The 3DEXPERIENCE platform to foster Innovation in Mobility

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Rail in Mobility Services | Context & Challenges

Infrastructure saturation
Increasing need for passenger & freight

Rail is the most sustainable mass transport mode ..for how long?

Rail in Mobility Services

Context & Challenges

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Infrastructure saturation
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Rail is the most sustainable mass transport mode ..for how long?

31 Railway Undertakings per EU country in average

7.7% on Rail / all inland passenger transport in EU

Significant % of EU trains delayed by more than 5 minutes

Coopetition between new transport modes and more railway undertakings

Rail Attractiveness?

Innovate faster to collaboratively provides Attractive and Robust Mobility & Transportation Services
Digital Twins for faster & continuous Innovation

**DIGITAL TWINS**
- Mobility Systems
- Fleet
- Network
- Infrastructure
- Territory and city

**Master complexity**

**Explore more possibilities**

**VALIDATE & DEPLOY faster**

**PHYSICAL**
- Manage the Assets
- Monitor the Operations
- Optimize the Operations
Dassault Systèmes

1981
3D Design

1989
3D DMU
Digital Mock-up

1999
3D PLM
Product Lifecycle Management

2012
3DEXPERIENCE®
platform
Business Experience
3DEXPERIENCE for Digitalization of Railway

**MODEL**
- City Modeling
- Systems Engineering
- BIM-Modeling
- Industrial Design
- Mechanical Design
- Material Science

**SIMULATE**
- Systems and Software Multiphysics
- Electrical E-Magnetics
- Aerodynamics

**VR/PLAY 3DEXPERIENCE**
- User / Traveler Experience
- Human Machine Interface
- Interactive Experience

**SOCIAL COLLABORATION**
- Fast ideas sharing
- Ideas & Project Management
- Social Network Monitoring
- Requirement Management
- BIM Management

**INFORMATION INTELLIGENCE**
- KPI monitoring
- Social Intelligence
- Customer Knowledge & Trends
- Connected Objects Data Analytics
- Issue & Asset Intelligence
- Predictive Maintenance

**MANUFACTURE, BUILD & OPERATE**
- Operations/Process Modeling
- Operations Management
- Planning and Scheduling Optimization
- Asset Maintenance Management
Key Applications of Digital Twins in Rail

Plan Transport Services within a digital twin of the City
Virtual Urban Planning with 3DExperience City

- Key decisions for development & investment through a common digital referential
- Multi scales / Multi domains
- A collaborative platform to integrate mobility data and third party apps
- Model & Simulate mobility scenario
- Collaboration and Sharing information across municipal, government entities, utilities, citizens
Key Applications of Digital Twins for Rail

Plan Transport Services within a digital twin of the City

Design & Simulate Transport systems
Simulate traveler’s experience
Design Innovative Mobility Solution: SkyWay example

https://www.youtube.com/watch?v=CDFXxeLmWzk&t=16s
https://www.youtube.com/watch?v=kE-o04fkP0
Design V2X communication systems for safe Mobility

Railroad crossing connected with the car
DIGIM 2 project with UIC
Model alternative concepts and simulate several scenarios of this future system to check:
- safety
- driver experience
- vehicles behavior
Virtual Train Engineering & Simulation

3D virtual model of train, including assembly and components

Train Control & Monitoring Systems and Software models

Multi-physic models of the complete train and all the sub-systems of the coaches

Automatic Train Control and Signaling models

3D model of infrastructure, including station, crossway, …
Simulation of Traveler’s Experience

Digital Experience

Travelers Flow in Station
Key Applications of Digital Twins for Rail

Plan Transport Services within a digital twin of the City

Design & Simulate Transport systems
Simulate traveler’s experience

Design and Build Transport infrastructure virtually with a full digital model (BIM)
Infrastructure Lifecycle Management and BIM

- Common referential to design, review and collaborate from Concept to Manufacturing details
- Linear Civil engineering (Geology, Geolocation, Extra large range) and System design
- Compliant with industry standard and with “China Railway’s BIM Standard” (CR-IFC)

Virtual Construction
- Simulate construction process
- Analysis key equipment usage
- Clash detection in installation
- Worker safety analysis
- Use VR for review & approval
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Design & Simulate Transport systems 
Simulate traveler’s experience

Design and Build Transport infrastructure virtually with a full digital model (BIM)

Monitor Asset Health and Predictive Maintenance
Asset intelligence and Predictive Maintenance

- Real Time Asset Monitoring on a 3D Digital Twin
- Access real time status
- Access detailed documentation and models
- Analyze historical information

- Track KPIs per category of assets
- Access timeline of events
- Analyze and categorize reported issues (Natural language)
- Predict failure
Key Applications of Digital Twins for Rail

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Design & Simulate Transport systems
Simulate traveler’s experience

Design and Build Transport infrastructure virtually with a full digital model (BIM)

Optimize Transportation and Mobility operations

Monitor Asset Health and Predictive Maintenance
Transportation & Mobility Planning and Optimization

Freight Transport Planning and Optimization
- Multimodal transport scheduling
  - First mile
  - Linehaul
  - Last mile

Traveler Transport Optimization
- Traffic Planning
- Timetable optimization
- Fleet & Crew planning
- Workforce planning
- Maintenance Scheduling

Same day delivery

Door to door mobility services

Logos of various companies are displayed at the bottom of the page.
Transportation & Mobility Planning and Optimization

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DELMIA Quintiq: Planning and Optimization Capabilities
- Optimisation
- Predictive Analytics
- Rule Propagator
- What-if
- Mobility
- Integrator
- GIS
Automated timetable optimization with multiple KPIs
Automated timetable optimization with multiple KPIs

Key Performance Indicators

Conflicts to be resolved
Optimized Traffic Disruption management

- Plan
- Monitor & assess status
- Execute plan
- Change train services
- Adjust vehicle allocations
- Adapt workforce assignment
- Review & publish plan
- Disruption

14:00 16:00

Electronic train plan

Set 3

Dassault Systèmes
Benefits of Optimized Traffic Planning and Management

**Infrastructure Manager**
- Optimize usage intensity and Revenue

**Railway Undertakings**
- Optimize loading factor and Revenue

**Passenger Freight Forwarders**
- Less time lost in transport
Fleet Maintenance optimized for vehicle availability

Benefits

- Increase Service time
- Reduce Lost Time
- Resource efficiency

Maintenance tasks

- Service Bill of Material

Fleet operations plan

Spare parts

Industrial Resources

Human Resources

Schedule maintenance of all units

Minimize turnaround time

- 109 Days
- 7 Days
- 16 Days
- 310
- 5
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Thank you! for your kind attention