



#StandWithUkraine

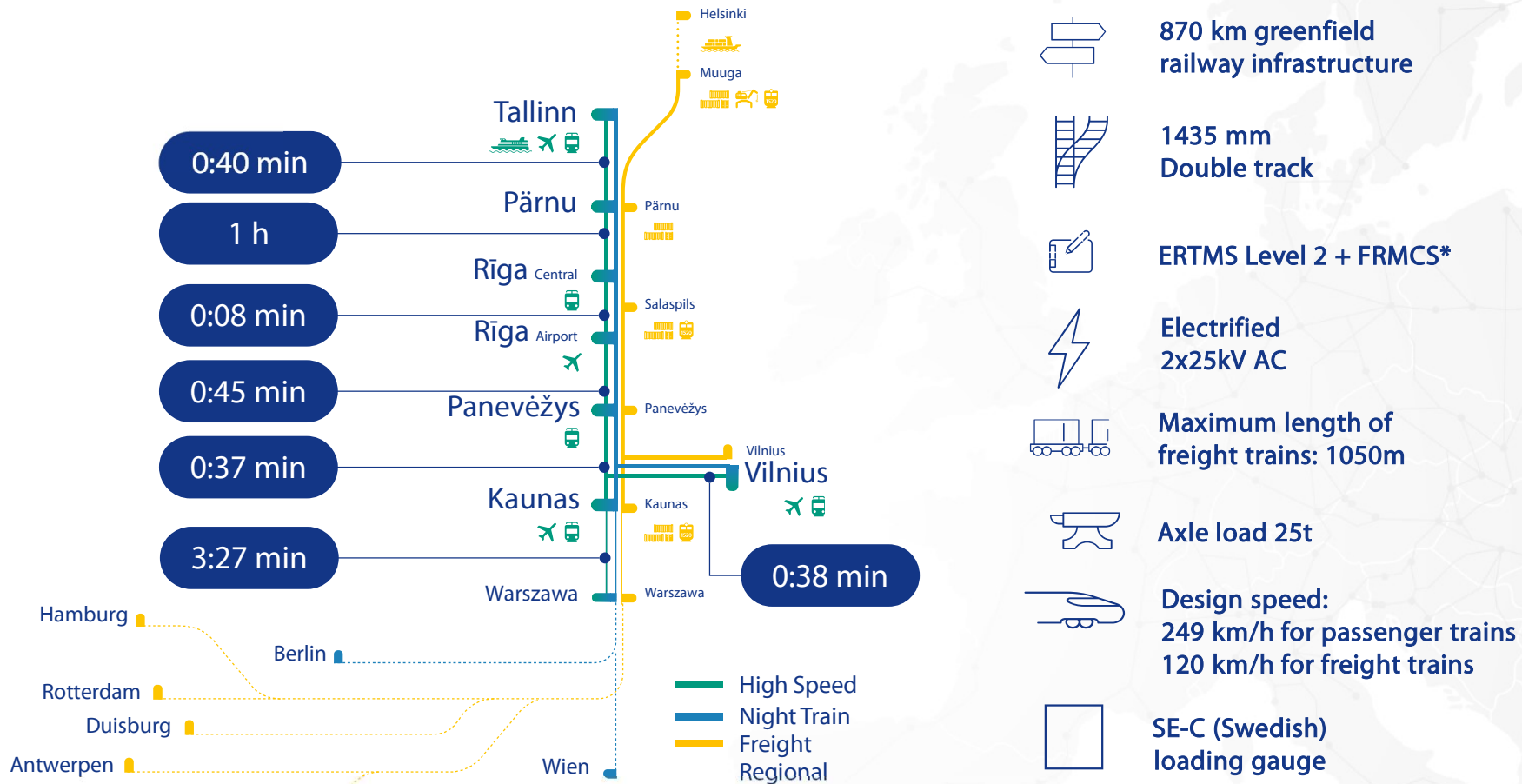
Rail Baltica - the Digital Railway

Andy Billington, Innovation and Digital Architecture Team Leader at RB Rail AS



Co-financed by the Connecting Europe
Facility of the European Union

Basis for new economic corridor, post-Covid recovery and military mobility



Forward-looking Infrastructure

Plan for decades, *not* years!

Improve Operations

Multimodal integration – passengers & freight

Open standards, data-sharing

Sensors, machine learning

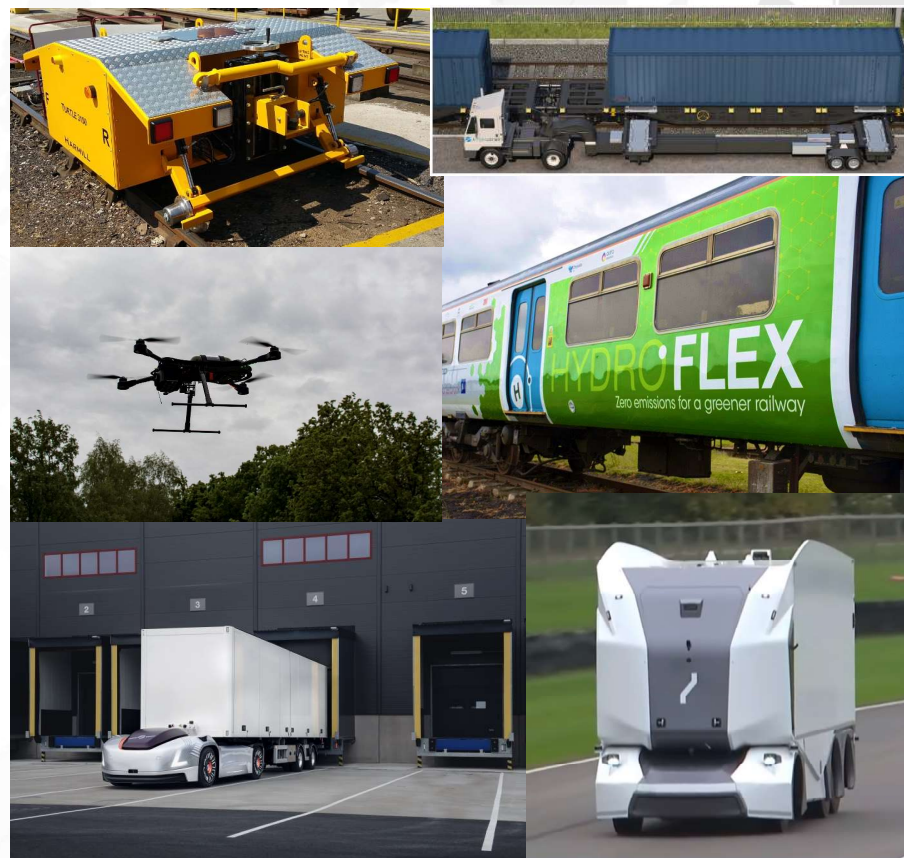
Predictive / prescriptive maintenance

Prepare for new developments

Autonomous futures

Alternative fuel – vehicles and infrastructure

Physical Internet



Operational Systems

Signalling & Control

Interfaces between IM & RU

Unified Ticketing/Travel

Air-Rail, Maritime-Rail

Freight Management

Integration & "Open Data"

Open standards



Intermodal Systems

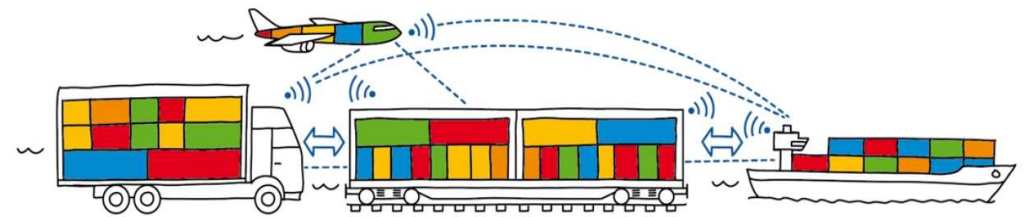
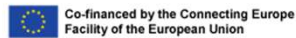
Efficient Services & Utilisation

- Unified tracking/status updates
- Synchronized Modal integration
- Support for Value-Added Services

Intermodal interoperability

- Data services across modes
- Real-time Visibility
- Terminals as Hubs
- Efficient onward distribution for air, maritime
- Last mile integration

Open standards



Maintenance Systems

Asset lifecycle management

- Condition Monitoring
- Predictive Maintenance
- Prescriptive Analytics
- Reliability Engineering

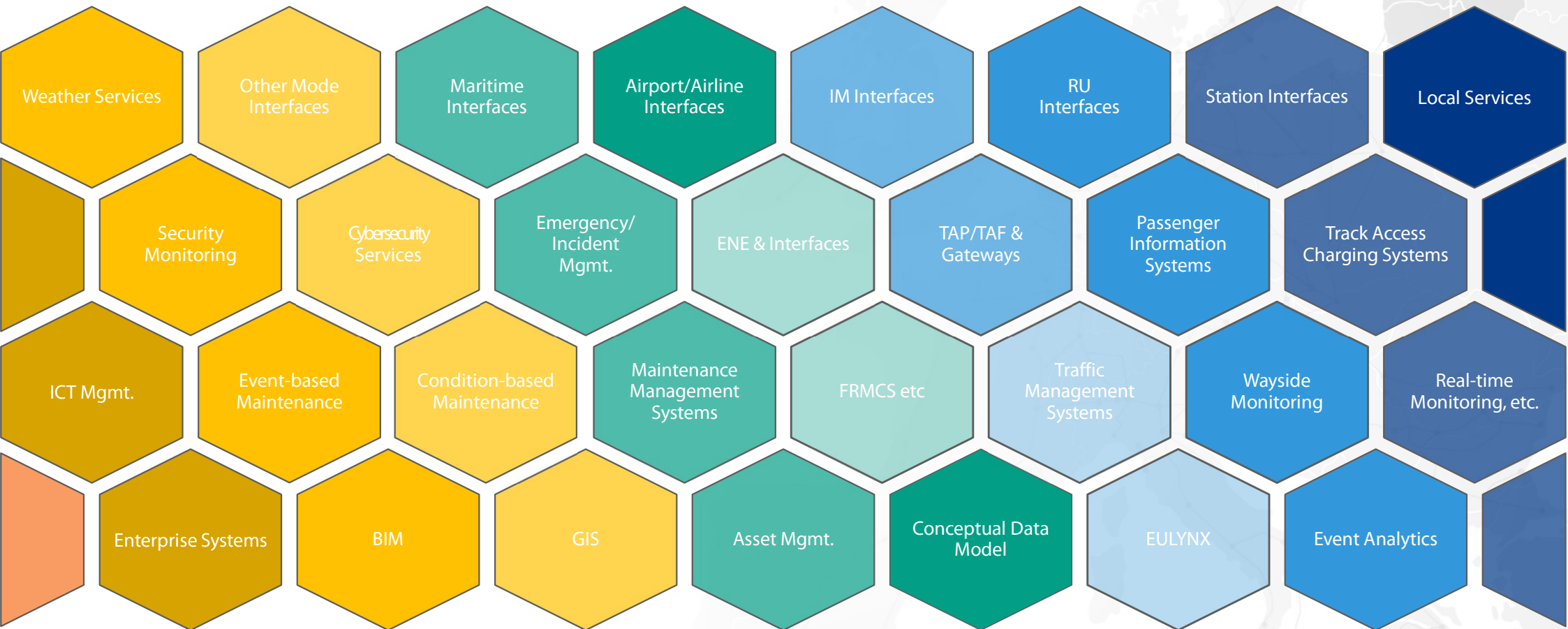
Multi-organisation interoperability

- Operators, Managers
- Suppliers & Maintainers
- Regulators, Safety Authorities, etc

Open standards



Digitalisation: Key Enabler



Sensors and Data Sources

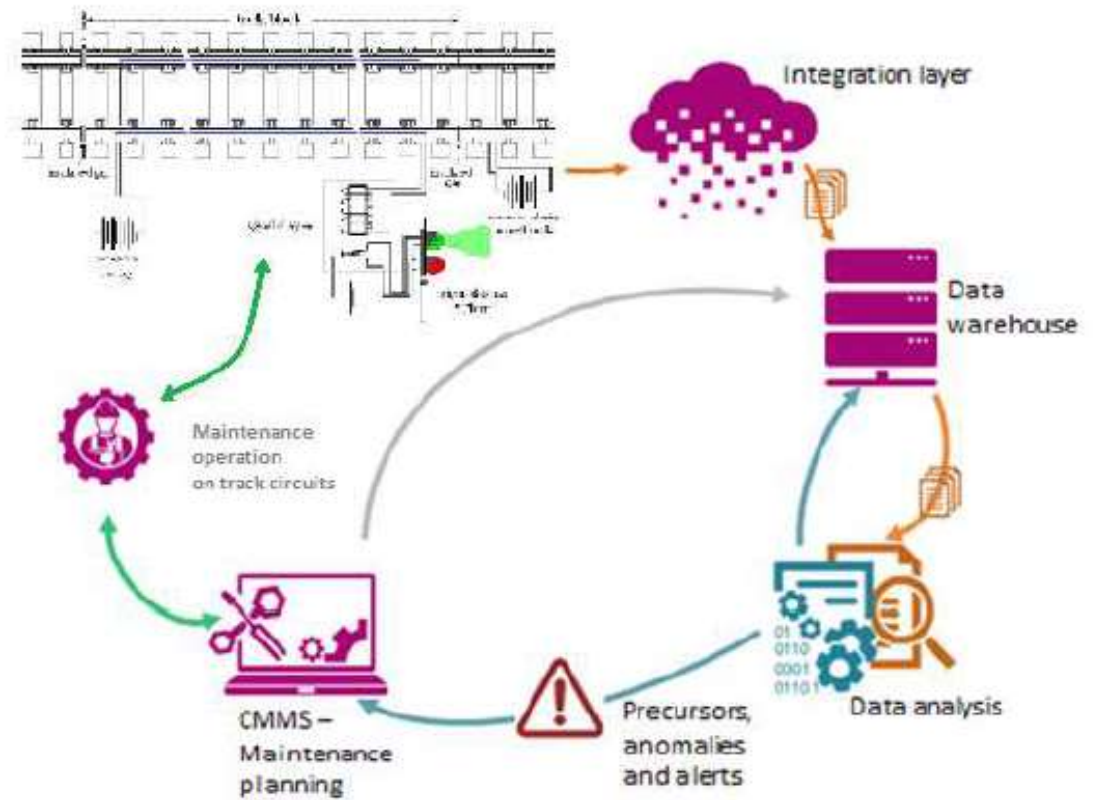
Discrete Sensor types

- RFID (vehicle ID)
- Weighing-in-Motion
- “Point” environmental sensors
- Video

Continuous/Distributed Sensing

- DAS
- DTS/DSS

Open standards



FRMCS

Future Railway Mobile Communications System

UIC / ETSI / 3GPP

Not railway-specific, features included in 3GPP Specifications

GSM-R feature set used as base

Additional features to be added

Bearer flexibility in specification

Spectrum

5.6MHz in 900MHz Band (n100)

10MHz in 1900MHz (n101)

On-board

Modular architecture

Multiple bearers supported



European Rail Perspective

ERJU / S2R

System Pillar

Linx4Rail

X2Rail

.....

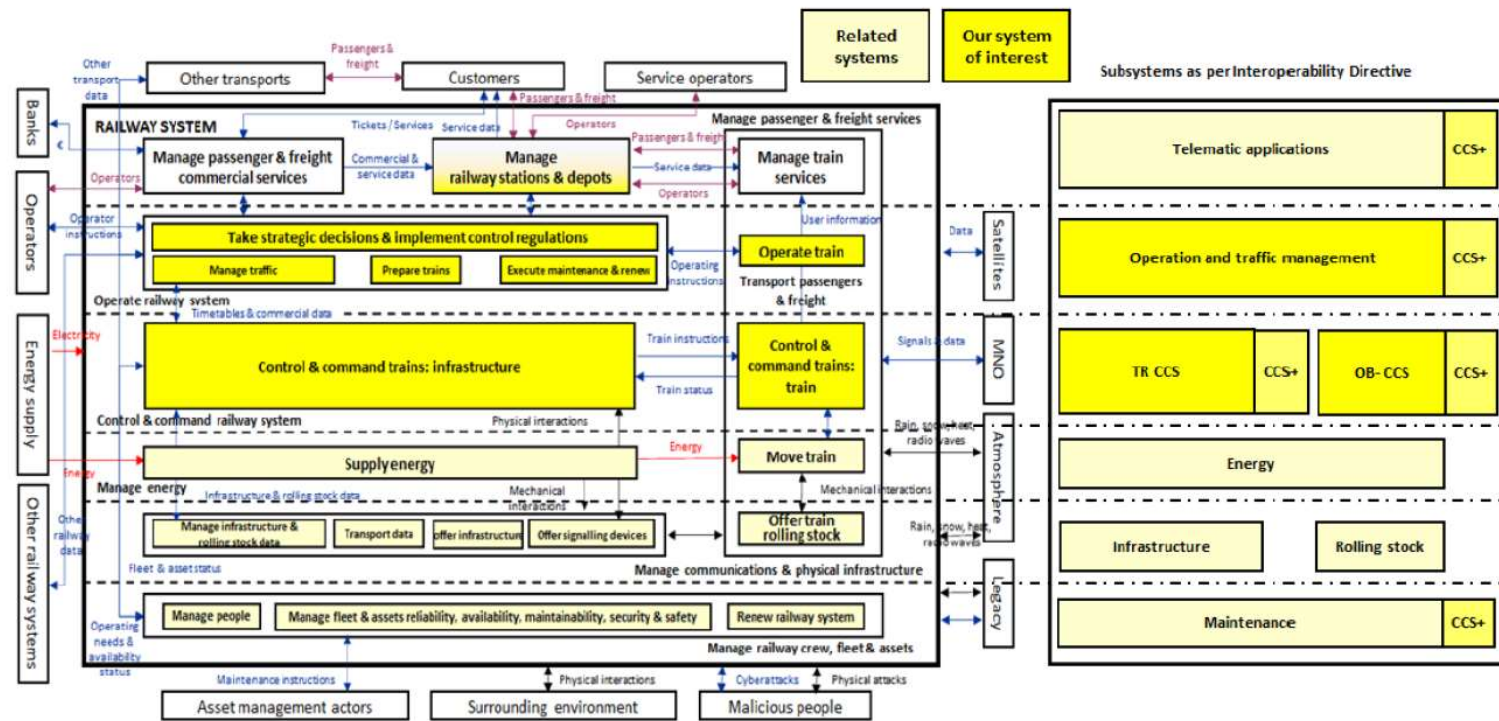
SERA

Common Data model

Secure data exchange

"RailCDM" ?

Open standards



ERJU System Pillar

Industry Initiatives

Multi-organisation

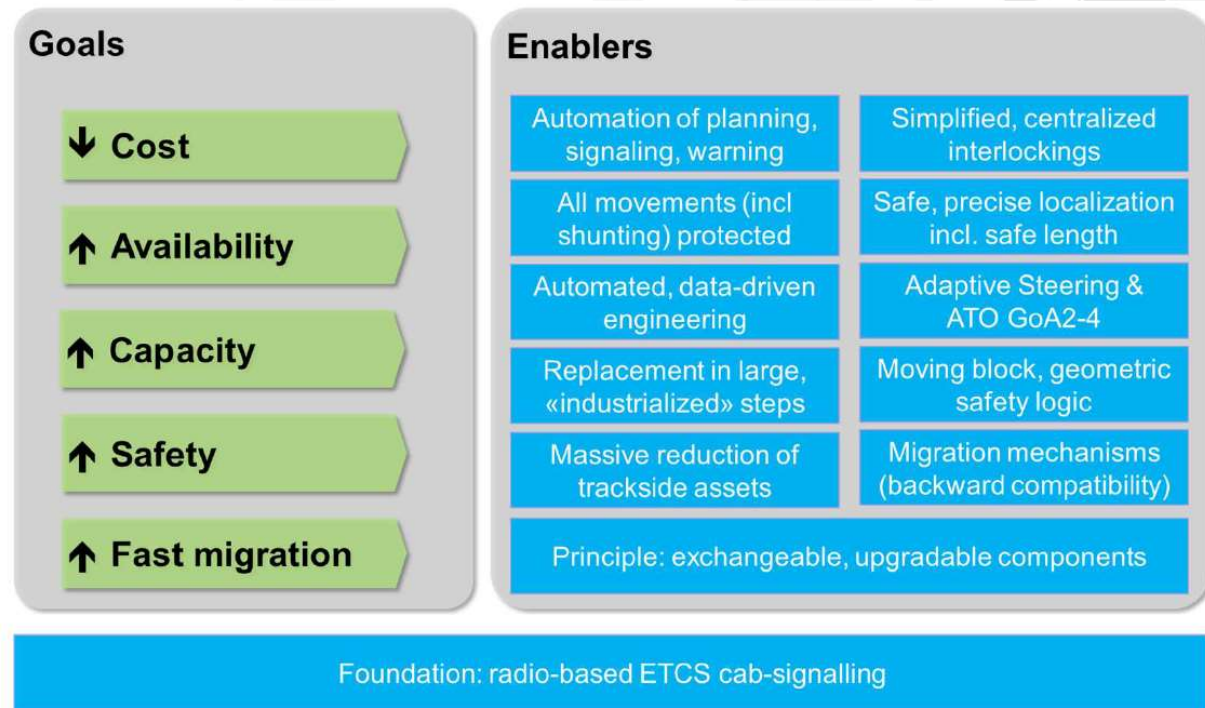
EULYNX
RCA
OCORA

SmartRail 4.0 (CH)

Digitale Schiene Deutschland (DE)

Digirata (FI)

Target 190plus (UK)



RCA System Concept - Effects

AutoID and Data Correlation

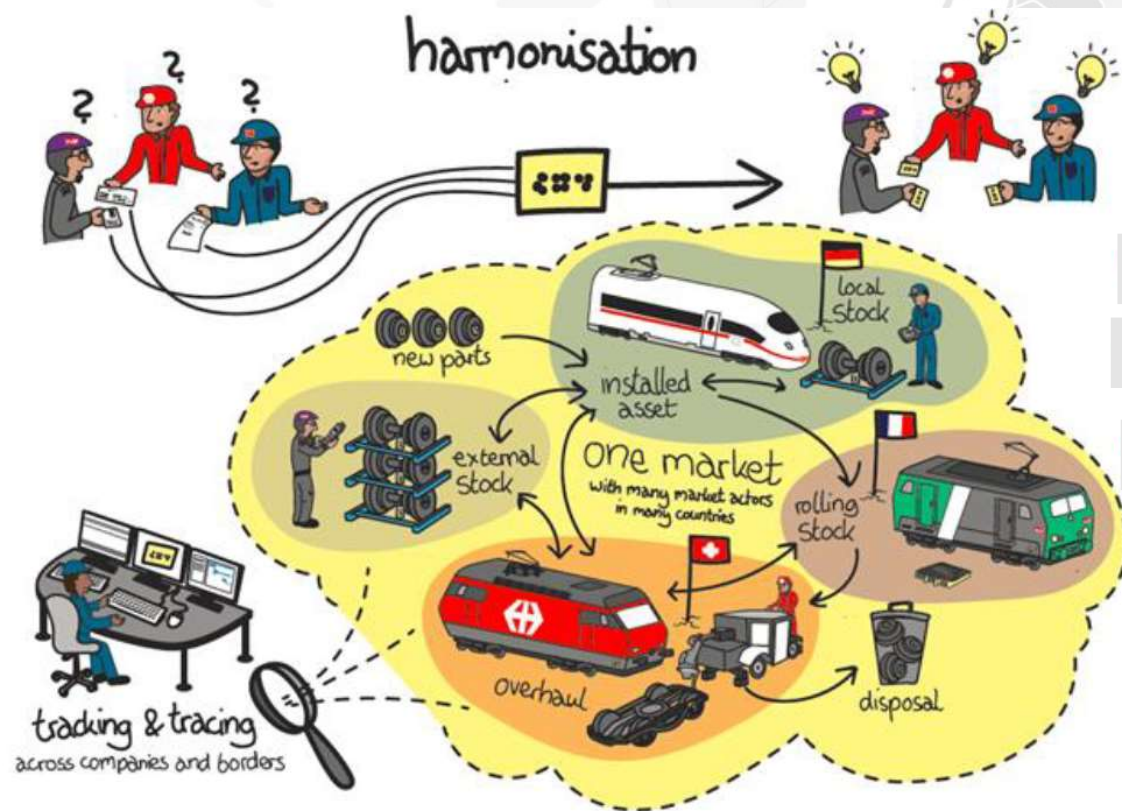
Asset Identification

- Vehicles
- Components
- Assemblies
- Locations
- Freight

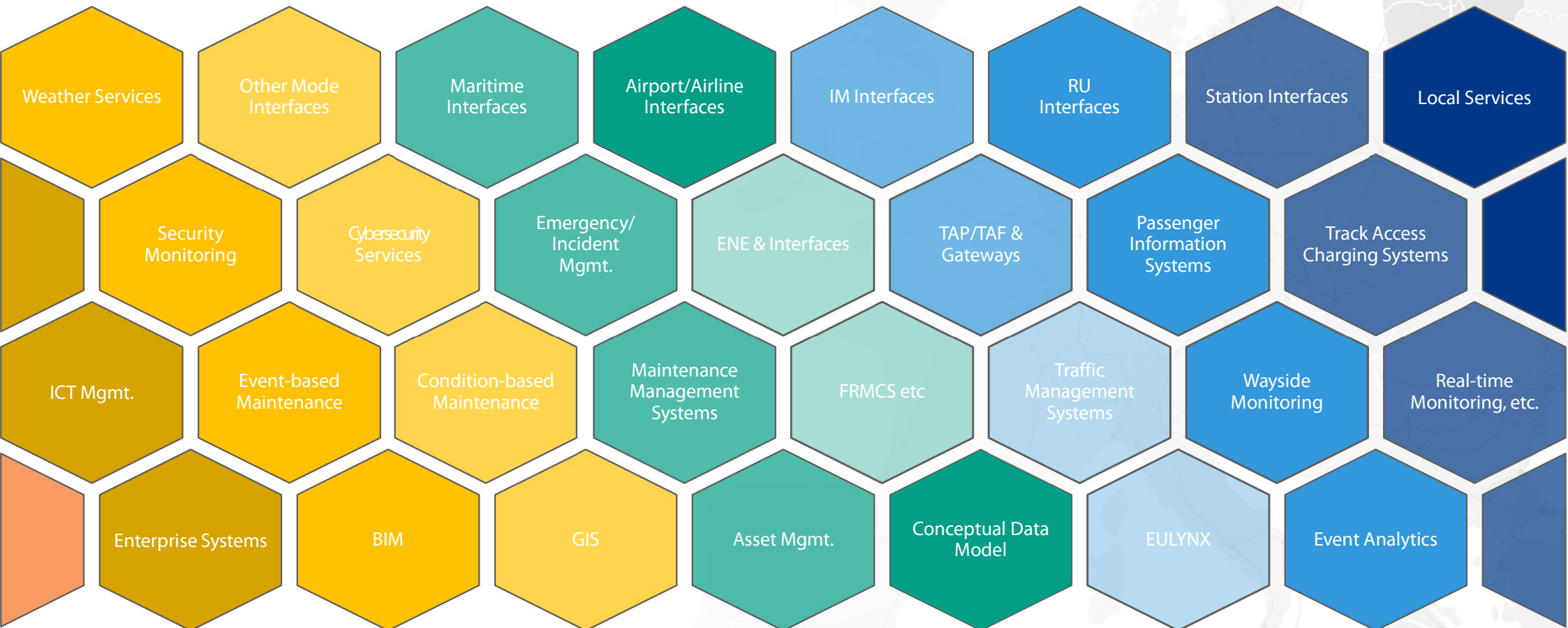
Multi-organisation

- Operators, Managers
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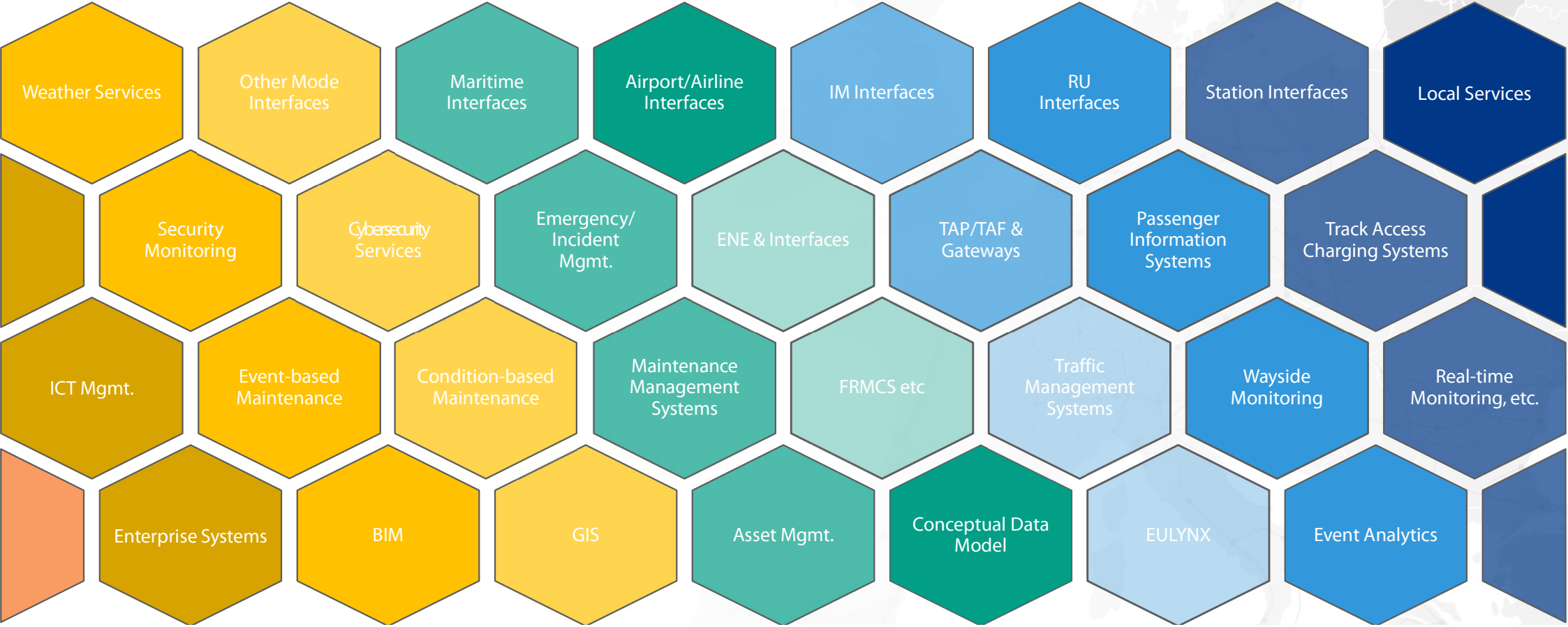
Open standards



Digitalisation: Key Enabler



Standards-Based Digitalisation: Key Enabler



Cloud Architectures

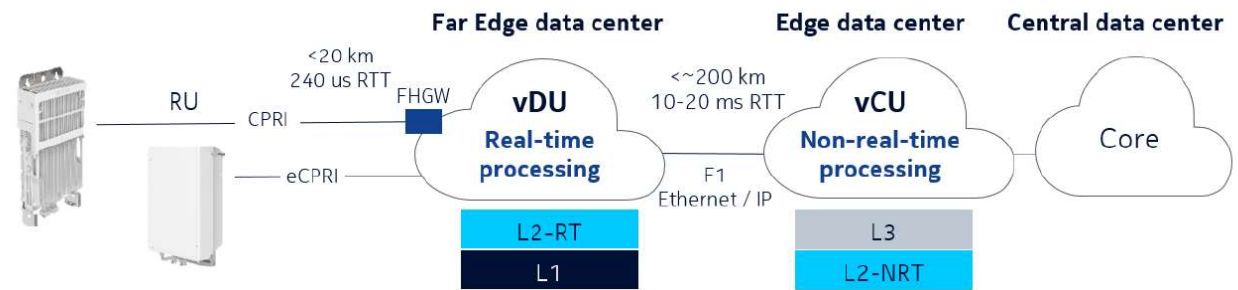
Edge Use Cases

- Real-time Alerts
- Analytics
- Data volume reduction

Multi-layer Architecture

- Edge
- Private Cloud
- External cloud (govt, "public"?)

Open standards



Analytics and Data Management

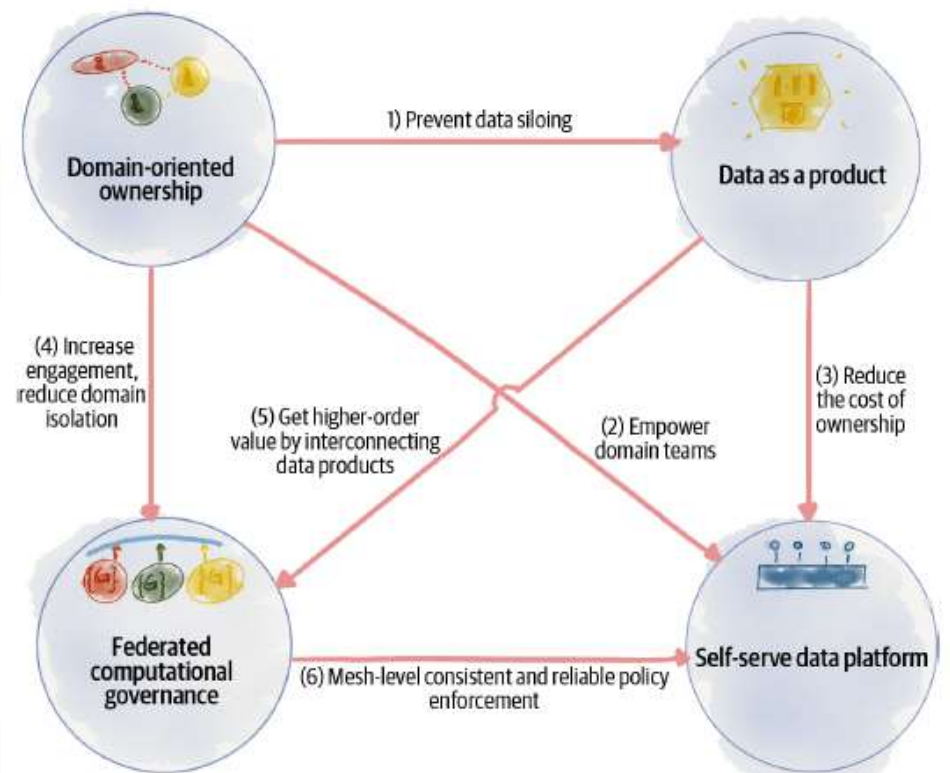
Multiple Data Patterns

- Streaming sources
- Files
- Relational databases
- Graph / NoSQL data

Key Factors

- Domain-driven patterns
- Self-service Analytics
- Governance
- “Data as a Product”

Open standards



Sustainability and ICT

Efficient, Flexible Systems

- Hyperscaler lessons
- Shared resources
- Supply chain flexibility
- Lifecycle considerations

Key Factors

- Open systems specifications/interfaces
- Efficiency & power consumption
- “Default” lights-out management
- Scope 3 emissions

Open standards



Data-Driven Railway

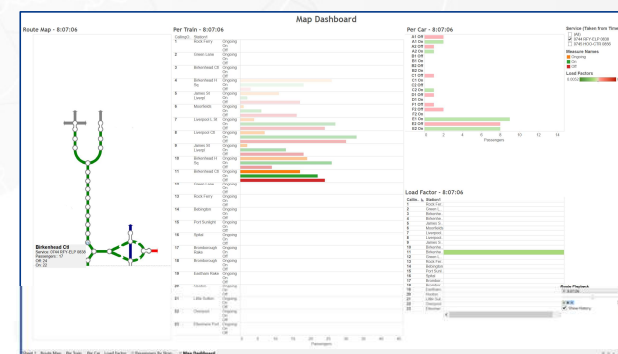
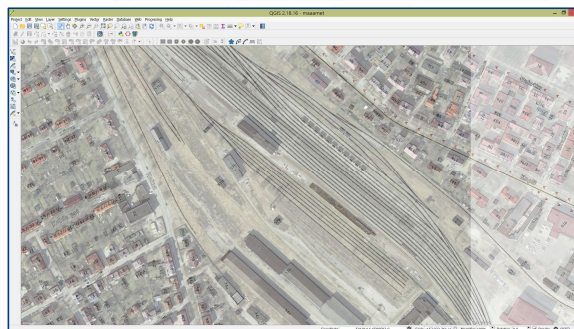
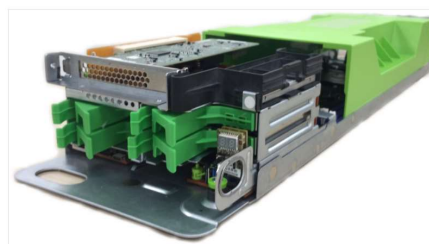
Efficient, Flexible Systems

- Standards-driven
- Published/Shared specifications
- Horizontal scaling
- Common spares

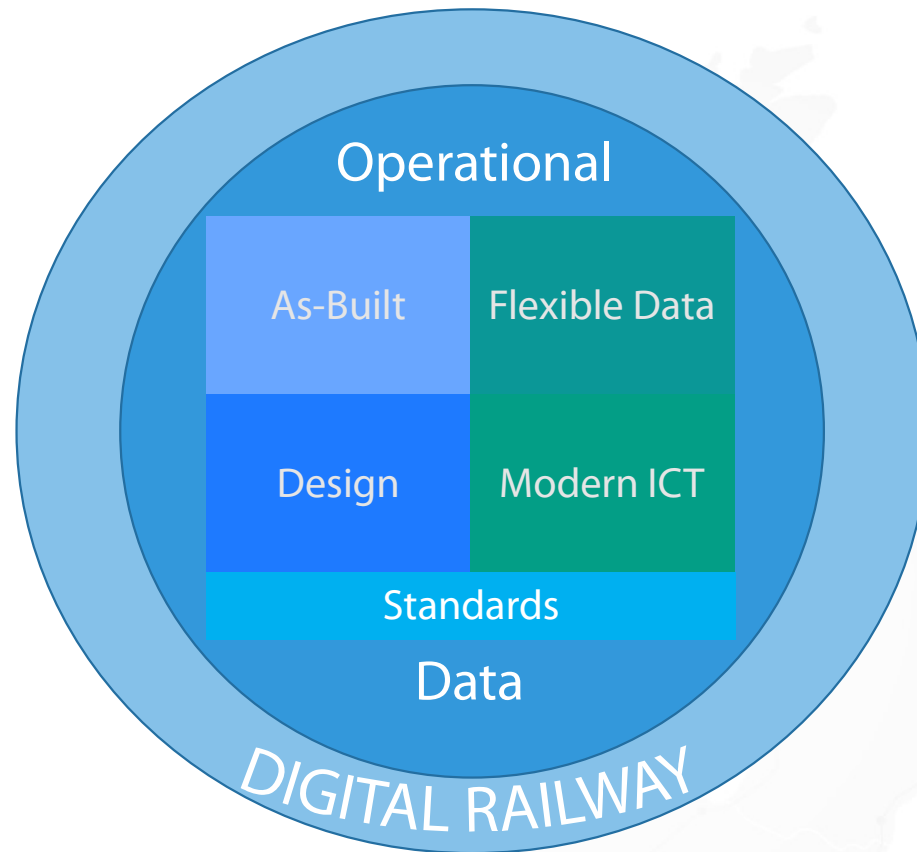
Cross-sector Lessons

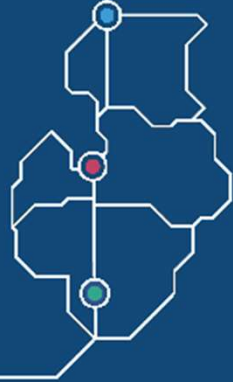
- Sensors (oil/gas, "IoT", etc)
- Telco / IT
- Energy

Open standards



The Digital Railway



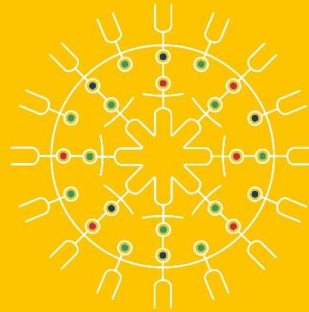


OUR VISION

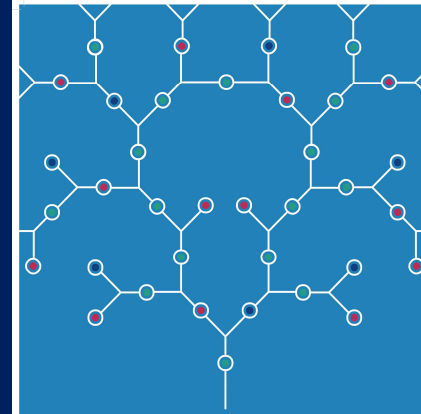
Connected Baltics in a
connected Europe

OUR MISSION

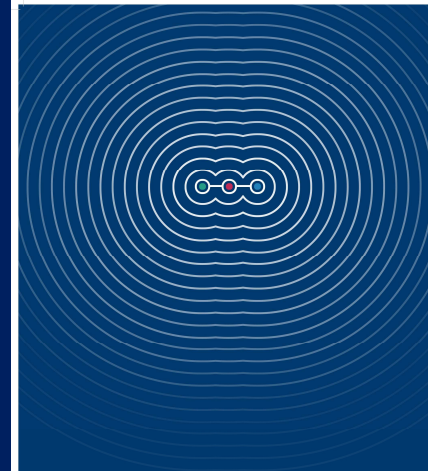
We are delivering a seamless mobility for
people, goods and services to accelerate
social and economic development in the
Baltics and beyond



WE VALUE PEOPLE



WE VALUE PROFESSIONALISM



WE VALUE PURPOSE

Thank you!