device Interrelationships Association



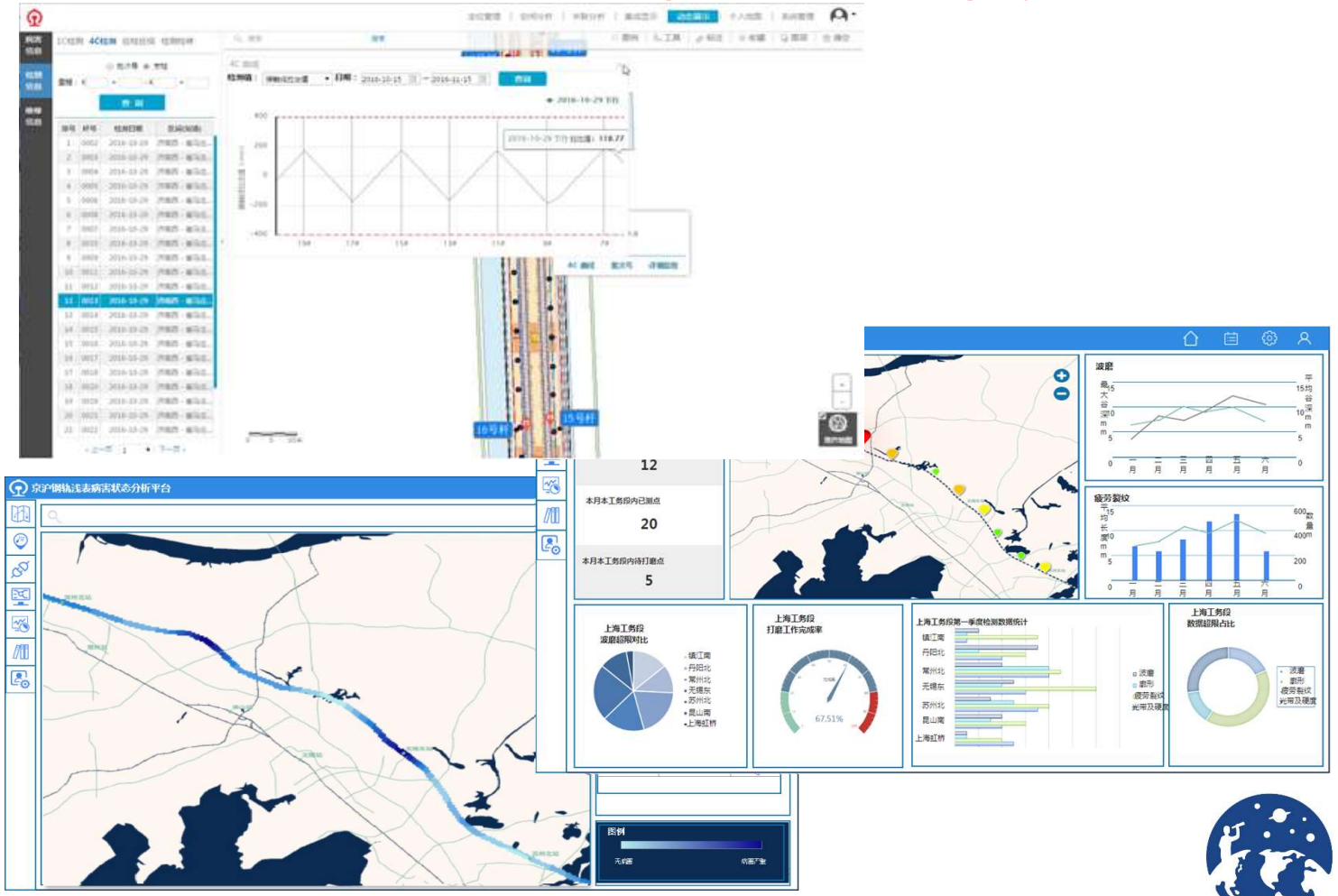


序号	巡检记录编号	巡检人	查看
1	XJ01617-0239	石强	
2	XJ01617-0240	石强	
3	XJ01617-0241	石强	

Function implementation

- Device Management, Query , and Location
- Device Interrelationships Association
- Detecting and monitoring Dynamic States
- Supervision of Maintenance
- Spatio-temporal Analysis

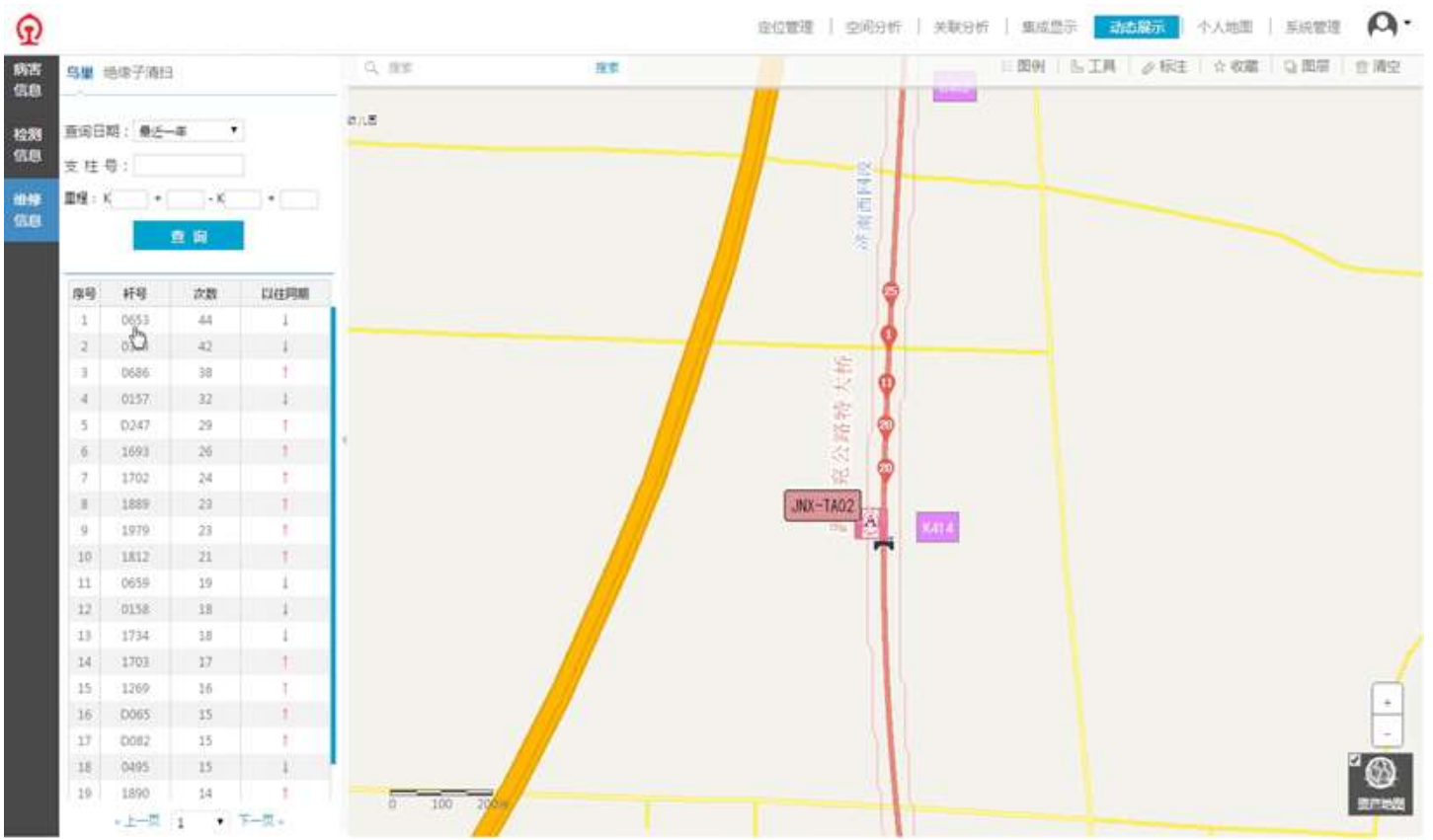
Detecting and monitoring Dynamic States



Function implementation

Supervision of Maintenance

- **Device Management, Query , and Location**
- **Device Interrelationships Association**
- **Detecting and monitoring Dynamic States**
- **Supervision of Maintenance**
- **Spatio-temporal Analysis**



Function implementation

Device Management, Query , and Location

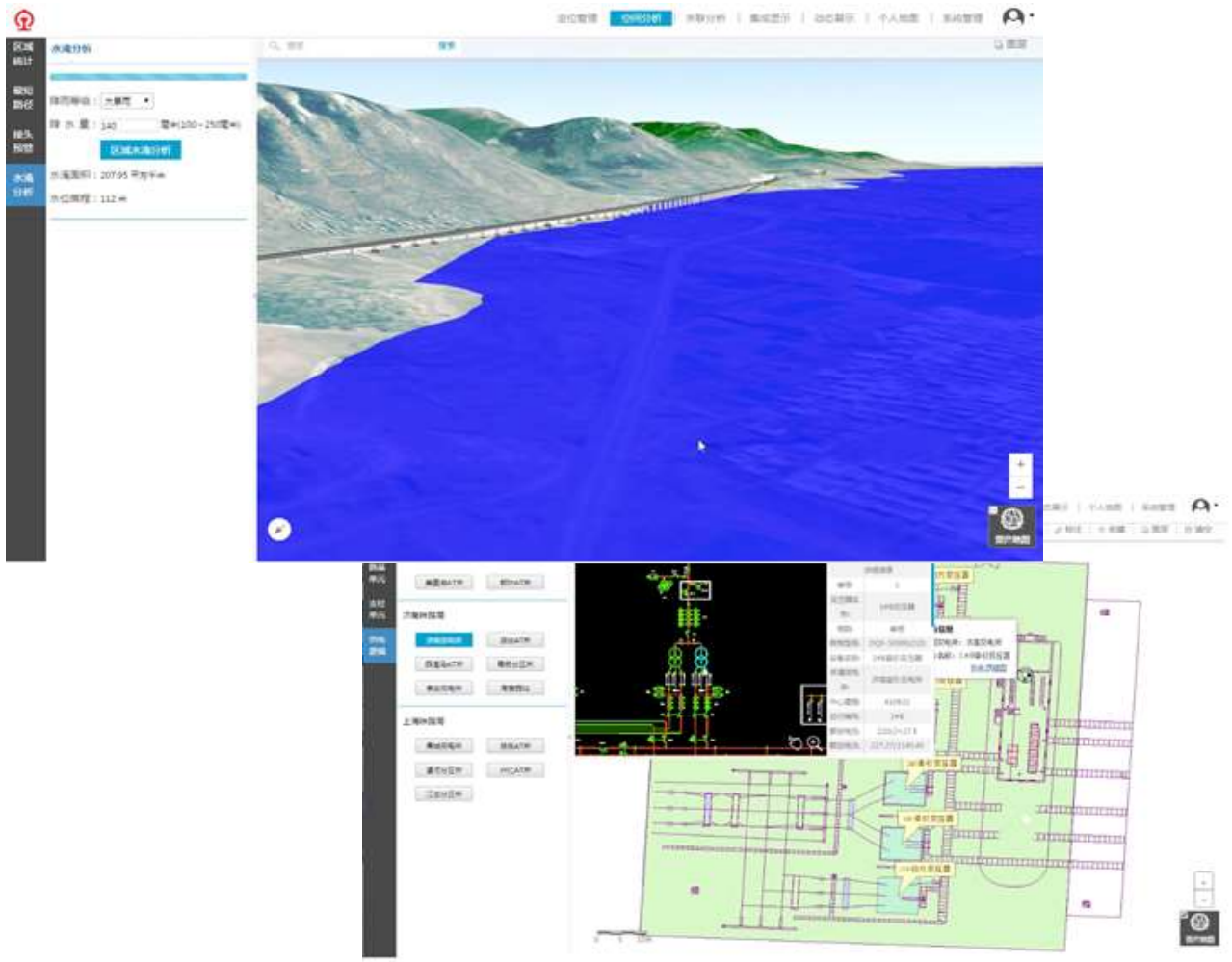
Device Interrelationships Association

Detecting and monitoring Dynamic States

Supervision of Maintenance

Spatio-temporal Analysis

Spatio-temporal Analysis



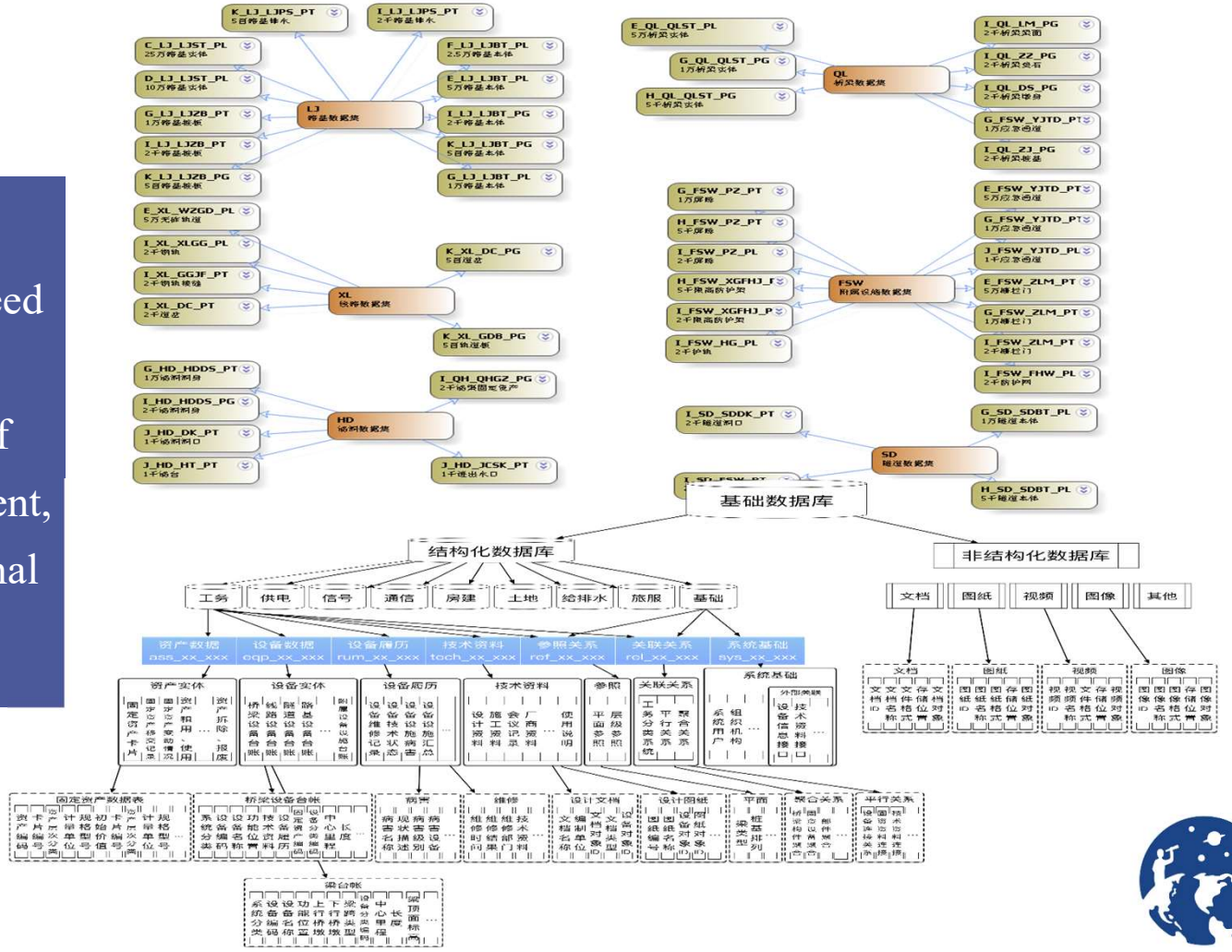
04 Innovation and Application Effect of Digital Asset Management Platform

Key Technologies and Innovations

Data modeling of multi-source & heterogeneous

Realizing spatial information modeling for refine management requirements of high-speed railway operation and maintenance.

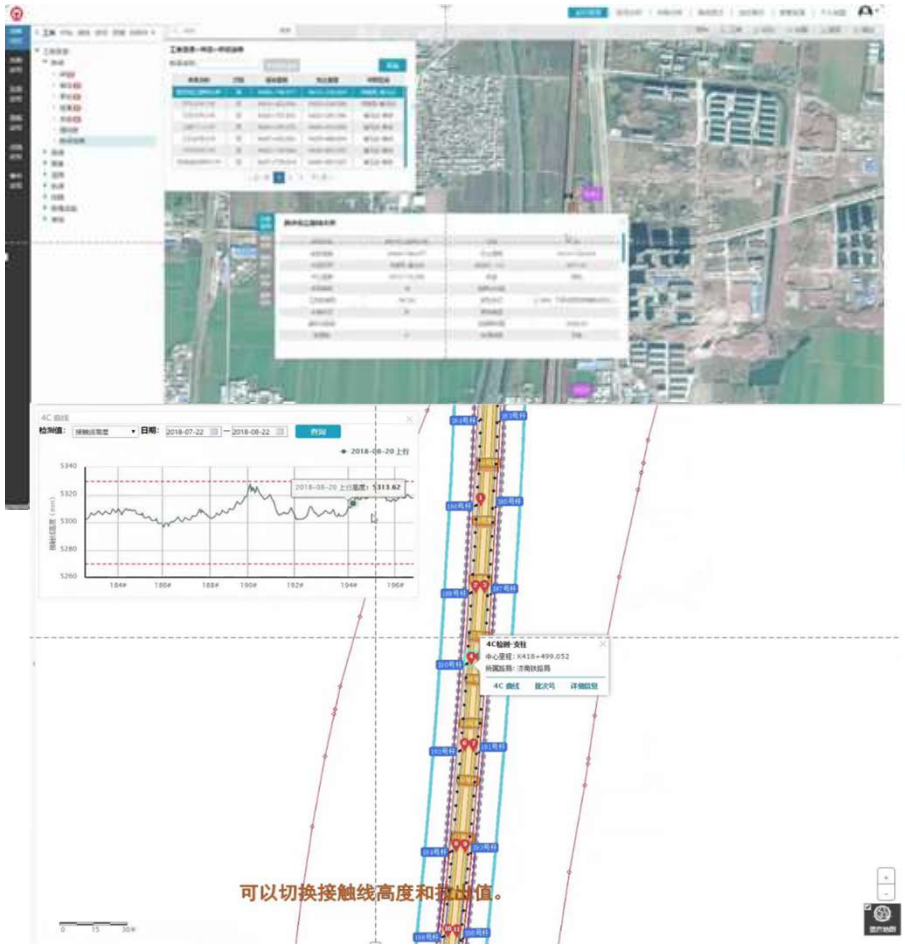
At the same time, solving the stratification of asset management and equipment management, and realizing data fusion of multi-dimensional information.



Key Technologies and Innovations

Unified integration coordinates of high-speed railway asset equipment information

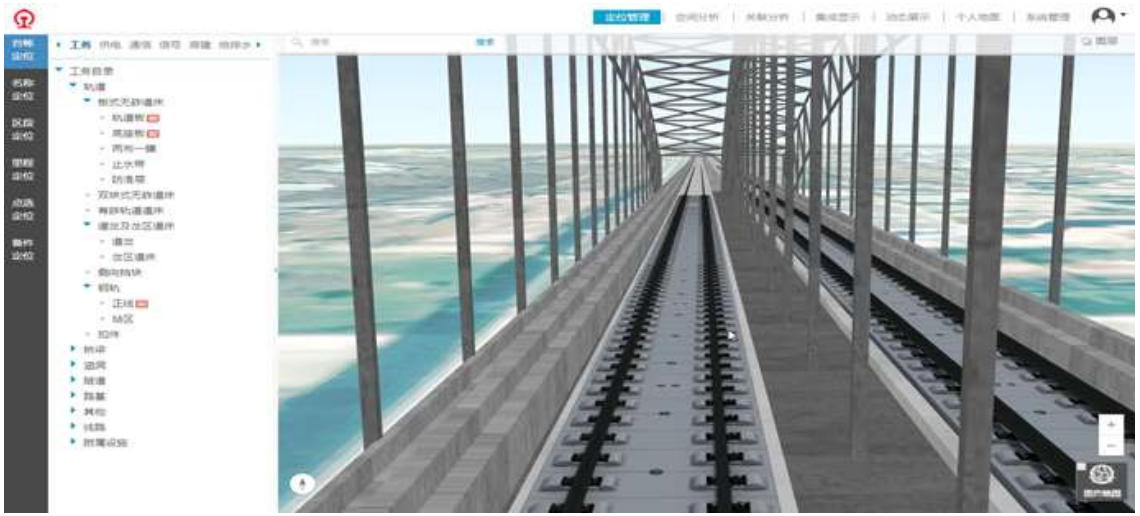
Under the uniform coordinates of the spatial position , to realize the integration of basic data, technical data, equipment testing, maintenance and other information, And promote the exchange and sharing of information among railway professions.

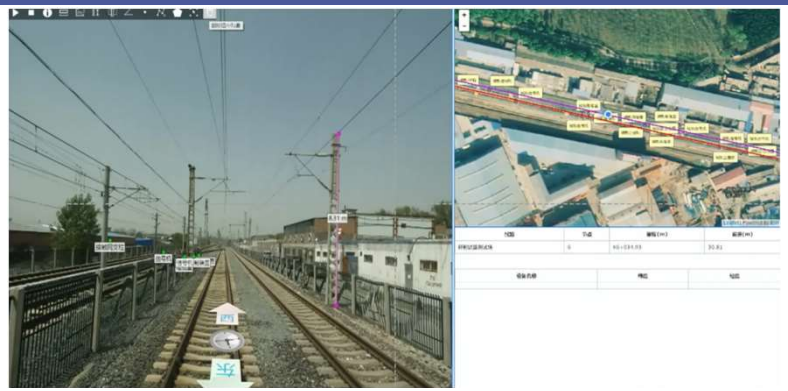


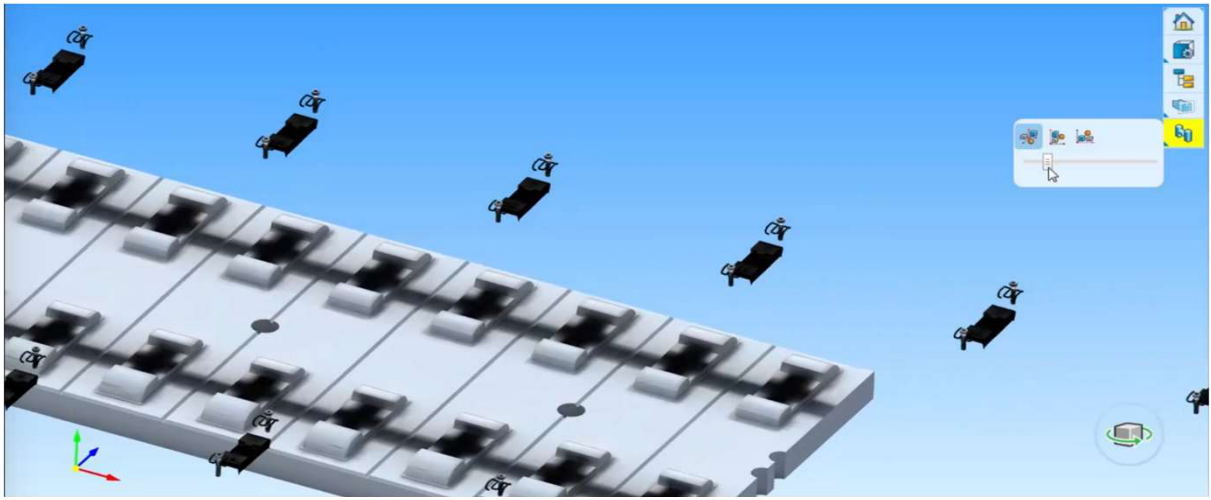
Key Technologies and Innovations

"Two & three-dimension + reality" multi-scale high-speed railway digital asset equipment virtual environment combined with BIM technology

Combining large scene GIS environment with refined BIM model, to realize digital simulation of entire asset from geographical environment to the micro-components ,and form a digital twin high-speed rail model.



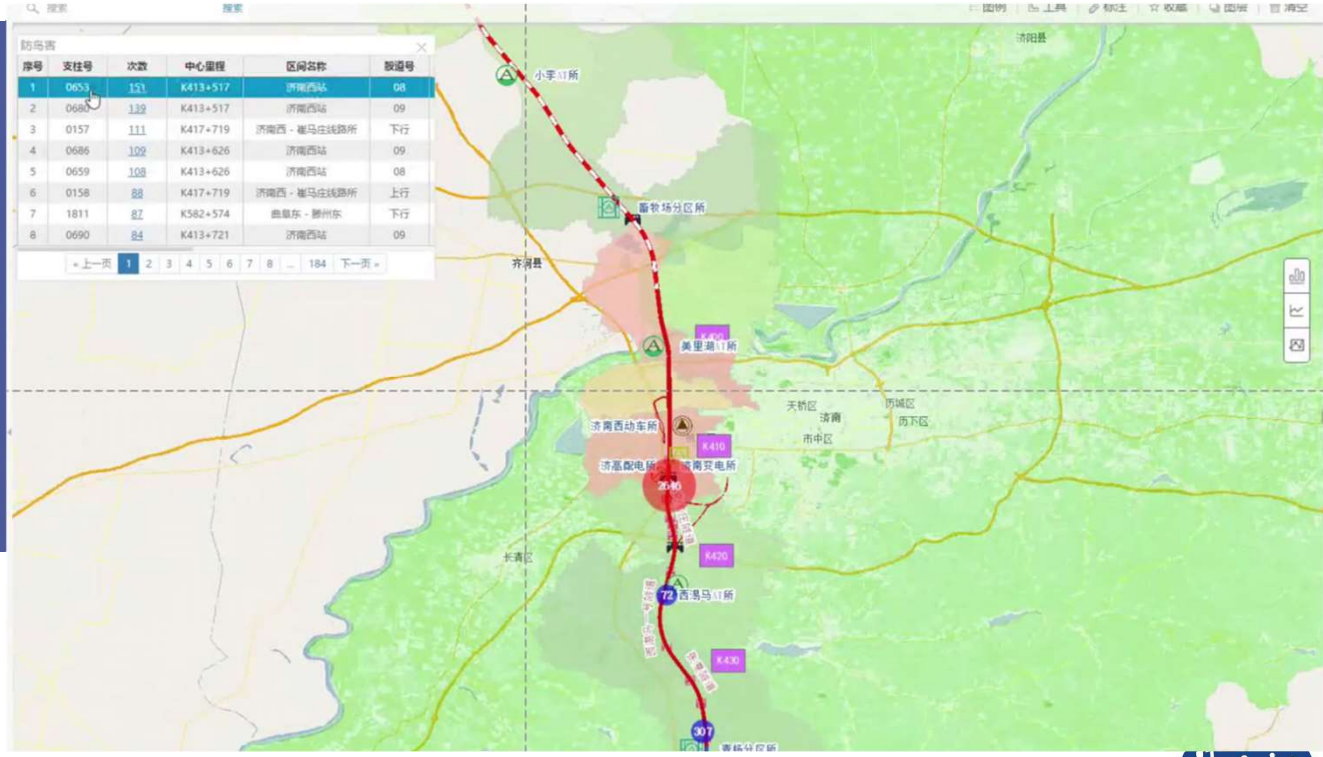




Key Technologies and Innovations

Spatio-temporal big data analysis of high-speed railway equipment and surrounding environment

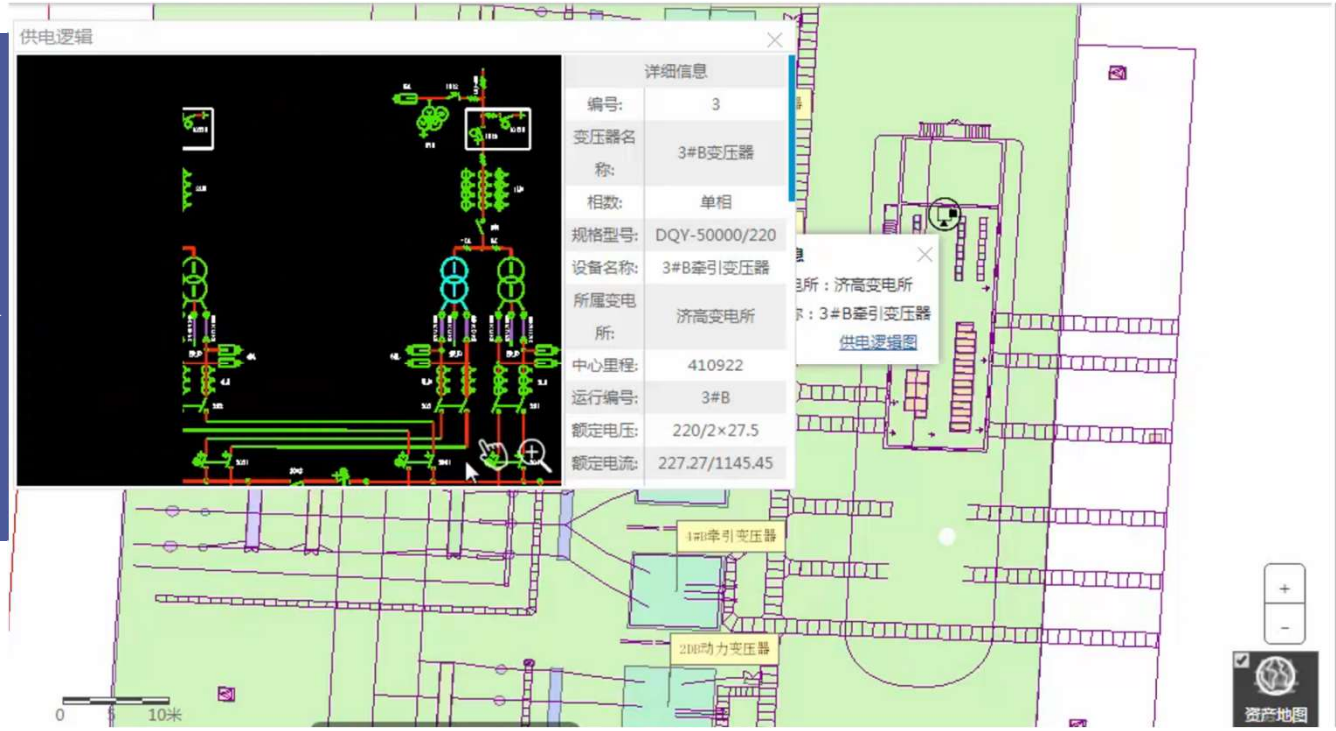
Construct a fusion channel between high-speed railway equipment and social data such as population, meteorology and environment, to realize spatio-temporal dual-dimensional big data analysis for high-speed railway operation and maintenance.



Key Technologies and Innovations

Correlation analysis of logical relation and spatial location

Based on the relationship of geographic information and logical topology, to realize the joint analysis of logical association and equipment location of the high-speed railway assets equipment, and auxiliary equipment troubleshooting.



Application effect of digital asset management platform

In the two stations and one interval - 57 km, platform：

1. Manages 7 majors, 39 sub-professionals, 311 categories of high-speed rail equipment
2. Collects 199020 basic data, 6360 blueprints of various professions
3. Forms a model library of 96-class high-speed railway asset equipment
4. Sets up high-precision digital twin high speed railway equipment environment with size of 160GB
3. Forms 2 standard processes and 1 set of technical specification

Application effect of digital asset management platform

Before

- The files are classified into **8** professions and **5** major categories.
- Data retrieval takes **several days**
- Device status information belong to more than **50** application systems
- Disease prevention depends on **experience**
- Environmental safety depends on **people's eye**

After

- Digital **integration** of technical data
- Indexed in real geographic location, retrieval takes **few seconds**
- Device status is **unified**
- Equipment disease environmental indicators quantified, , disease prevention accuracy increased by **42%**
- Digital environment simulation, work efficiency increased by more than **41%**

Thank You!