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Digitalization of Rail Baltica Global Project

#RailBaltica

Couple of facts about me

- In RB Rail AS since January 2018
- Before working at Trimble Solutions Oy, Finland
- “Involved” with BIM since 2012
- Worked as bridge and structural engineer
- Professional Master Degree in Transportation

Engineering, RTU



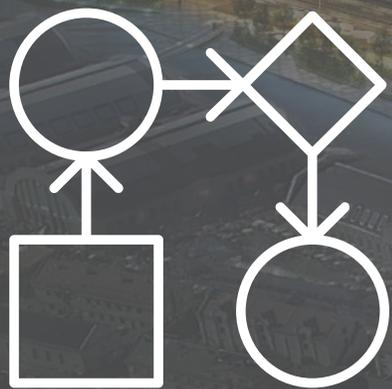
Raitis Bušmanis

Head of Virtual Design and Construction Department

Agenda

- What is Rail Baltica?
- Digitalization
- First acknowledgements





What is Rail Baltica?

Rīga Central
Station

A complex railway infrastructure system designed to provide multiple modes of travel



7 international passenger stations
45 local passenger stations/stops



3 tunnels



> 440 structures (bridges, overpasses, viaducts, tunnels)



6 Infrastructure maintenance facilities



> 90 wildlife crossings (ecoducts, culverts, overpasses)

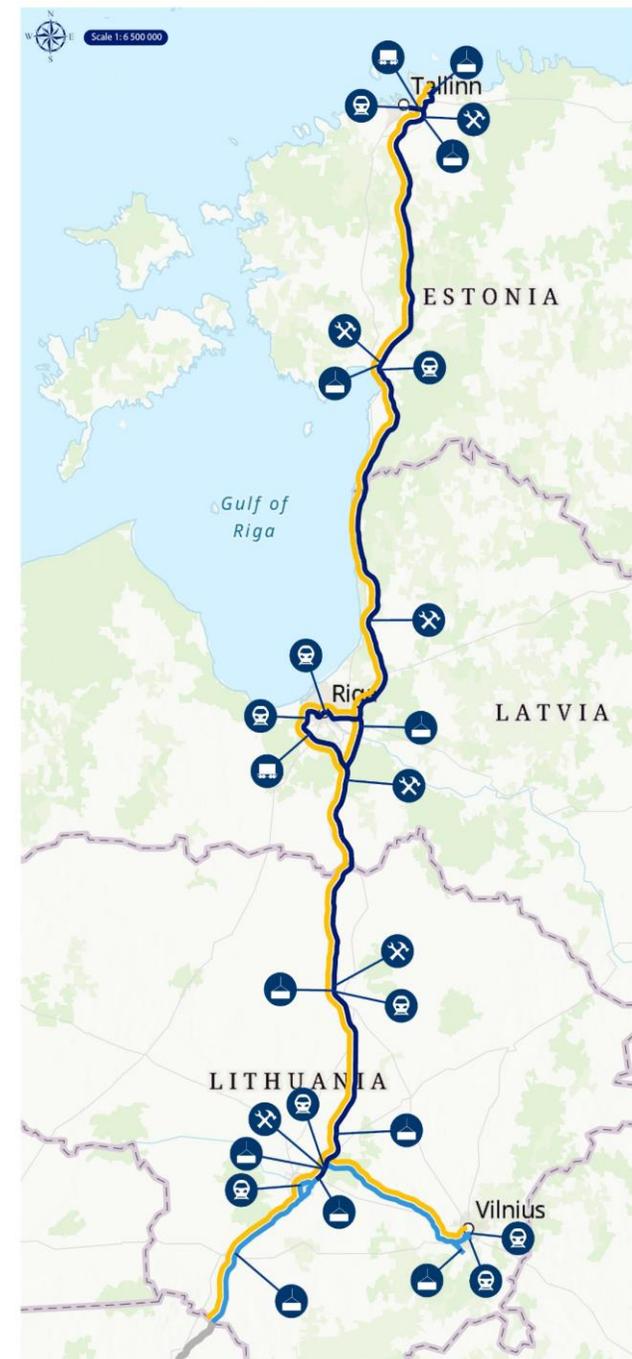


14 freight terminal + port connection

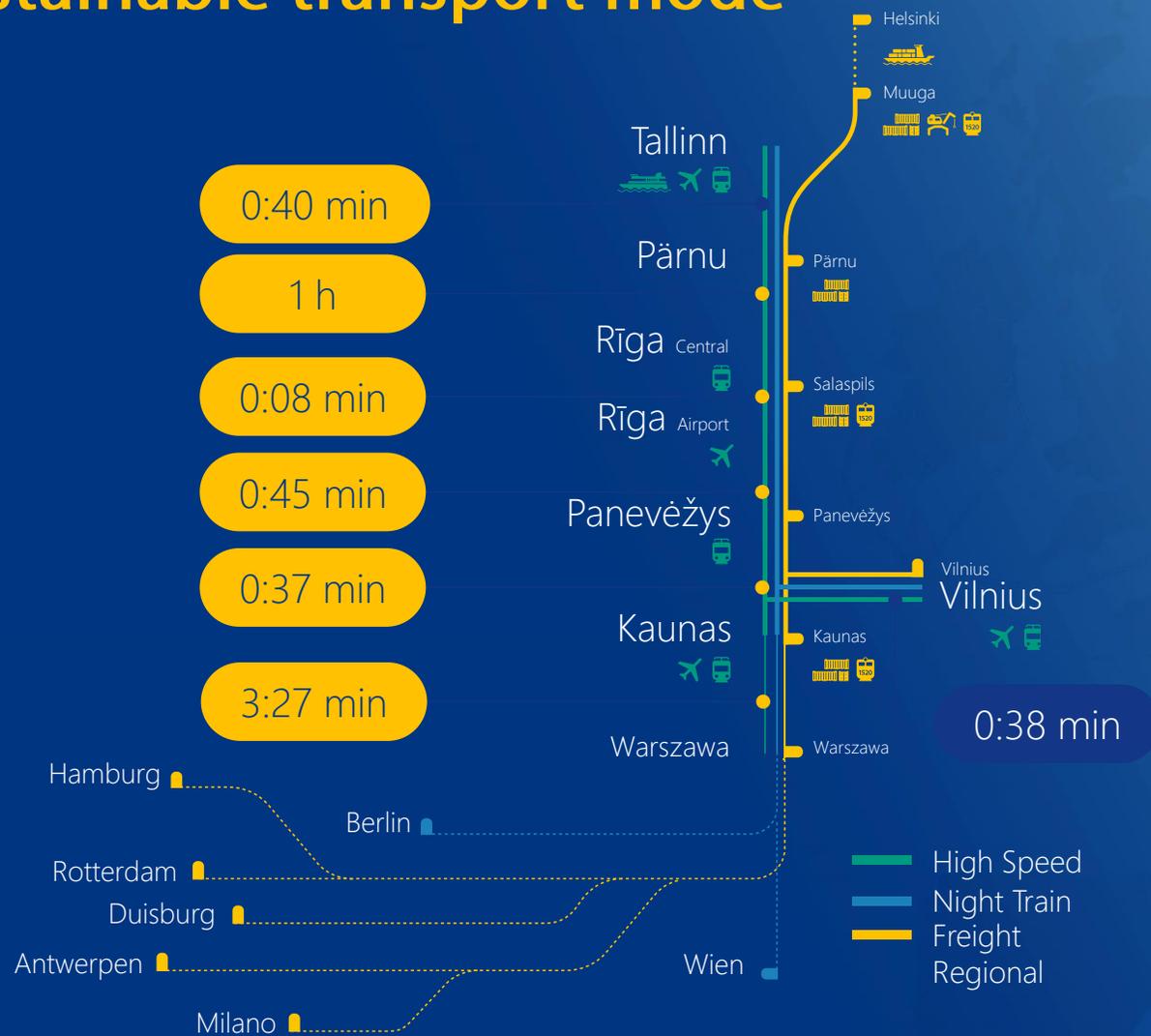
The economic impact will significantly exceed the required investments

Estimated Capex 23.8 bnEUR

Economic impact (direct and indirect) 48 bnEUR



Convenient, modern and sustainable transport mode



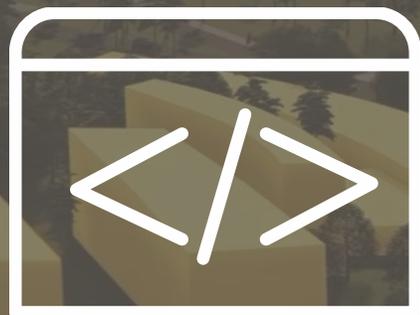
- 870 km greenfield railway infrastructure
- 1435 mm Double track
- ERTMS Level 2 + FRMCS*
- Electrified 2x25kV AC
- Maximum length of freight trains: 1050m
- Axle load 25t
- Design speed: 249 km/h for passenger trains 120 km/h for freight trains
- SE-C (Swedish) loading gauge

* Subject to confirmation

15% of the mainline under construction in 2024

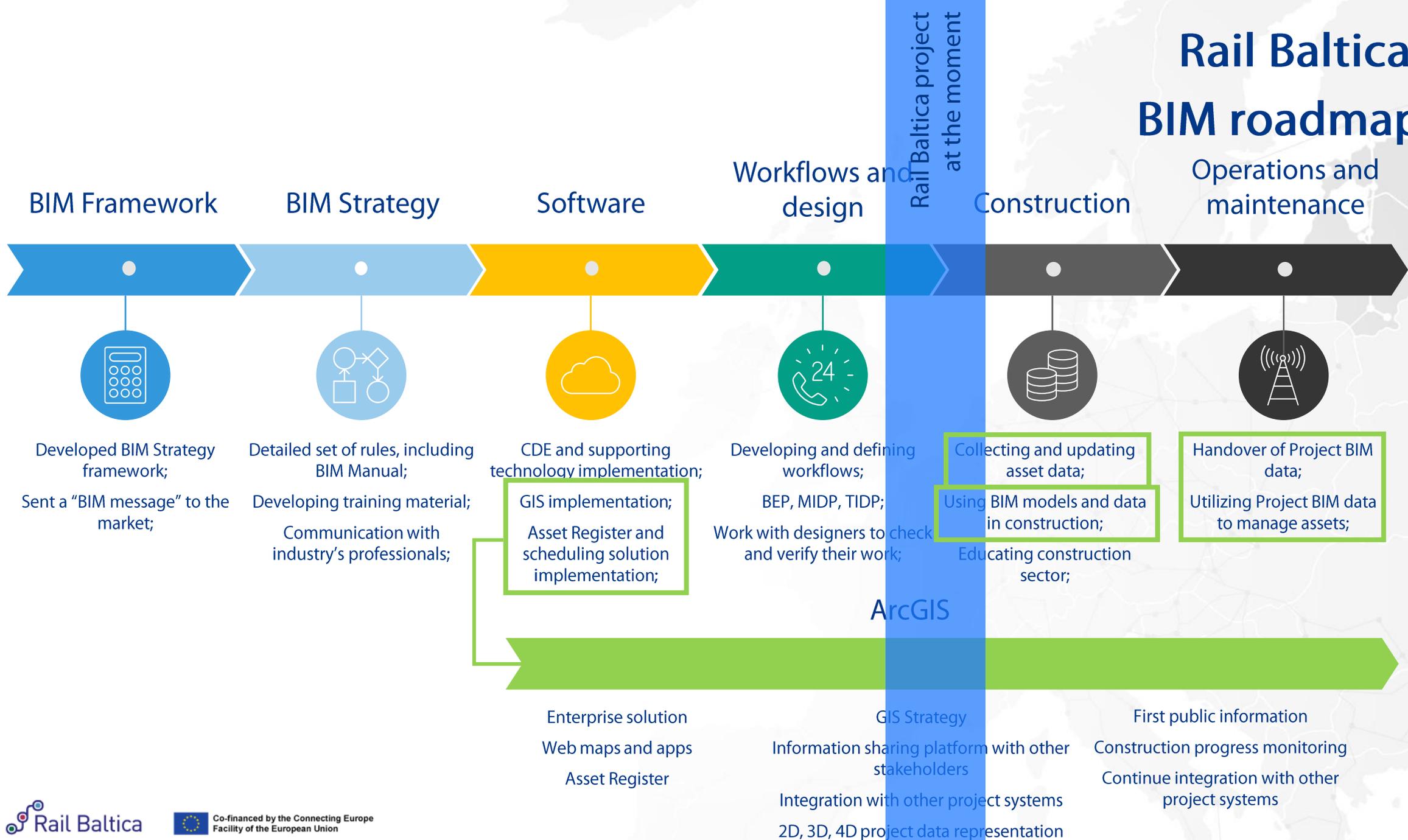
- Master designs for priority sections nearing completion;
- Over 150 km of mainline (870 km) covered by contracts/purchase orders;
- Consolidated material procurements in final stage;
- Electrification and signaling subsystem (870 km) design and build procurement ongoing;
- Pending decisions on the Rail Baltica Phase I.

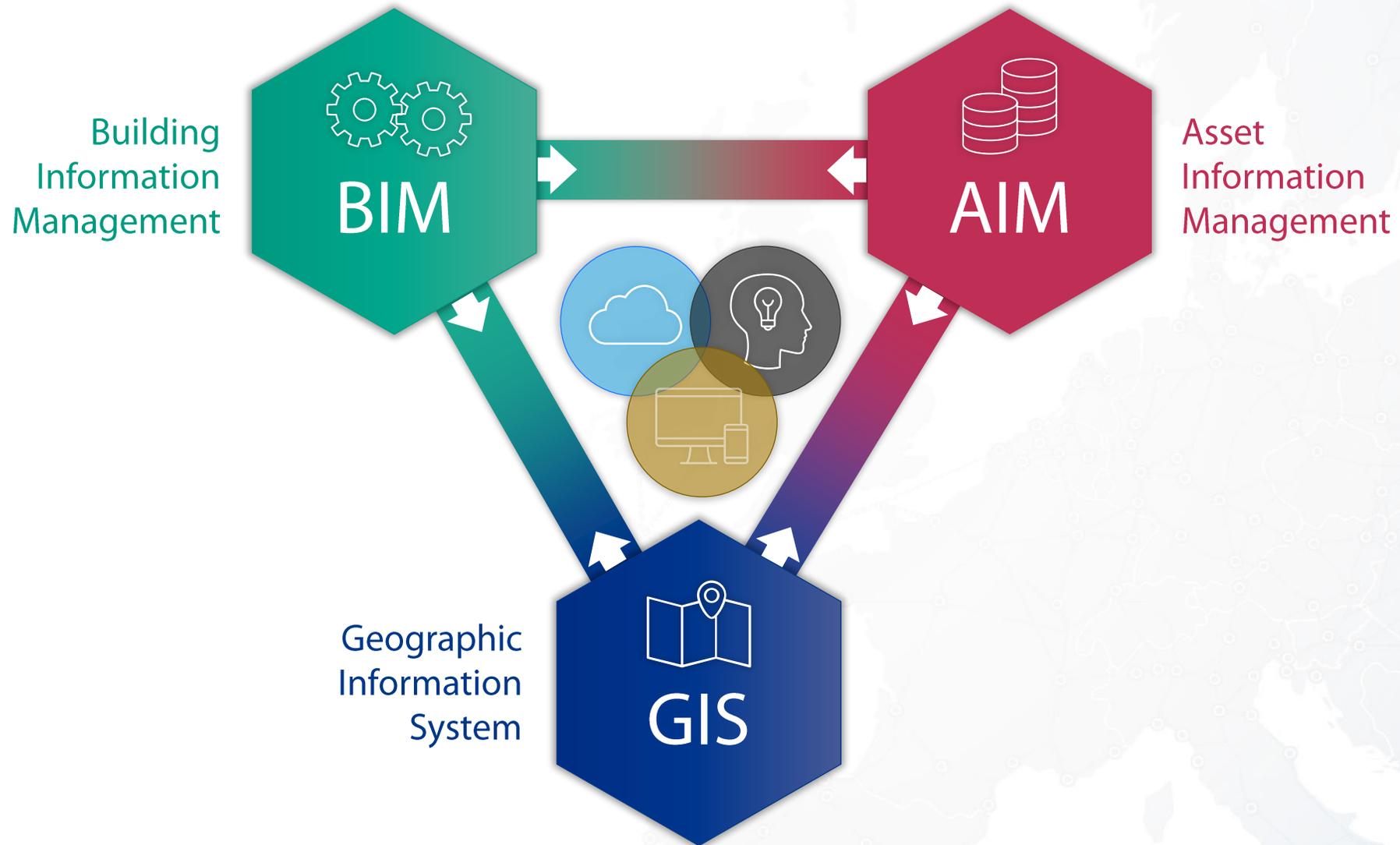




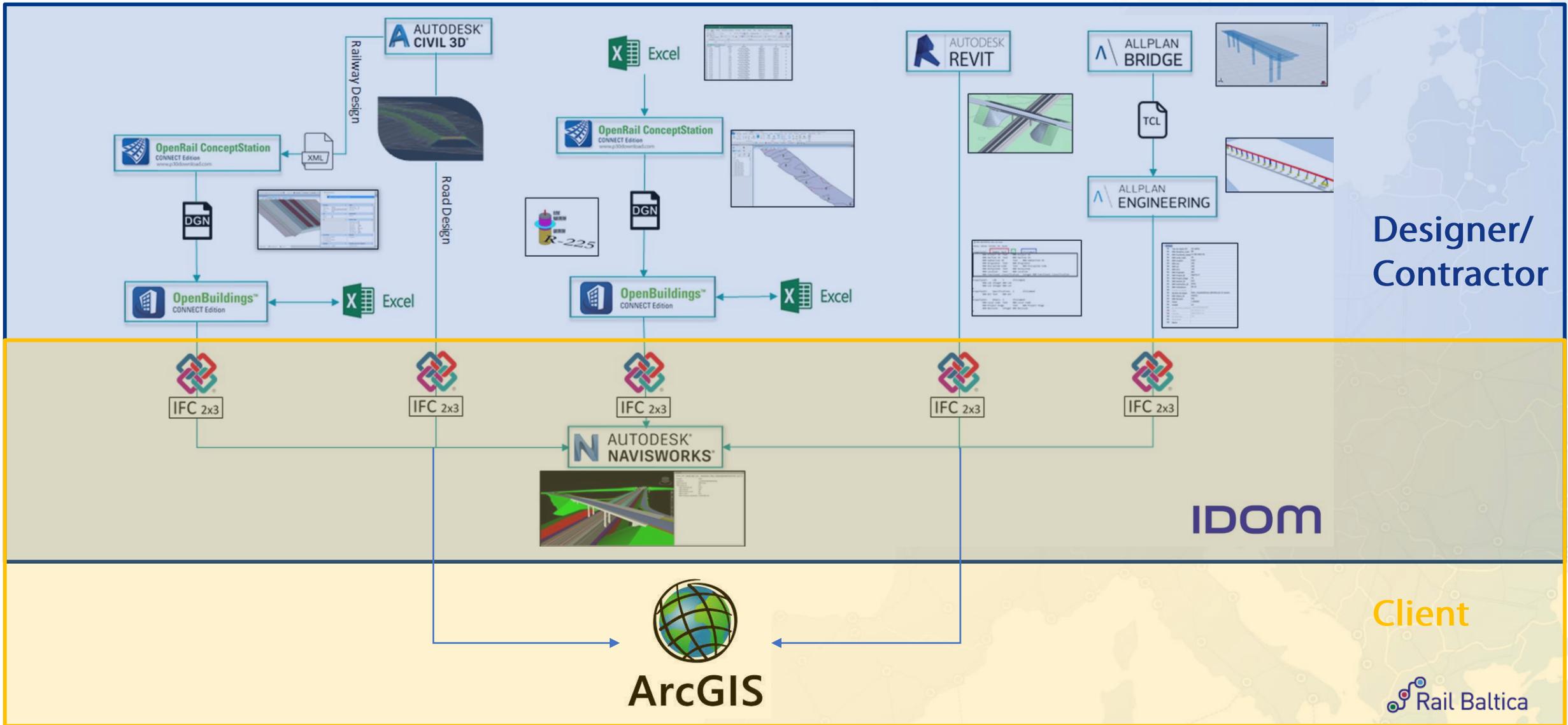
Digitalization

Rail Baltica BIM roadmap

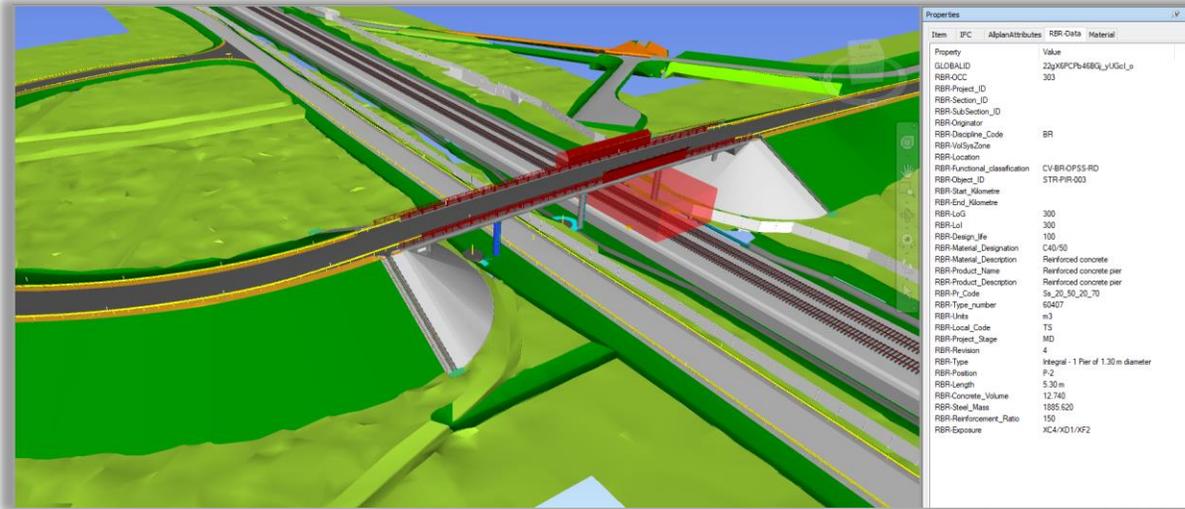




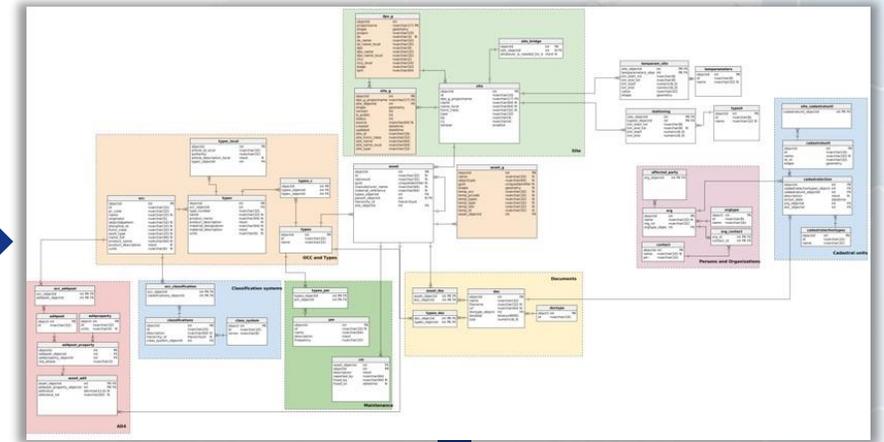
Attribute information in BIM models



BIM to GIS = Asset Register

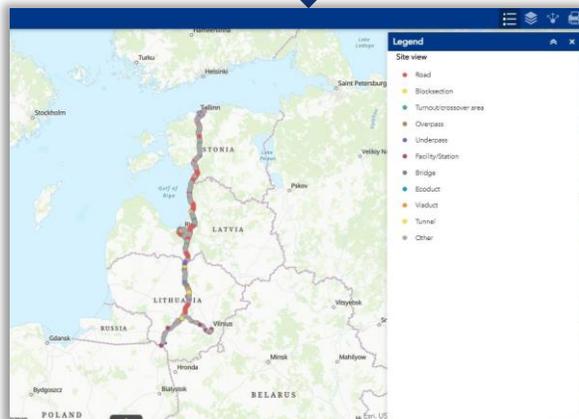


GIS Enterprise Geodatabase (SQL)

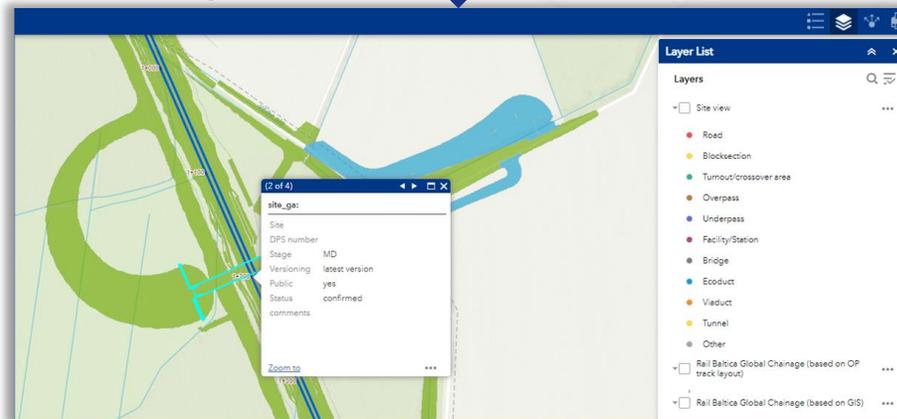


Web Interface

Sites



2D Footprint



3D Representation



Asset/element identification

- Country – LV
- DS – DS1, DS2, DS3, DS4
- DPS – DPS1, DPS2, ...
 - Building permit – BP04
 - Site – RW5200

LV-DS4-DPS2-BP04
lecava River Bridge section
(157+000-158+000)

The screenshot displays the 'Building Permits (Submission packages)' interface. On the left, a list of building permits is shown, with 'LV-DS4-DPS2-BP04' selected. Below this, the 'Building permit (SP) details' for 'BP 4 / 4-2 - lecava River Bridge section (157+000 - 158+000)' are visible, including fields for OBJECTID, DPS SP, Submission Package, SP name, Description, and various MD dates.

The central panel shows 'Sites in selected BP: 54' and 'Total in DPS: 75'. A list of sites is provided, with 'RW5200 (BP04): Track DPS2' highlighted. Other sites include noise barriers, access roads, and local roads.

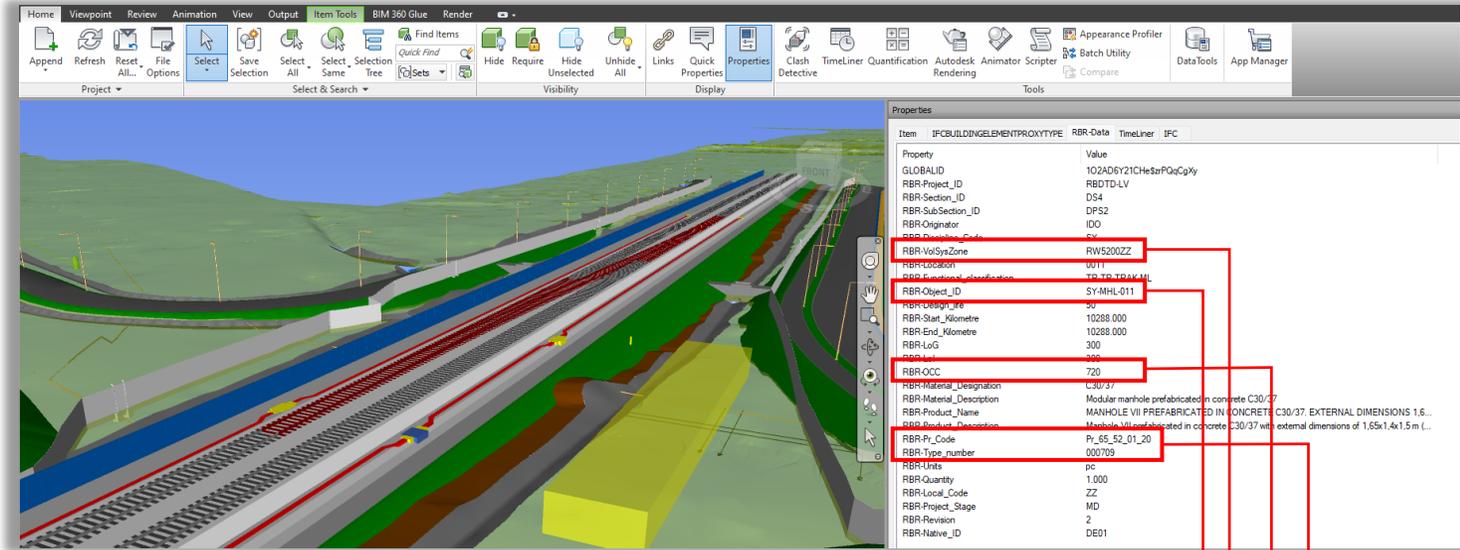
On the right, a map shows the project location with a purple polygon highlighting the bridge section. A 'Sites by type' bar chart at the bottom right shows the distribution of site types: Barrier, Bridge, Culvert, Interface, Other, Overpass, Road, and Track.

Asset/element identification

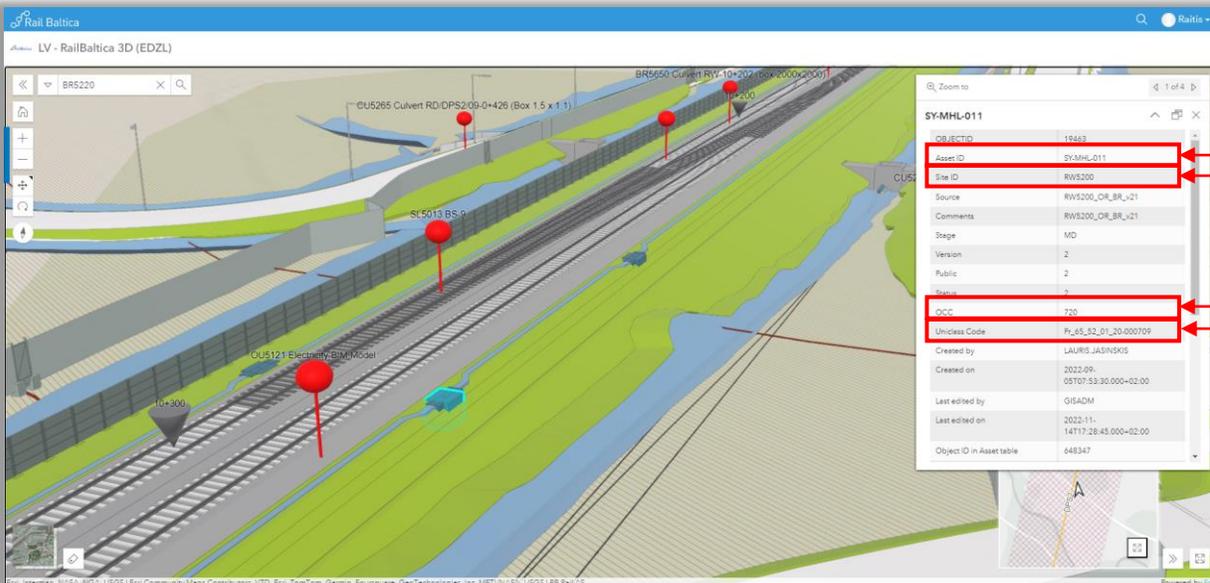
Federated BIM model

Site – RW5200

- RBR-VolSysZone = Site ID
- RBR-ObjectID = Asset ID
- RBR-PR_Code+RBR-Type_number = Uniclass2015 code
- RBR-OCC = OCC



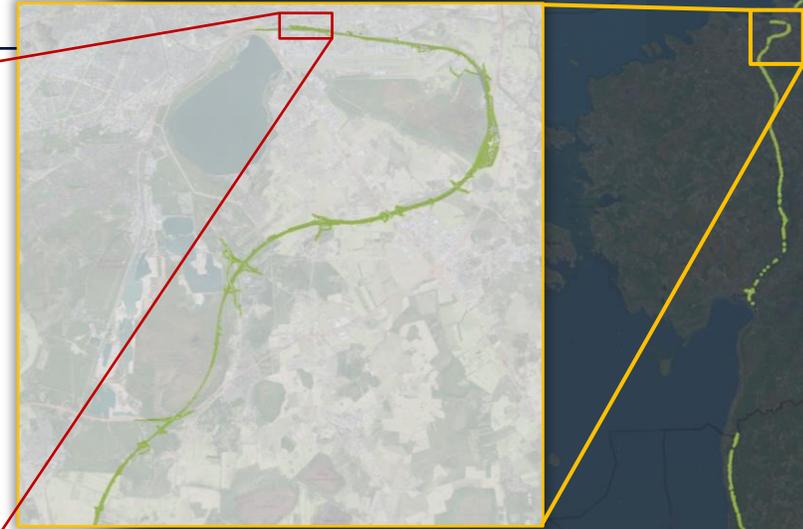
Asset Register in GIS DB



Additional minimum required attributes in as-built stage

- RBR-Product_Name (= TypeName in COBie)
- RBR-Product_Description (= Description in COBie)
- RBR-Manufacturer_Name (= Manufacturer in COBie)
- RBR-Material_reference (= ModelNumber in COBie)
- RBR-Installation_date (= InstallationDate in COBie)
- Before construction stage up to 10 attributes may be added.

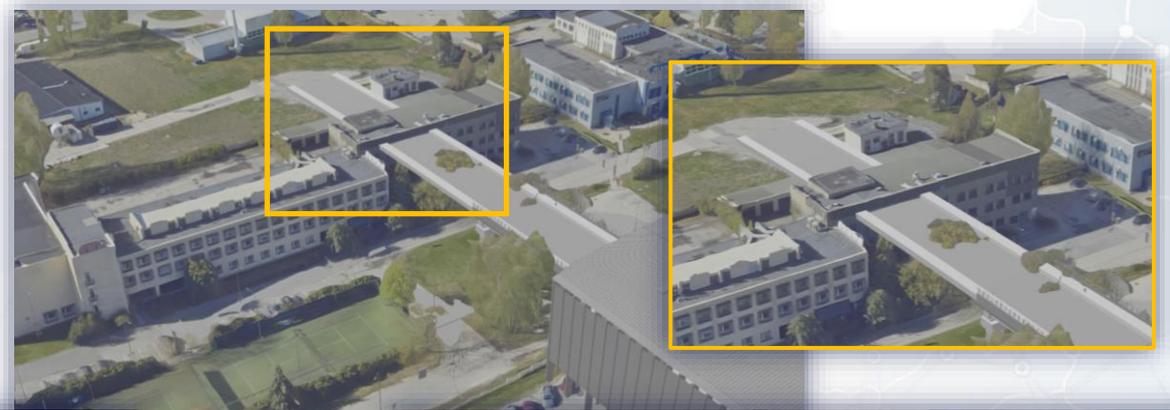
Rail Baltica in BIM in GIS db



Target – to have all 870km of railway infrastructure in BIM in GIS db

Design & Planning – Rail Baltica in 3D

BIM & Mesh data combine in GIS not only allows to show how future infrastructure will fit into the existing environment, but also allows to identify potential issues and shows everything in a very simple and understandable way for everyone.



“GEORIGA” data

Collection and Evaluation of Factual Data from Construction Sites

Field Applications. On-site Data Collection

Drones. Quick and Efficient Assessment of the Situation and Data Collection

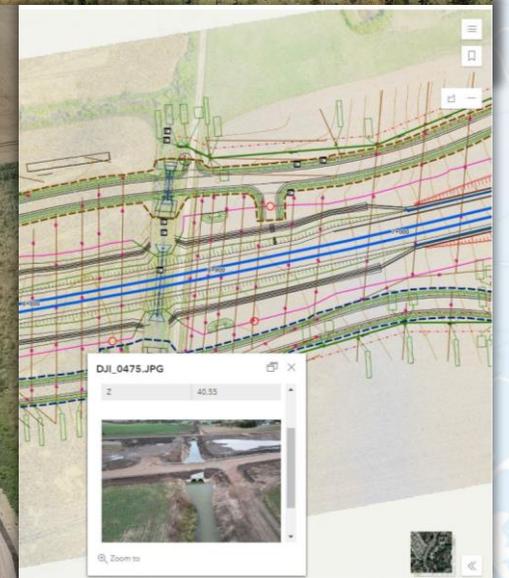
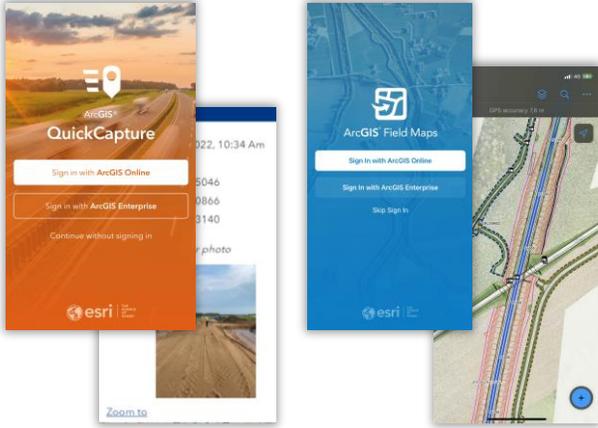


Photo collection from sites – 2D map for location

The screenshot displays a software interface for managing site visits. On the left, a metadata table for site BR6376 is shown. The main area is a 2D map of a railway corridor with various infrastructure elements. On the right, a legend defines the symbols used on the map, and a vertical scale bar is visible.

Name	BR6376
Type	Video Snapshots
DateTime	17/10/2024
Direction	
X	
Y	
Z	
PhotoLink	View

RB Site Visits Visual Material v2

- Drone
- Other
- Video Snapshots

Site view

- Bridge
- Viaduct
- Overpass
- Underpass
- Tunnel
- Ecoduct

Map labels include: 1505, Cielny kel., 0+100, 0+200, 0+300, 19, Semlišk g.

Scale bar: 0 to 50 m

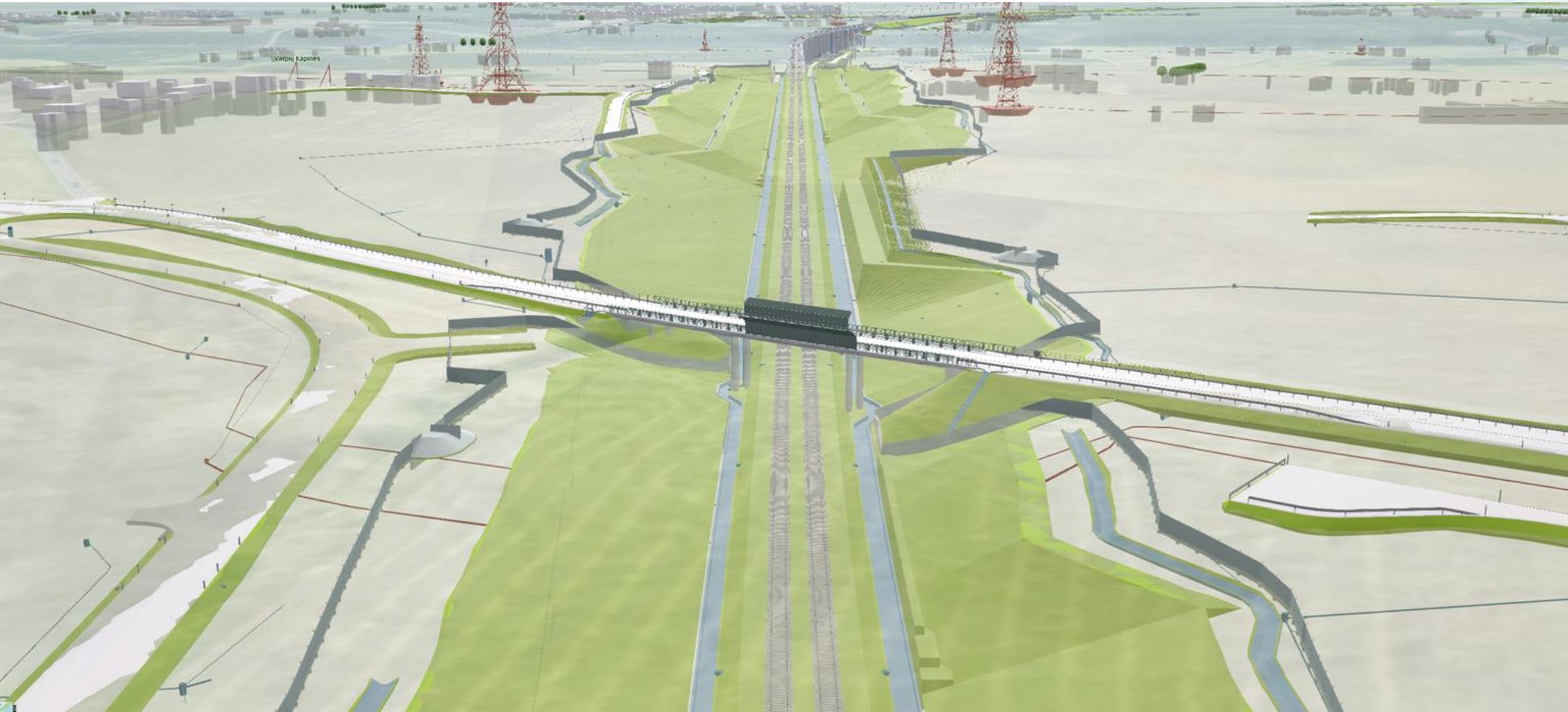
Vertical scale: 40 to 42

Video Snapshots: 41

Photo collection from sites – drone photos



BIM models in GIS (Asset register view)



Digital Model / Shadow – what we can achieve now

1. Digital Model
(BIM)



Design -> Construction



2. Digital Shadow
(GIS)

As-built

Digital Twin - target

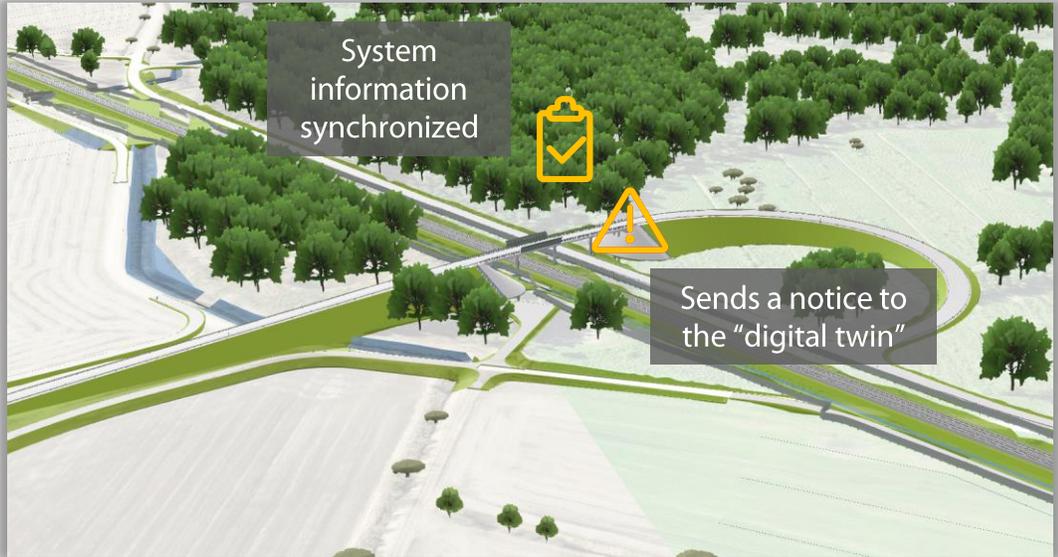
3. Digital twin – ideal “what we want to achieve” solution



System information synchronized

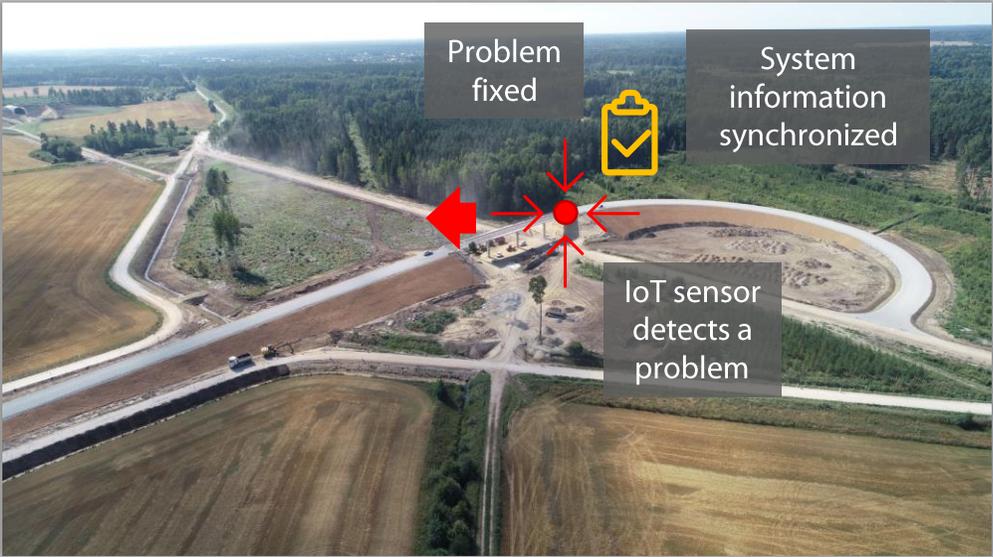
Maintenance crew is dispatched

Work order is issued



System information synchronized

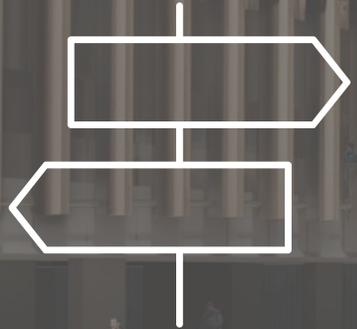
Sends a notice to the “digital twin”



Problem fixed

System information synchronized

IoT sensor detects a problem



First acknowledgements

RIX Airport
Station

01



Set clear requirements

BEP and TIDP

It must correspond to BIM EIR and it shall be agreed during the Inception phase, but must be updated frequently.

VE, MD and DTD stages – must be renewed and followed.

02



Follow the progress

Client's task

Client must follow the progress. Client must be involved and must have/develop the knowledge. Client must understand what is being delivered. Dedicated team must be assigned (for now).

03



BIM is not alone

AIM, GIS, etc.

Digitalization should be the priority. Modern asset management, digital tools and IT minded engineers.

04



Everybody must learn

Client and Consultant

Teams on both sides must learn. Early stages of the project (VE) serves as «test ground» for Master and Detailed Technical Design stages.

Engineers «love» Excel.

05



Big picture

Client must work with it in mind

Consultants come, do their work and go. Client must think about the goals to be achieved with Digitalization. BIM just to have BIM is not a goal.



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**Thank you!
Mulțumesc!**

