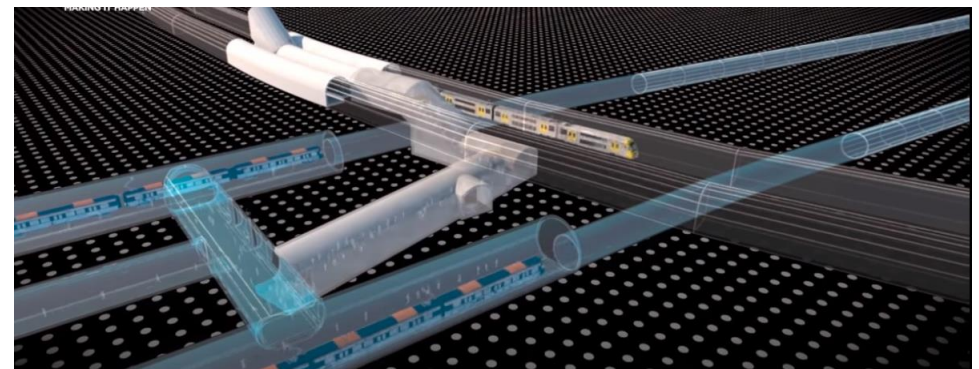




# De-risking Railway PPPs with BIM

José Cordovilla - Director  
*Advisory Services*

Czech Republic – Spain Railway Business Forum  
Prague 21/05/2024



# TYPSA - at a GLANCE

3.600 employees

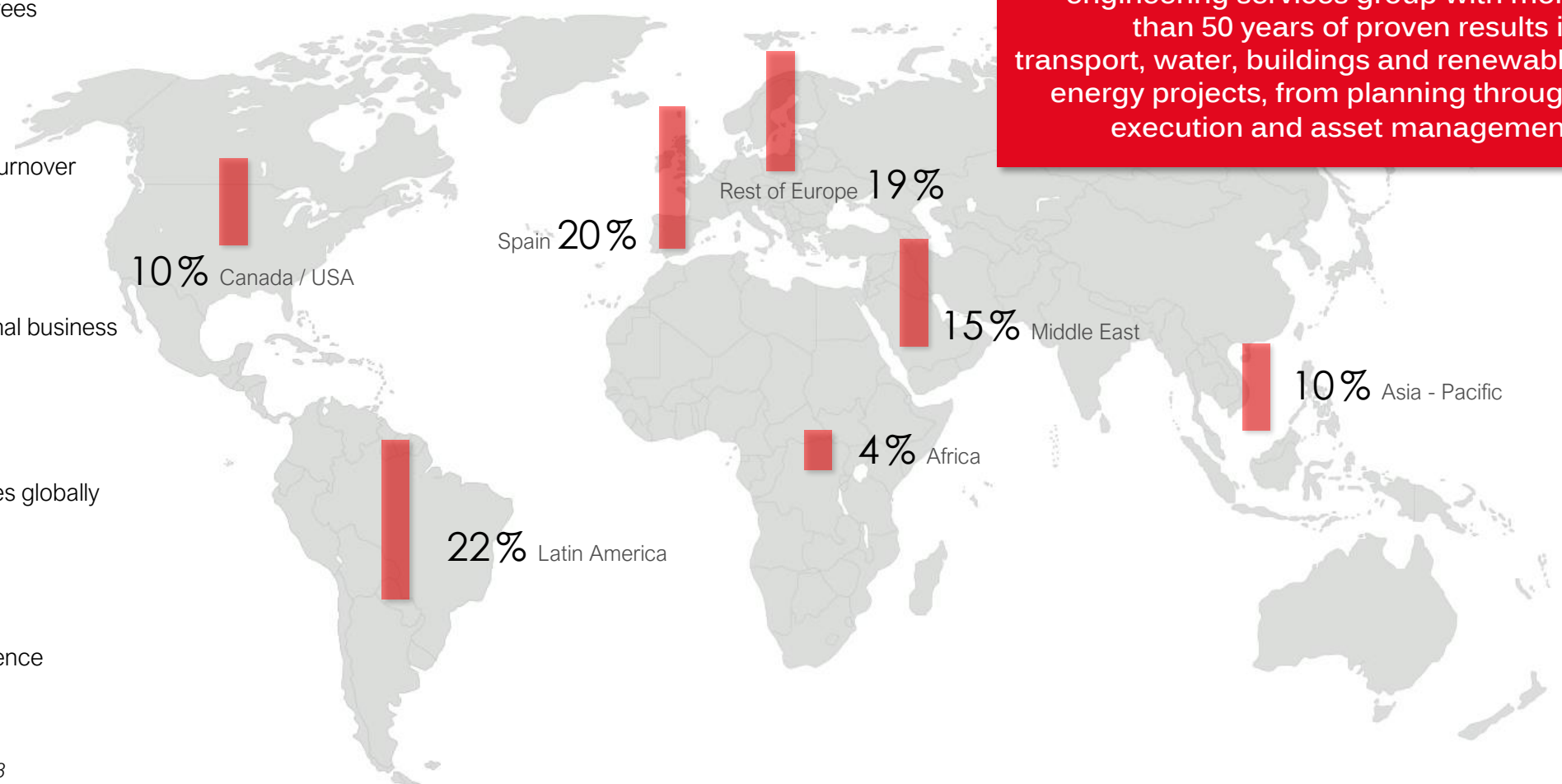
360M € turnover

80% international business

51 permanent offices globally

58 years of experience

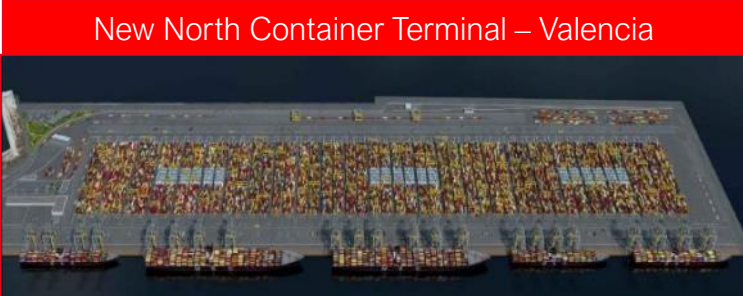
TYPSA is an independent consulting and engineering services group with more than 50 years of proven results in transport, water, buildings and renewable energy projects, from planning through execution and asset management.



\*Figures as of December 2023



# We design and execute some of the most outstanding and challenging projects worldwide





# Services Portfolio



## CONSULTING

- Strategic Advisory
- Transaction Advisory & PPPs
- Asset Management & Operations
- Digital engineering
- Master Planning & Feasibility studies
- Technical & Commercial Advisory
- Sustainability & Climate



## DESIGN & TENDER SUPPORT

- Program & project management
- Preliminary designs
- Final/detailed designs
- BIM modelling / digital twin
- Preparation of tender documentation
- Tender and contract award services
- Right of way permitting



## CONSTRUCTION & OPERATION SUPERVISION

- Works supervision
- Independent Engineering
- Health and safety coordination
- Environmental control & monitoring
- Construction project management
- Performance monitoring
- Auditing



# Private participation in railway infrastructure



## WHO DETERMINES PRICE & QUALITY

## SOLUTION TO THE MONOPOLY PROBLEM

MARKETS



- Private contracts

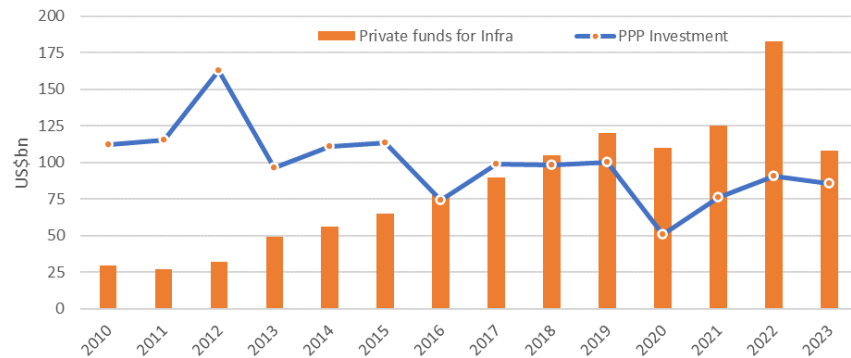
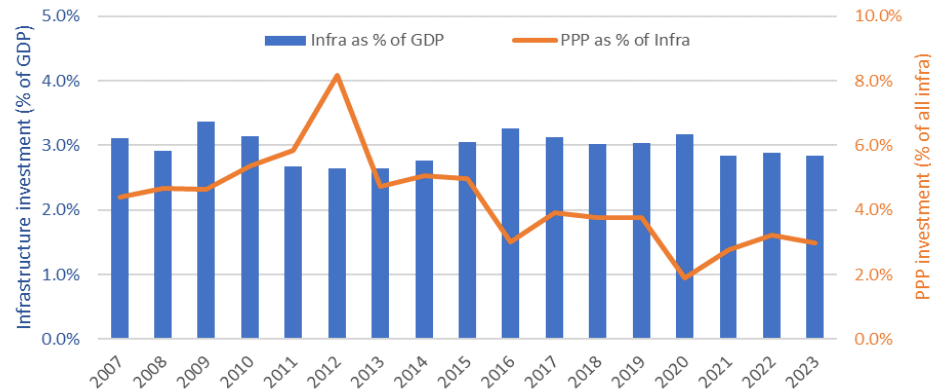
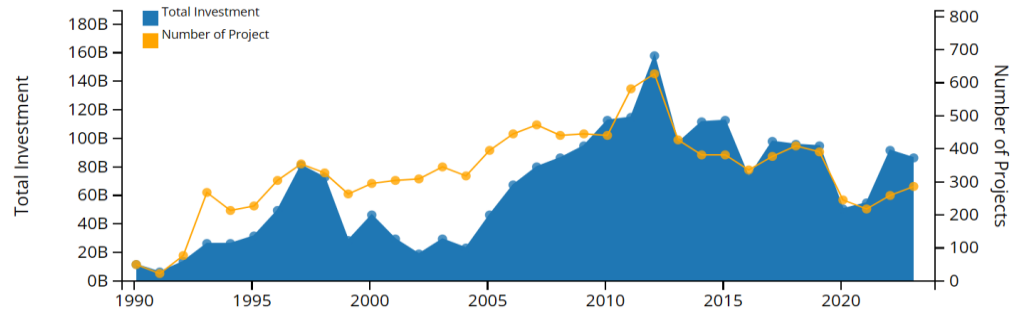
- Concession contracts

- Discretionary regulation

POLITICS

- Public enterprises

# PPP Trends



Source: Own research based on data from InfraPPP, World Bank, IMF and GIHub

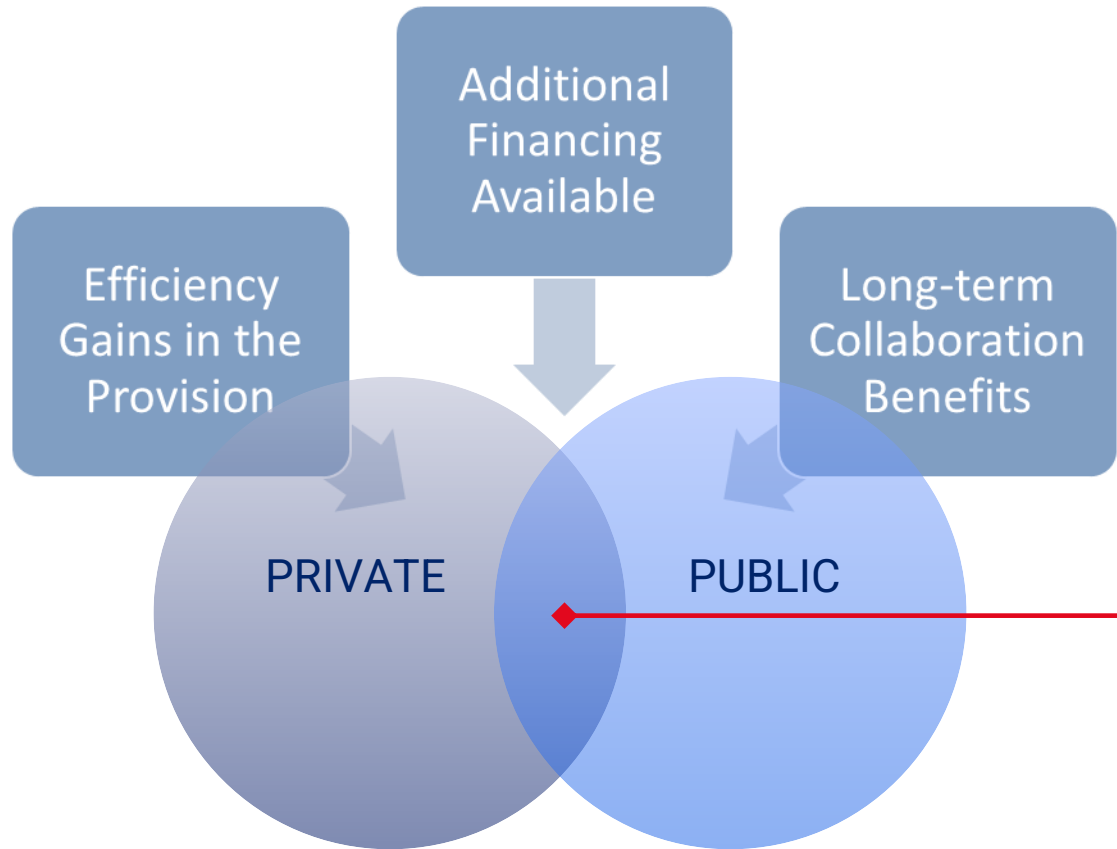
## Key Trends – All PPPs

- Private participation in infra grew x10 between 2002 and 2012
- Since 2012:
  - ✓ Global GDP up by 30%
  - ✓ Investment in infra approx. 3% of GDP/year
  - ✓ PPP regulations enacted in 70+ countries
  - ✓ Private capital raised for infra funds x5
  - ✗ PPP share of infra investment dropped from 8% to 2%.

## Key Trends – Railway PPPs

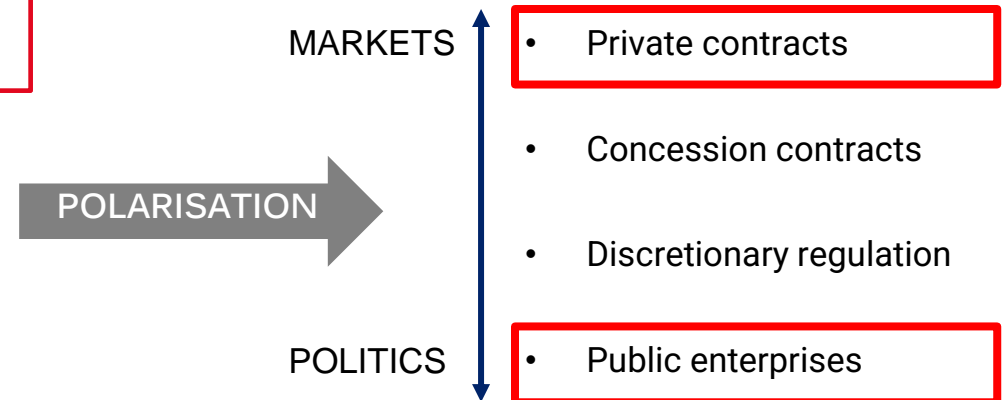
- Decline in number of projects. Average project size increased
- Shift to availability-based contracts
- Shift to sub-systems, away from integrated projects
- Longer transaction periods than other types of PPPs
- 37% of all PPP projects at tender stage are railways
- 62% of all PPP projects at planning stage are railways

# PPP Rationale & Challenges



## Vulnerable bond:

- Long-term contracts on monopolistic assets
- Difficult risk transfer -> public deficit implications
- Complex systems and interfaces (**interface risk**)
- Rapid change in technologies and user preferences
- Private investor vulnerable to government changes
- Government vulnerable to private investor's monopoly



## HS2 High-speed railway line

### Phase 1: Lot S1 (Euston Tunnels & accesses)

Length: 8 km (5 miles) – 7.3 km twin TBM tunnel

### Phase 1: Lot S2 (Northolt Tunnels)

Length: 16.3 km (10.1 miles) – 13.7 km twin TBM tunnel

### Phase 2b: Lot 3 (sections L3 and L4)

Length: 112 km (69.6 miles)



## BIM helps de-risk PPP Projects because it enables:

- ✓ Transparency and trust in critical information
- ✓ Enhanced collaboration between parties
- ✓ Clearer risk allocation, especially interface risk
- ✓ Improved cost certainty
- ✓ Reduced rework
- ✓ Lower risk of delays
- ✓ Agile management of changes
- ✓ Smoother procurement & due diligence
- ✓ Efficient asset monitoring & management

BIM facilitates a TRUST FRAMEWORK for all stakeholders during all project stages

## Toronto Subway expansion

### Scarborough subway Extension (SSE)

Runs from: Kennedy station to Sheppard/McCowan

Length: 7.8 km (4.8 miles) TBM tunnel

Stations: 3

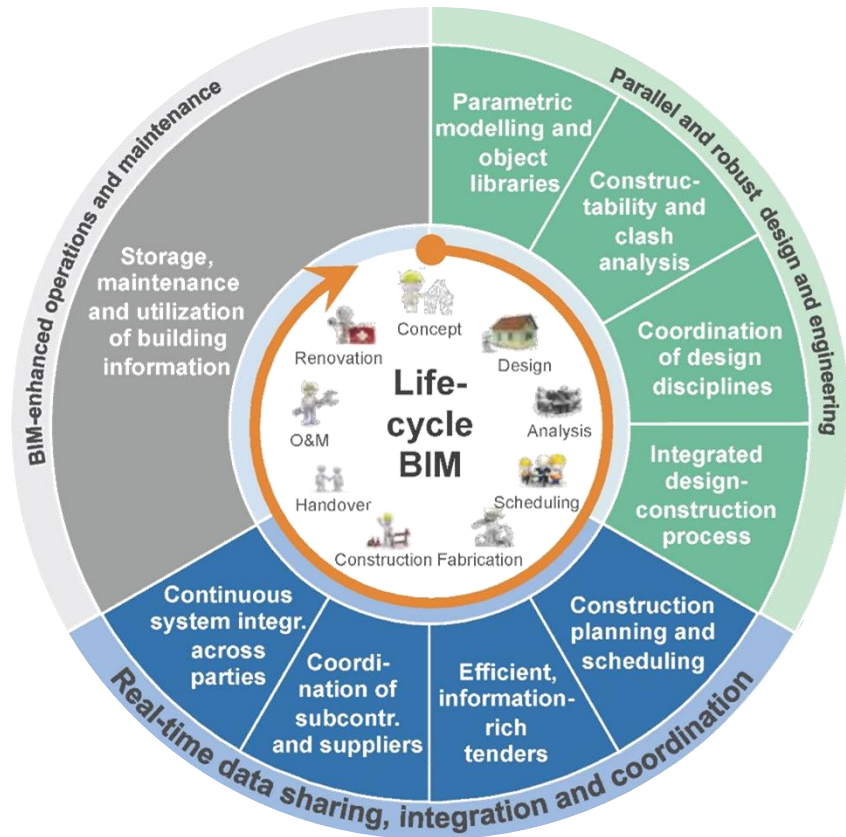
### Eglinton Crosstown West Extension (ECWE)

Runs from: Mount Dennis LRT to Renforth Gateway  
Length: 9.2 km (5.7 miles) TBM tunnel, at grade and elevated alignment





# PPP CYCLE & BIM



Source: BCG & own research

## CONTRACTUAL APPLICATIONS OF BIM MODELS THROUGHOUT THE LIFE CYCLE

### Performance Specifications

Design parameters, O&M requirements assigned to components and assets of the BIM model, contractually.

### Interface Requirements

Interactions & dependencies between civil works, superstructure, rolling stocks, and systems.

### Design & Constr. Standards

Building codes, safety & quality regulations integrated into the model for compliance checking.

### Risk Allocation Provisions

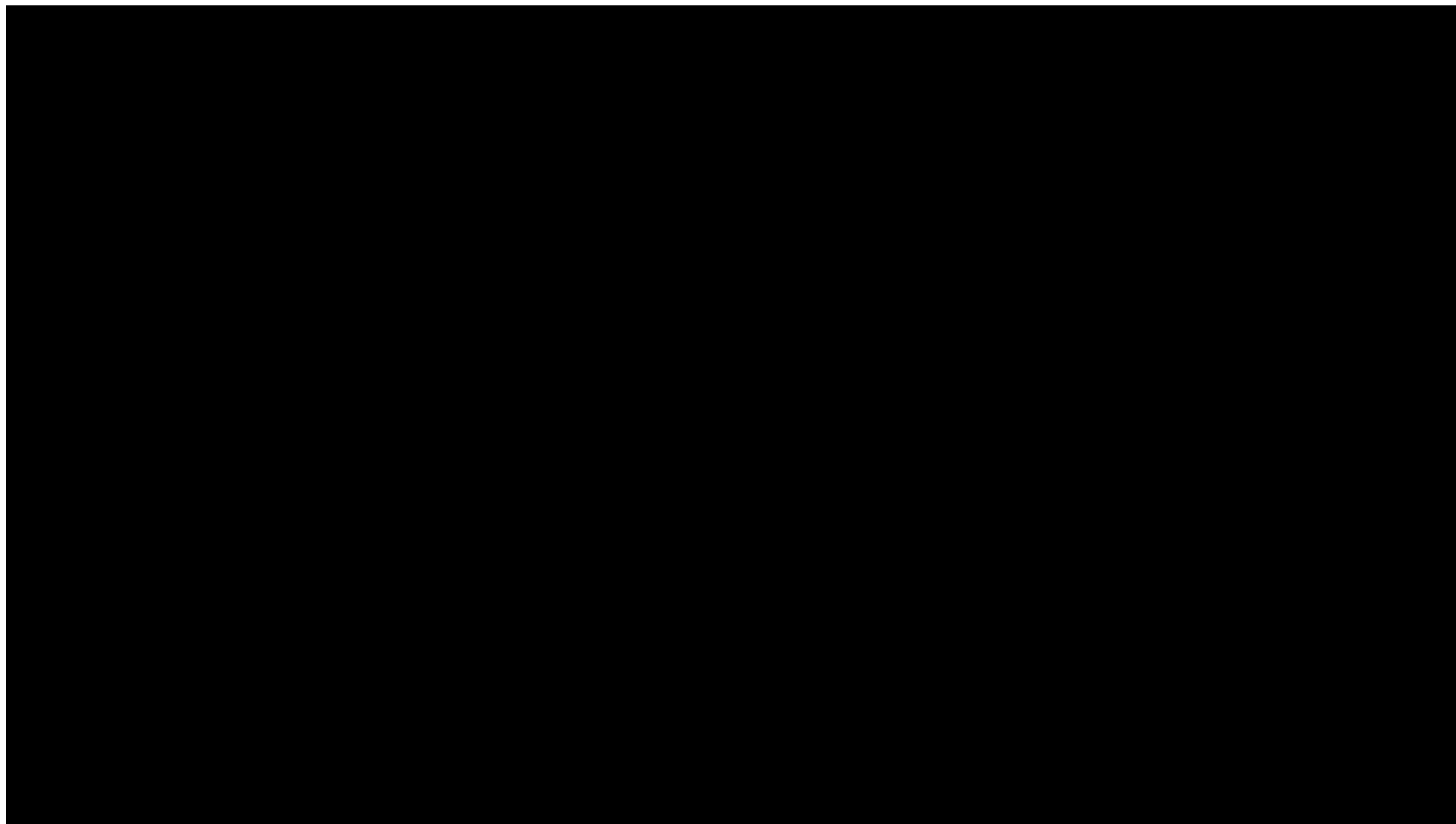
Delays, cost overruns, and performance failures for specific elements in the BIM model as a central platform for contract management.

### Asset Management

Digital twin of the built environment, including as-built information, O&M schedules, and service performance data.

# TYPSA & BIM

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