

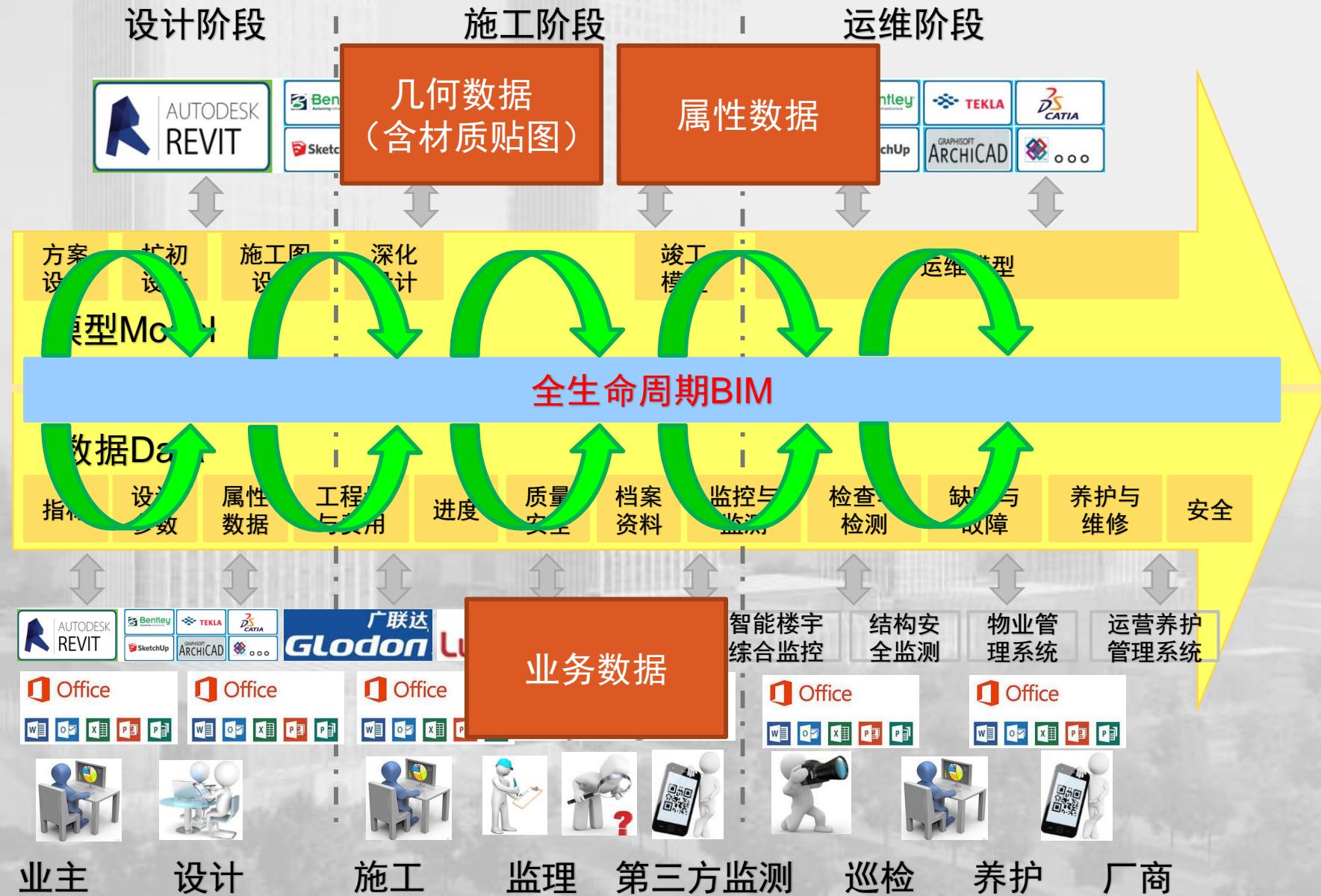
# 基于BIM的竣工交付和运维 关键技术



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# 1、全生命周期BIM

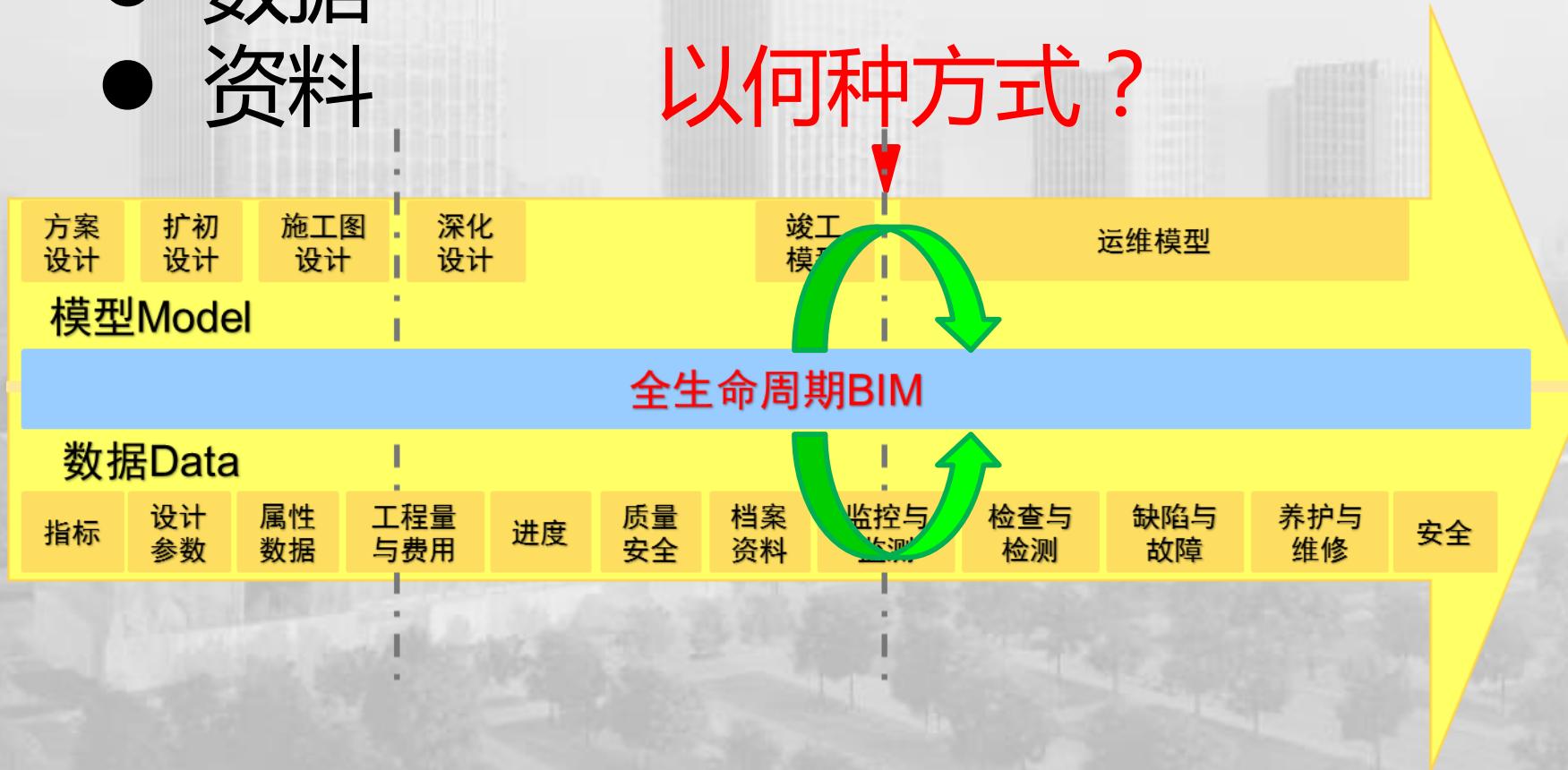


## 2、基于BIM的竣工交付关键技术

### 竣工交付

- 模型
- 数据
- 资料

以何种方式？



## 2、基于**BIM**的竣工交付关键技术

### 竣工模型

- 多种建模方法
- 多种专业
- 多种模型来源

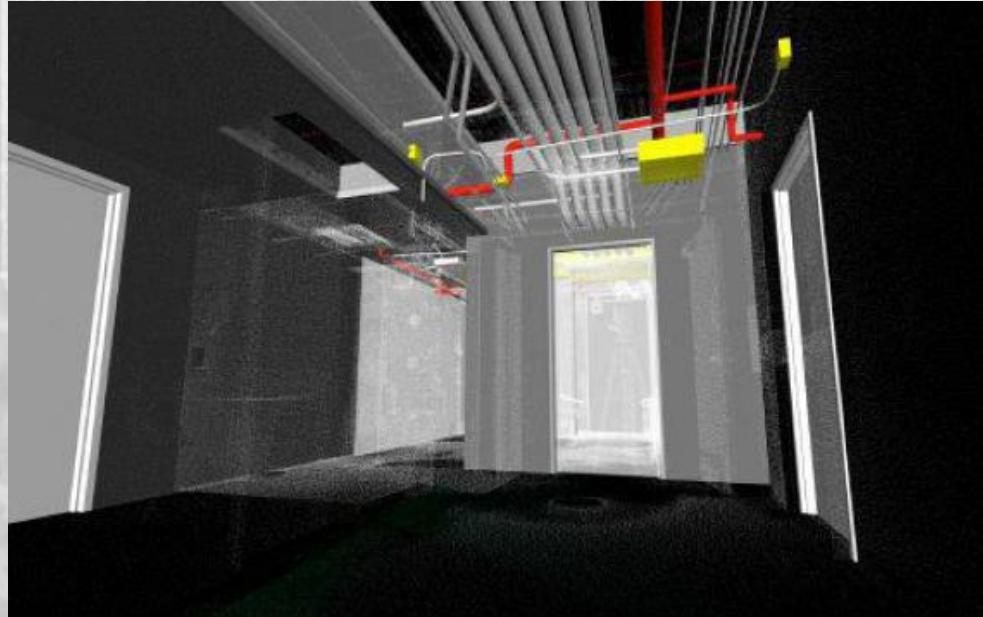
反映实际施工情况



## 2、基于**BIM**的竣工交付关键技术

### 建模方法

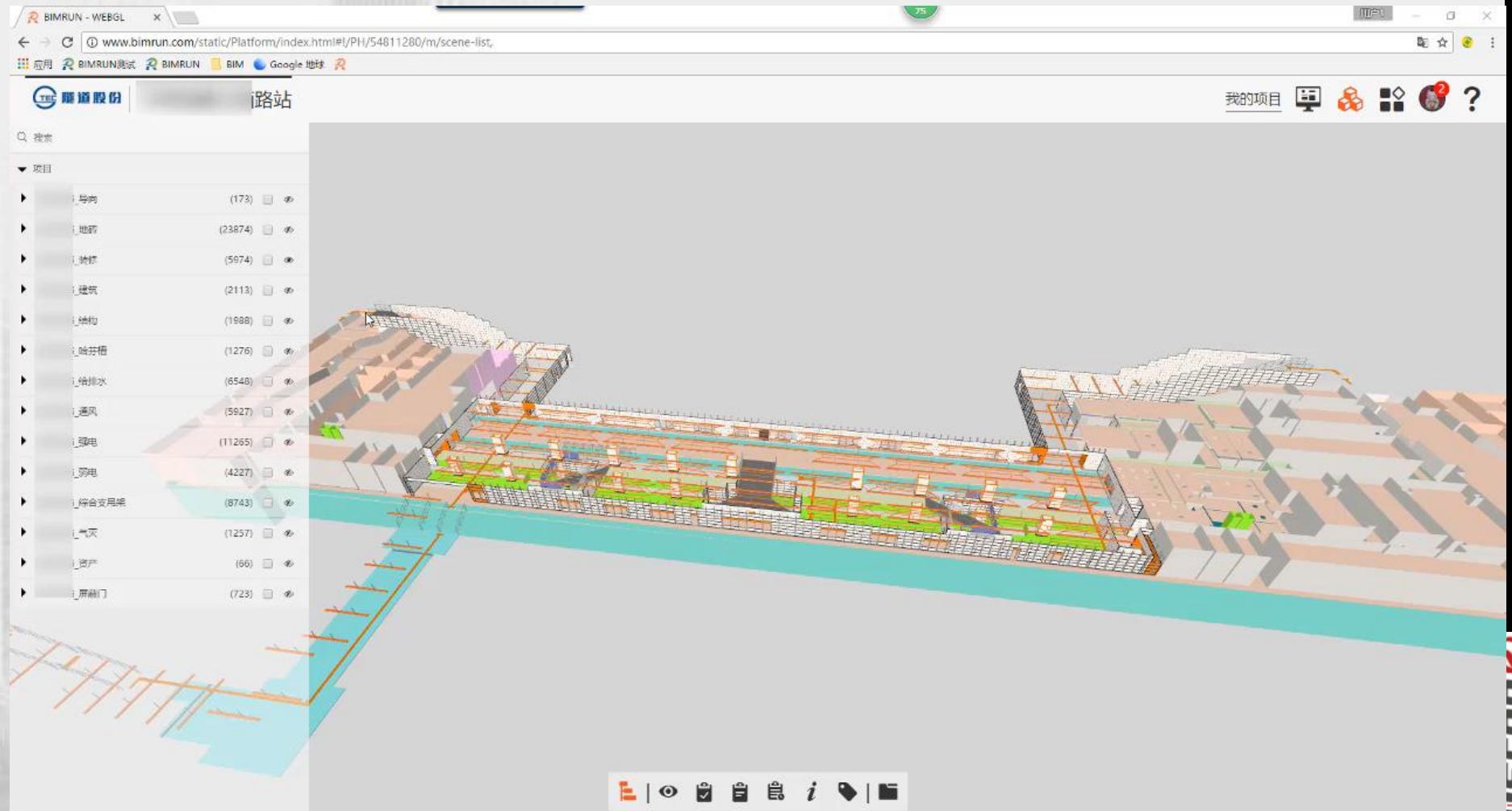
- 设计院移交的设计模型
- 按照竣工图翻模
- 局部按现场实际情况翻模
- 局部点云扫描后人工转模
- 周边环境航拍转模



## 2、基于BIM的竣工交付关键技术

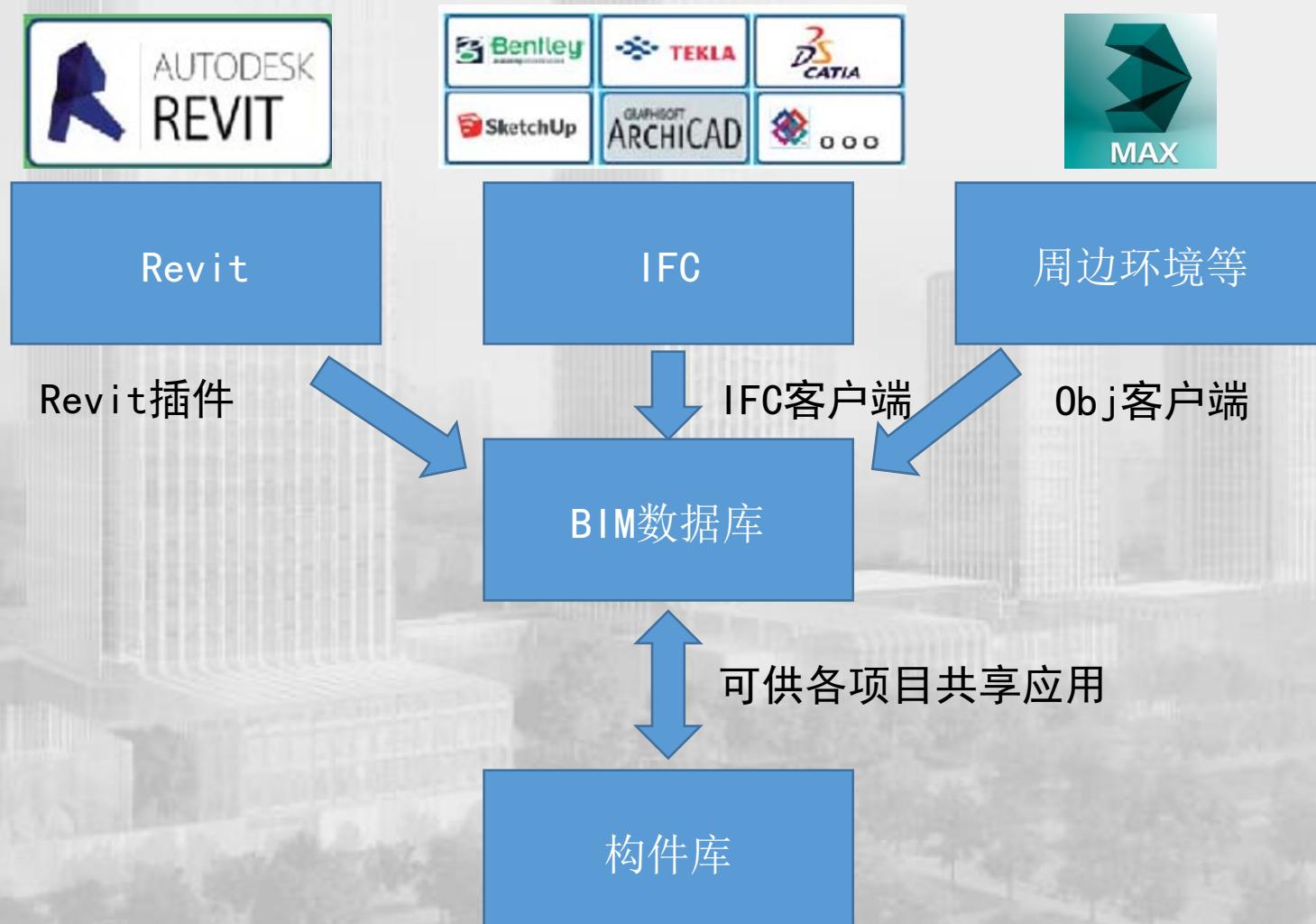
多种专业

- 建筑
- 结构
- 暖通
- 给排水
- 消防
- 照明
- 强电
- 弱电
- 幕墙
- 电梯
- 装饰装修
- .....



## 2、基于BIM的竣工交付关键技术

### 多种模型来源



## 2、基于BIM的竣工交付关键技术

### 数据

#### ● 模型属性

The screenshot displays a web-based BIM management application interface. On the left, a vertical sidebar lists project management modules: 首页 (Home), 模型漫游 (Model Navigation), 模型管理 (Model Management), 文档管理 (Document Management), 进度管理 (Progress Management), 监测数据 (Monitoring Data), and 视频监控 (Video Monitoring). The '模型管理' (Model Management) module is currently selected.

The main content area features a 3D rendering of a bridge foundation structure, specifically a pile foundation. The piles are highlighted in yellow. To the right of the 3D view is a table titled '实例属性' (Instance Properties) showing detailed information for each pile. The table includes columns for 编号 (Number), ID, 名称 (Name), and 编码 (Code). The data is as follows:

编号	ID	名称	编码
1	115223804		
2	115223805		
3	115223806		
4	115223807		
5	115223808		
6	115223809		
7	115223810		
8	115223811		
9	115223812		
10	115223813		

At the bottom of the table, there are navigation links: '显示1,003结果中的1-10.' (Displaying 1,003 results from 1-10.), '批量导出' (Batch Export), and '批量导入' (Batch Import).

## 2、基于BIM的竣工交付关键技术

### 数据

#### ● 业务数据

The image displays three screenshots of the BIMRUN mobile application interface, illustrating its features for managing construction data.

- Screenshot 1 (Left): Project Submission Screen**

This screen shows a grid of nine thumbnail images representing different construction projects. Below the grid is a large button with a plus sign, currently displaying a loading message: "正在提交...". At the bottom, there are three navigation items: "所在项目" (Project Location), "别墅项目" (Villa Project) with a right arrow, "查看权限" (View Permissions), "公开" (Public) with a right arrow, and "选中模型" (Select Model) with a right arrow. A blue "提交" (Submit) button is at the very bottom.
- Screenshot 2 (Middle): Activity Feed - Site Photo Collection**

This screen shows a news feed entry from "罗 [REDACTED]" on June 27, 2017, at 10:47 AM. The post states: "[罗 [REDACTED]]发布了现场图集" (Site photo collection released). It includes a thumbnail image of a group of people in a meeting room. Below the post is a "查看全文" (Read More) button. A timestamp "6月28日 早上08:48" (June 28, 2017, 08:48 AM) is visible above another feed item.
- Screenshot 3 (Right): Platform Exchange Meeting**

This screen shows a photograph of a conference room during a "BIM Platform Exchange Meeting" on July 3, 2017, at 11:24:11 AM. Several people are seated around a long table, looking at documents or screens. The background shows a banner with the text "BIM平台交流会" (BIM Platform Exchange Meeting).

## 2、基于BIM的竣工交付关键技术

### 数据

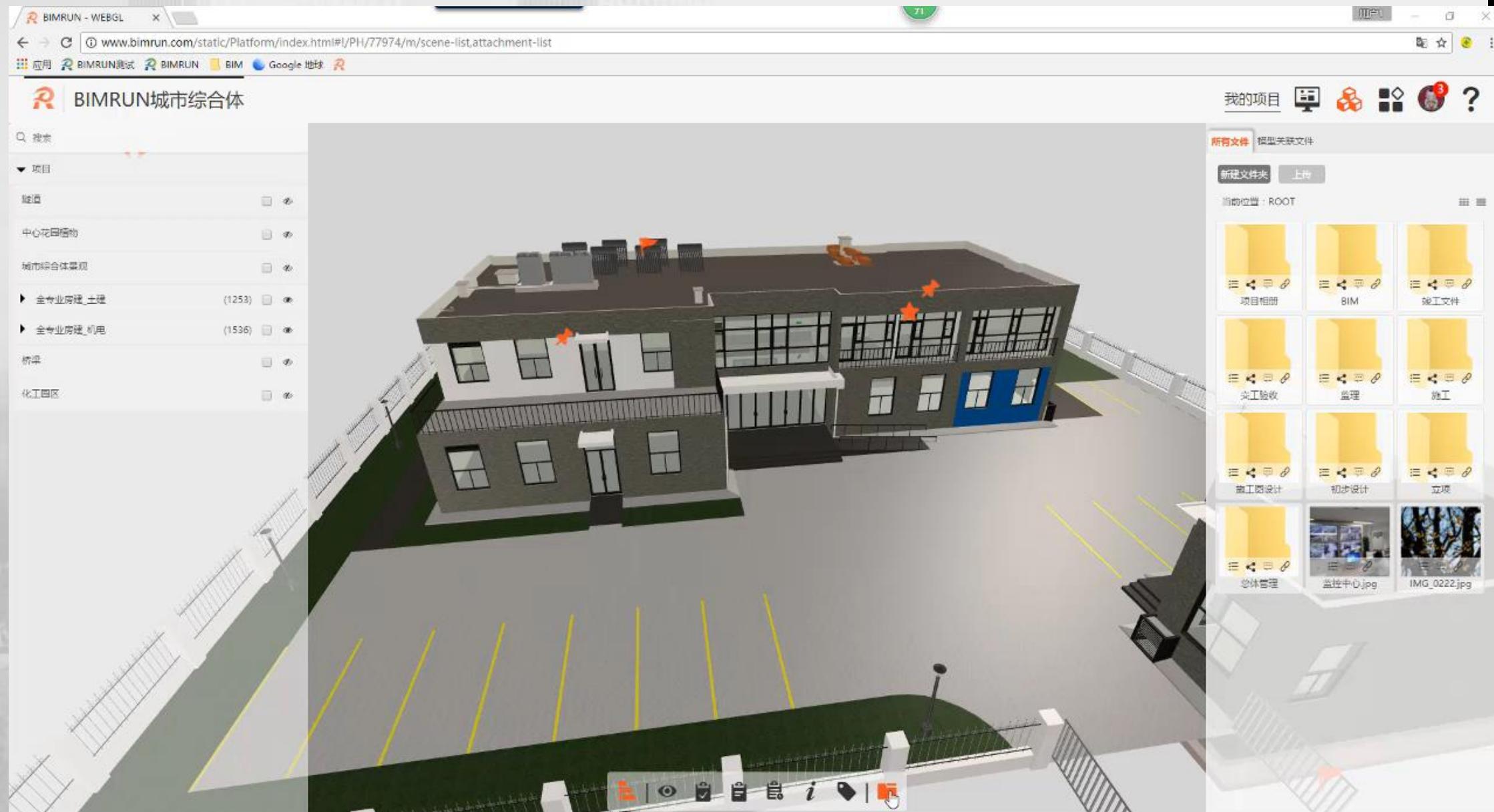
#### ● 业务数据

The image displays three screenshots of the BIMRUN mobile application interface:

- Screenshot 1: BIMRUN Mobile App**
  - Top bar: BIMRUN Mobile App
  - Search bar: 按关键字查询 (Search by keyword) with a magnifying glass icon.
  - Search bar: 扫二维码查询 (Scan QR code) with a camera icon.
- Screenshot 2: 二维码/条码**
  - Top bar: 二维码/条码
  - Content area shows a QR code being scanned by the app's camera interface.
- Screenshot 3: BIMRUN**
  - Top bar: BIMRUN
  - 构件编码 (Component Code): YB-74
  - 构件类型 (Component Type): DBD-77-2013
  - 构件名称 (Component Name): YB-74
  - 所属项目 (Project): 前滩52-01项目
  - 构件工序进度 (Component Process Progress):
    - YB-74预制 (YB-74 Prefabrication): checked (checked)
    - YB-74进场 (YB-74 Arrival): unchecked (unchecked)
    - YB-74安装 (YB-74 Installation): unchecked (unchecked)
  - Bottom buttons: 继续 (Continue) and 结束 (End)

## 2、基于BIM的竣工交付关键技术

资料



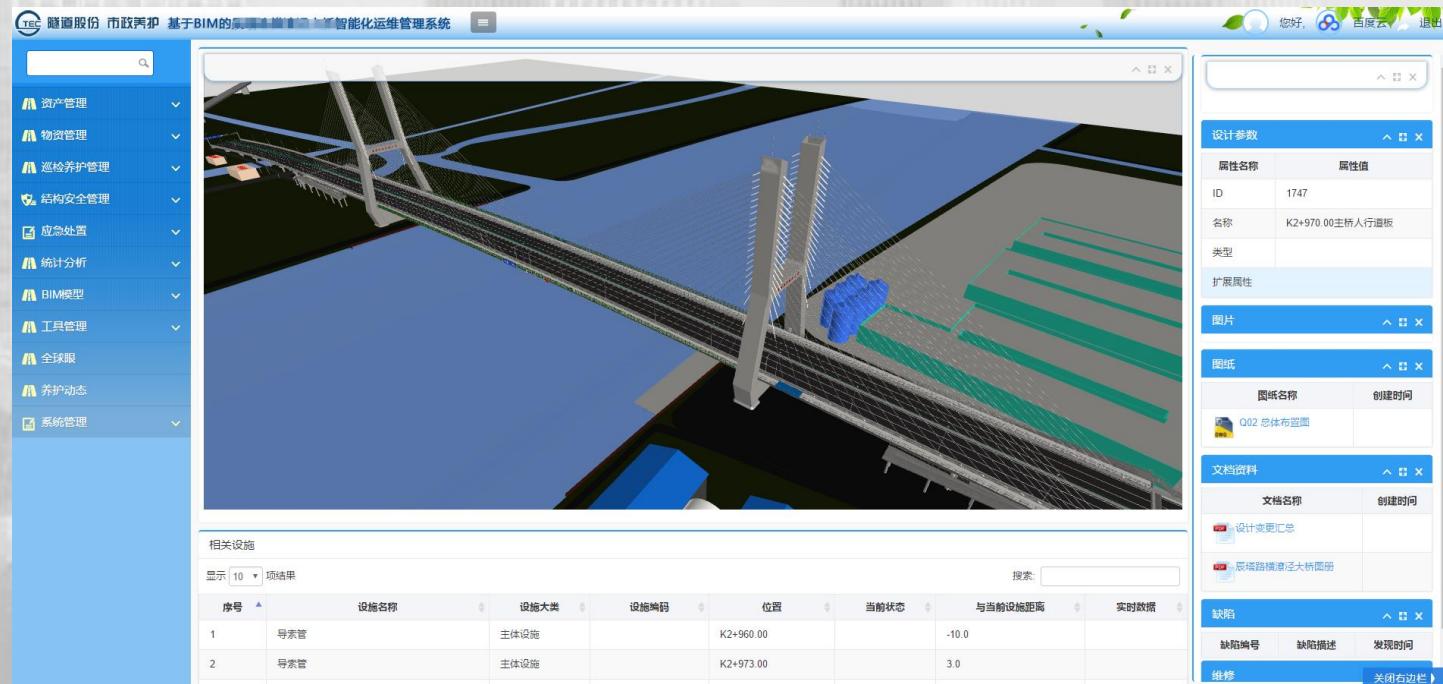
## 2、基于BIM的竣工交付关键技术

序号	交付形式	交付载体	资料整理时间	运维可用性
1	传统文件型交付	模型文件（含属性参数）文档	竣工验收阶段	大量初始化工作
2	交互文件型交付	IFC、COBie等交互文件文档	竣工验收阶段	模型信息可快速导入 文档仍需初始化关联
3	私有数据格式交付	私有格式BIM数据库（模型、数据、文档）	竣工验收阶段	可直接导入
4	公开数据格式交付	遵循P-BIM系列标准的BIM数据库	竣工验收阶段	可直接导入
5	基于协同平台的私有数据格式交付	平台、平台API及数据库	项目建设过程	可直接导入
6	基于协同平台的公开数据格式交付	平台、平台API及数据库	项目建设过程	可直接导入

## 2、基于BIM的竣工交付关键技术

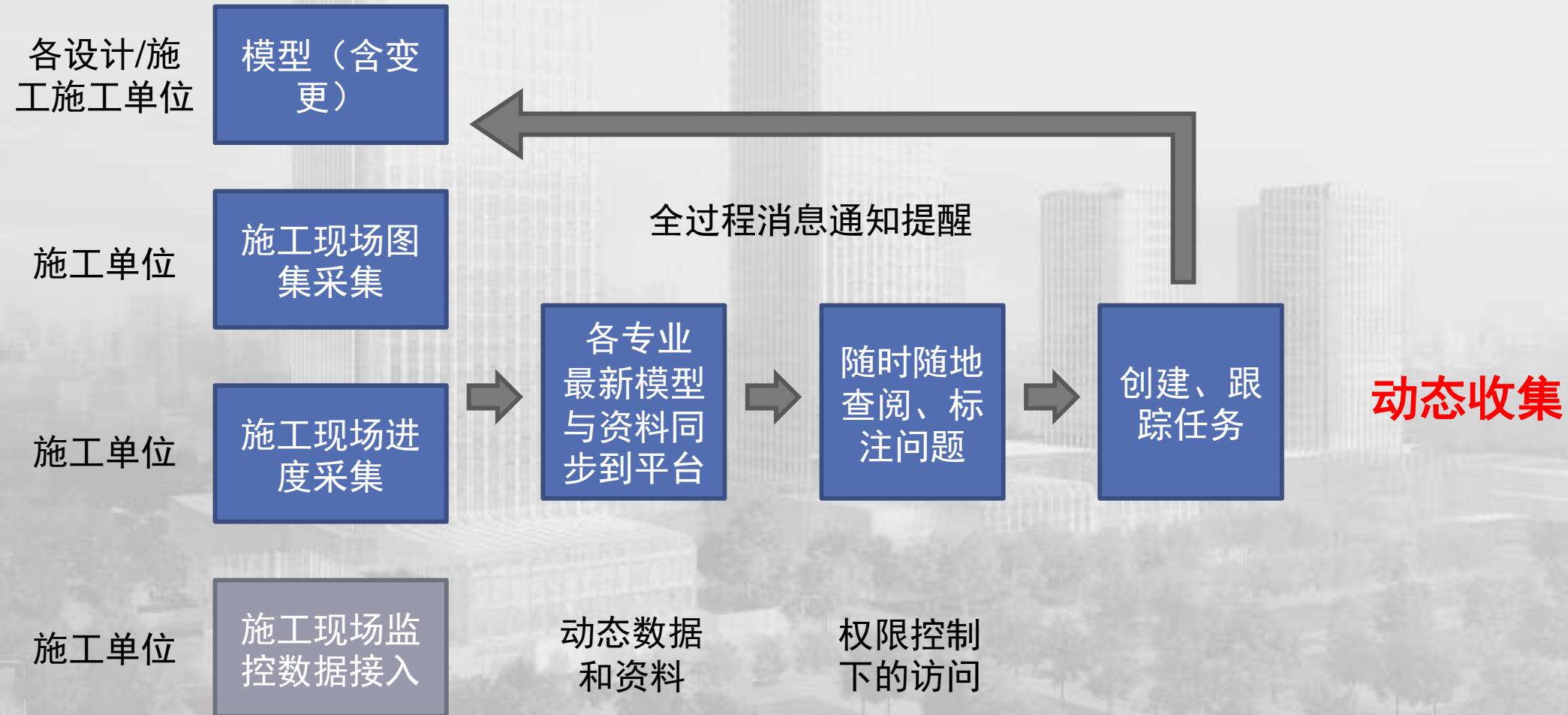
### 基于协同平台的私有数据格式交付

- 按竣工目录要求组织的电子文档库（含模型文件），大部分文档与模型关联；
- 以数据库方式存储的模型（构件级）、属性、业务数据
- 开放API供后续运维阶段软件调用



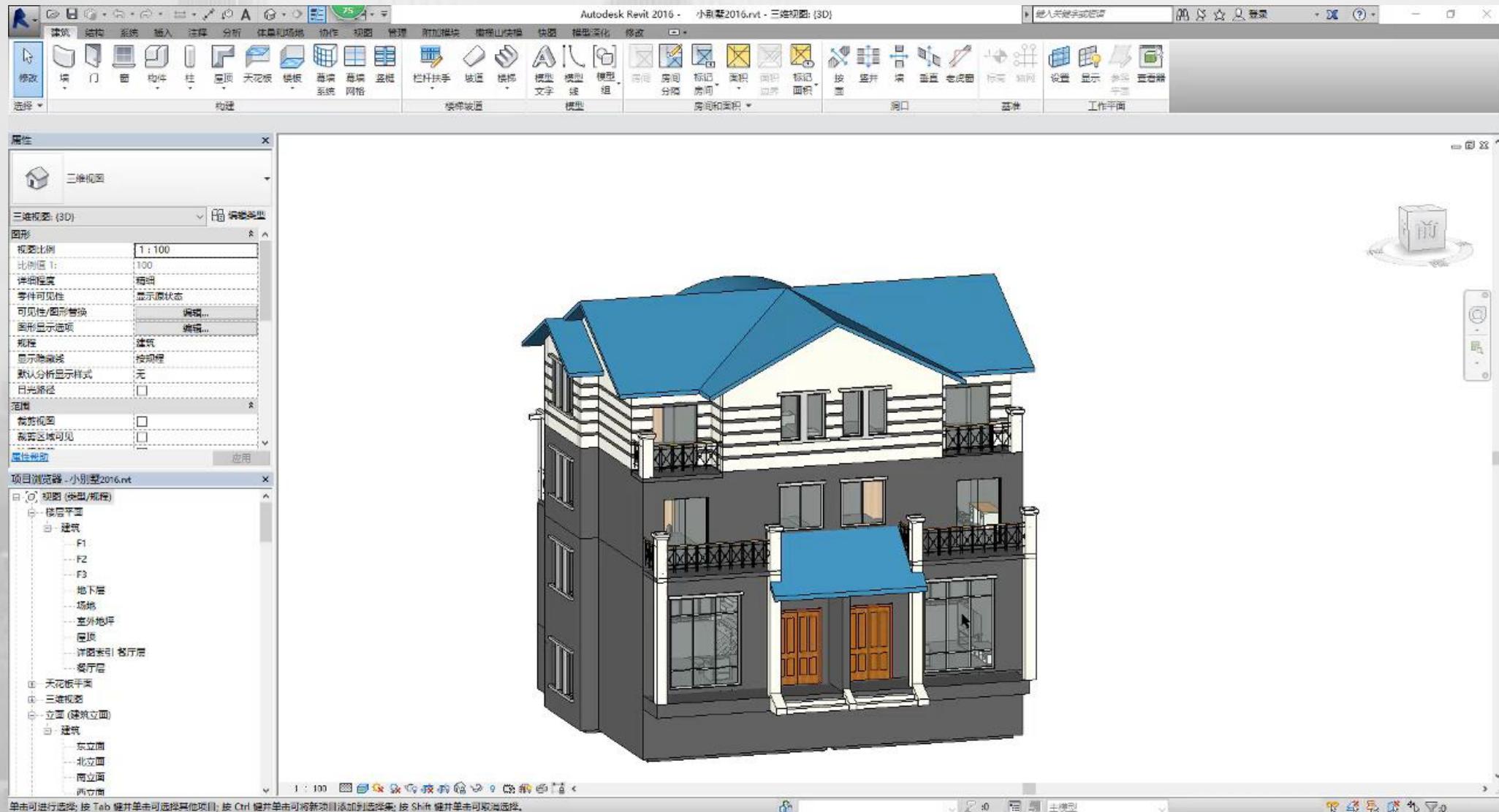
## 2、基于BIM的竣工交付关键技术

基于协同管理平台在项目实施过程中不断汇集、细化模型、资料和数据  
为运维阶段提供平台/平台API及数据库的方式移交



## 2、基于BIM的竣工交付关键技术

多专业模型→平台



## 2、基于BIM的竣工交付关键技术

The screenshot shows a BIM software interface. On the left, there's a sidebar with a search bar and a '项目' (Project) section containing four items: '船厂滨江\_地形', '跨泵站人行高架步道桥', '船厂滨江\_环境', and '船厂滨江\_植物'. On the right, there's a main workspace with a large empty area, a top navigation bar with icons for search, project, and help, and a bottom toolbar with various icons. A floating window titled '绿地区域一' (Green Area One) displays a 3D rendering of a green space next to a body of water, with options to '查看详情' (View Details), '共享' (Share), '评论' (Comment), and '关联' (Associate).

### 功能

- 项目模型的场景分解、上传、同步、整合
- 项目模型的跨平台浏览、查询定位、视图加载、视点定位
- 基于模型的信息标注、任务跟踪、分享协同
- 相关属性、文档、图像、动态数据的维护、关联与查询

### 特点

- 支持主流模型文件格式
- 支持模型差量更新模式
- 跨平台、免插件
- 轻量化
- 快速加载、流畅漫游

### 3、基于BIM的运维管理关键技术

运维BIM模型（Model）

+

监控、监测等动态数据集成（Data）

+

基于BIM的运维管理系统（Software/Hardware）

+

基于BIM的运维管理模式（Management）

+

运维团队（Team）

动态变化

以三维可视化视角集成、显示、管理运维数据

### 3、基于BIM的运维管理关键技术

运维模型 ≠ 竣工模型

满足运维管理对**管理对象**的基本建模要求  
**建模范围、几何外观、颜色材质、模型划分、数据定义**

周边环境

设施设备

家具

空间

.....

基本准确的外  
围尺寸

区分子系统

增强现实感

管理精度

信息标注精度

设施设备编码

运维相关参数

设施设备关系

模型是动态变化的  
**空间分隔变化**  
**设施设备更新**  
**大中小修**

### 3、基于BIM的运维管理关键技术

#### 动静态数据集成



以竣工资料为主的静态数据  
以各专业系统为来源的动态数据  
以移动端采集为主的现场检查数据  
IBMS、BAS、EMS、CMMS、  
SHMS.....

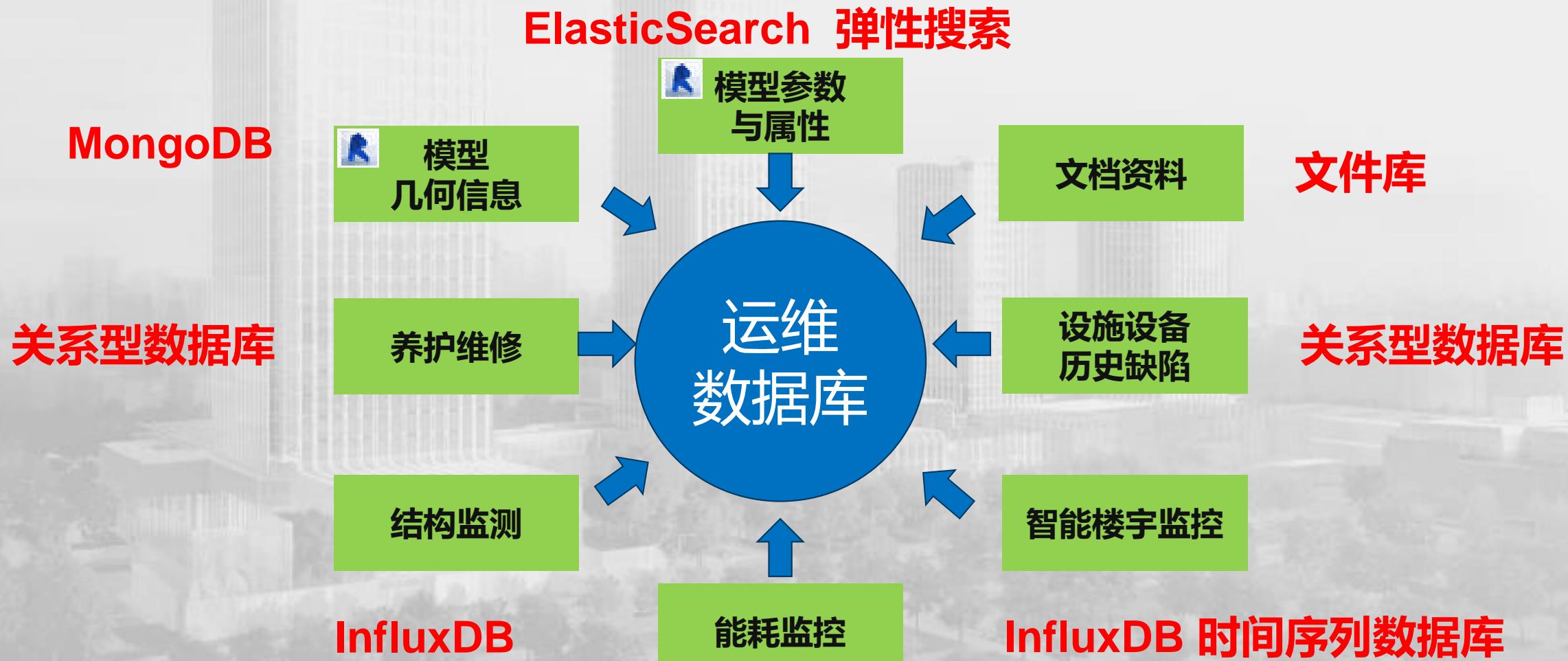
### 3、基于**BIM**的运维管理关键技术

#### 基于**BIM**的运维管理系统

- 能接收竣工移交的数据文件、数据库和文档 —— **数据导入**
- 能动态更新模型 —— **模型导入与同步**
- 能整合各类静态动态数据、文档 —— **数据集成、关联与存储**
- 具备运维管理的基本功能（监控、预警报警、计划管理、巡检、维修、应急处置） —— **运维管理业务功能**
- 能利用空间及属性数据为运维决策提供支持 —— **参数化模拟**
- 数据、文档能通过三维可视化的方式展现 —— **数据可视化**

### 3、基于BIM的运维管理关键技术

#### 海量数据的存储



### 3、基于BIM的运维管理关键技术

轻量化——满足用户快速加载、流畅漫游的期望

The screenshot illustrates the data pipeline for BIM management, divided into three main stages:

- 数据层面 (Data Layer):** This stage is represented by a blue box containing the "后台处理环节" (Backend Processing Stage). It shows a list of building components and their status (e.g., 未上传, 待审核, 已通过, 待发布, 待发布) in a tree-like structure.
- 技术层面 (Technical Layer):** This stage is represented by another blue box containing the "前端加载/操控" (Front-end Loading/Control). It displays a 3D model of a building with various floor plans and sections visible.
- 上传环节 (Upload Stage):** This stage is shown on the left side of the interface, listing files being uploaded or processed. A large orange arrow points from the "后台处理环节" towards the "前端加载/操控" stage, indicating the flow of data from processing to the final user interface.

At the bottom of the interface, there is a toolbar with various icons for file operations like upload, download, and search.

### 3、基于BIM的运维管理关键技术 基于三维模型的设施设备信息卡

延安东路隧道运维管理平台 您好, 退出

The screenshot displays the Yan'an East Tunnel Operation and Maintenance Management Platform. The main interface features a 3D visualization of a fire pump room with various pipes, valves, and equipment. To the right of the 3D model is a detailed equipment information card.

**设计参数 (Design Parameters)**

属性名称 (Attribute Name)	属性值 (Attribute Value)
ID	2439
名称 (Name)	1#井消防泵房4#稳压泵
类型 (Type)	Q=1L/S,H=87M,N=5KW

**图片 (Images)**

Three small thumbnail images showing different views of the fire pump room equipment.

**图纸 (Drawings)**

图纸名称 (Drawing Name)	创建时间 (Creation Time)
XBD9.7-1-25GDL-SQL800消防增压稳压设备	
消防水泵、稳压泵等控制图	
XBD6.1-5-50GDL-SQL1000消防增压稳压设备	
XBD10-1.42-25GDL-SQL800消防增压稳压设备	

**相关设备 (Related Equipment)**

显示 10 项结果 搜索:

序号 (Index)	设备名称 (Equipment Name)	设备大类 (Equipment Category)	设备编码 (Equipment Code)	位置 (Location)	当前状态 (Current Status)
表中数据为空					

显示第 0 至 0 项结果, 共 0 项 上页 下页

文档资料 关闭右边栏

### 3、基于BIM的运维管理关键技术 基于三维模型的设施设备信息卡

The image displays three screenshots of a mobile application interface, likely for facility equipment management using BIM technology.

- Screenshot 1: Component Information Card (构件信息卡)**
  - Header: 构件信息卡
  - Content:
    - 板F-0001 (Panel F-0001) with a 3D model of a long rectangular panel.
    - 显示周边 (Show Surroundings) button.
    - 标注 (Annotations):
      - 有破损 (Damaged) with an icon showing a blue area on a grey background.
      - 有渗漏 (Leaking) with an icon showing water droplets on a grey background.
    - 质量问题是 (Quality Issues):
    - 任务 (Tasks):
      - 破损情况检查 (Check for damage) with a character icon.
      - 漏水情况检查 (Check for leakage) with a character icon.

20:03 0.73K/s 移动 4G 联通

← 构件信息卡 板F-0001 显示周边

标注 有破损 有渗漏 质量问题 质量问题 任务 破损情况检查 漏水情况检查

  
- Screenshot 2: File Management (文件)**
  - Header: 文件
  - Content:
    - > 根目录 (Root Directory)
    - 总体管理 (Overall Management)
    - 设计图纸 (Design Drawings)
    - 施工方案 (Construction Plan)
    - 变更 (Change)
    - 竣工文件 (Completion Document)
    - BIM
    - 图像资料 (Image Materials)

20:03 0.73K/s 移动 4G 联通

← 文件 > 根目录 总体管理 设计图纸 施工方案 变更 竣工文件 BIM 图像资料

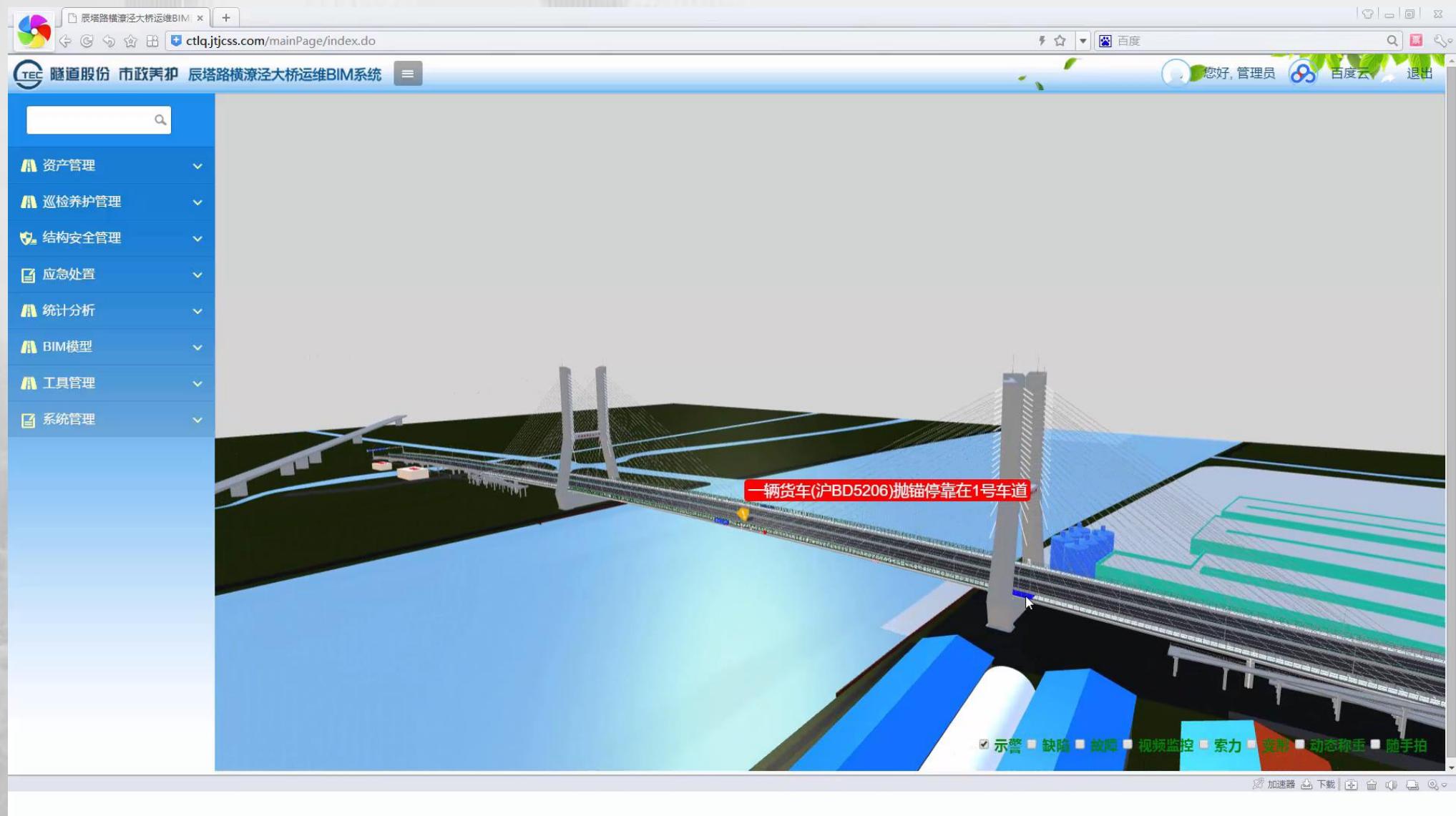
  
- Screenshot 3: Document Viewing (文档查看)**
  - Header: 文档查看
  - Content:
    - 上木01.pdf (Upper Wood 01.pdf)
    - A large thumbnail image of a PDF document showing a detailed 3D BIM model of a wooden structure.

20:03 0.73K/s 移动 4G 联通

← 文档查看 上木01.pdf

### 3、基于BIM的运维管理关键技术

#### 基于BIM的集成监控



### 3、基于BIM的运维管理关键技术

#### 基于BIM的集成监控

延安东路隧道运维管理平台 您好，退出

The platform interface includes a left sidebar with navigation links such as 综合监控与预警, 养护信息, 巡检管理, 应急处置, 文档管理, 结构安全管理, 竣工模型, and 系统管理. The main area features a large 3D BIM model of the tunnel, a live video feed from a camera at NK1+200, and a summary statistics section.

监控	消防	照明	通风	供电		
序号	设备名称	设备编号	位置	规格	与报警点距离	当前状态
1	NK0+985.00漏泄电缆	601200221	NK0+985.00		0.0	在用
2	NK0+985.00漏泄电缆	601200222	NK0+985.00		0.0	在用
3	NK0+985.00漏泄电缆	601200223	NK0+985.00		0.0	在用

### 3、基于**BIM**的运维管理关键技术

基于属性数据的巡检养护计划提醒



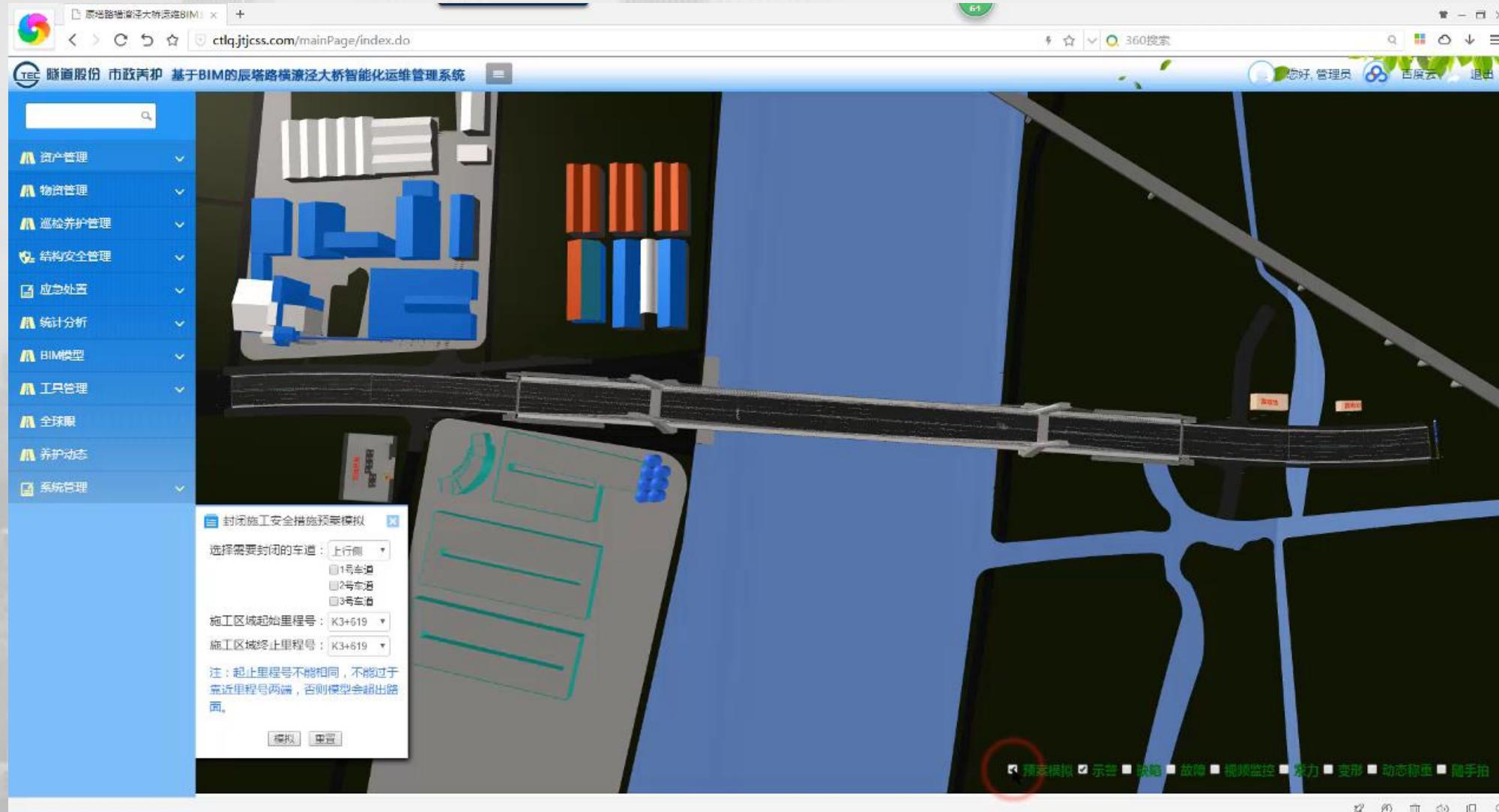
### 3、基于BIM的运维管理关键技术

#### 基于空间数据的应急预案模拟



### 3、基于BIM的运维管理关键技术

#### 基于空间数据的应急预案模拟



### 3、基于**BIM**的运维管理关键技术

#### 数据可视化

运维相关的数据 在 三维模型上 的 可视化表现

监测  
监控  
人流  
能耗  
租金  
巡检  
养护  
计划  
故障  
缺陷  
问题  
事件  
.....

单个模型  
楼层  
系统  
空间  
.....

标签  
文字  
视频  
动态数值  
颜色  
云图  
变形  
移位  
.....

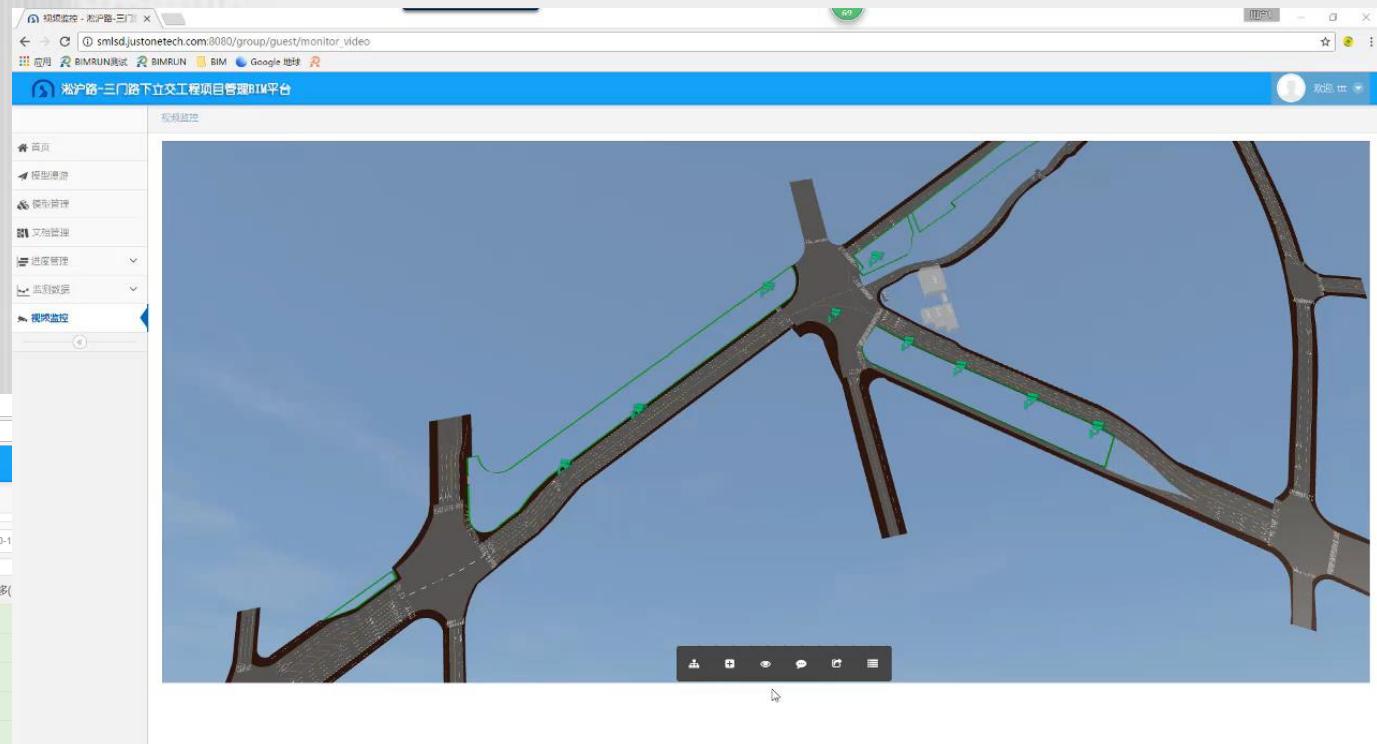
### 3、基于BIM的运维管理关键技术

#### 数据可视化

The screenshot displays a 3D model of a bridge structure with various monitoring points marked by colored circles (red, blue, yellow) and arrows indicating data flow or status. To the right, a table lists vertical displacement data for five monitoring points:

点号	本次垂直位移(
建筑物沉降测点JC1	2.0
建筑物沉降测点JC2	0.1
建筑物沉降测点JC3	5.0
建筑物沉降测点JC4	5.0
建筑物沉降测点JC5	5.0

Below the table is a line chart titled "测值数据走势图" (Trend Chart of Measured Data) showing a steady upward trend from approximately 1.0 to 1.8 over time.



### 3、基于BIM的运维管理关键技术

#### 数据可视化

The screenshot displays the Yan'an Avenue Tunnel Operation and Maintenance Management Platform. The interface includes a top navigation bar with the platform name, user status, and exit options. On the left, a vertical sidebar lists various management modules: General Monitoring and Early Warning, Maintenance Information, Patrol Management, Emergency Response, Document Management, Structural Safety Management, Inspection Points and Channels, Structural Technical Status, Construction Model, and System Management. The main content area features a 3D BIM model of a tunnel segment, visualizing inspection routes and defect locations. A legend indicates that green lines represent inspection routes and red areas represent defects. Below the 3D model is a search bar and a table titled 'Structural Technical Status Evaluation'.

评估等级	请选择	关键字	搜索	重置	跳转	+ 新增			
结构技术状况评定									
管理单元	管理单元编号	里程起点	里程终点	评定分数	评定等级	评定时间	附件	操作	
1	南线浦东敞开段	S19	SK1+982.00	SK2+112.00	80.6	I级	2016-05-09		
2	南线浦东矩形段	S18	SK1+730.00	SK1+982.00	80.6	I级	2016-05-09		

# 感谢聆听！



WORKING TOGETHER

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