

Digital Asset Engineering

Making railway systems digital, accurate, and trustworthy

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Lead Data Strategy, Governance and Architecture



WORK PACKAGE LEAD 27
2022 – 2026



A Single European Railway Area

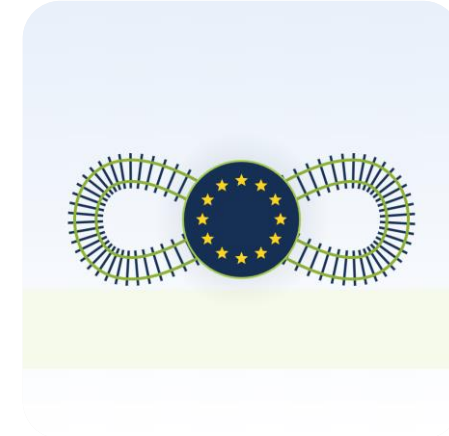
Connect Europe's railways into a **single, interoperable system** — by aligning data, engineering rules and digital infrastructure across infrastructure managers, suppliers and borders.

27

EU member states aligned

Increased **interoperability**

Significantly **less** planning effort



Cross-Border European Rail Services



European Rail Traffic Management System

Digital Asset Engineering makes railway systems digital, accurate, and trustworthy.

D

Designed

CCS planned with shared engineering rules

O

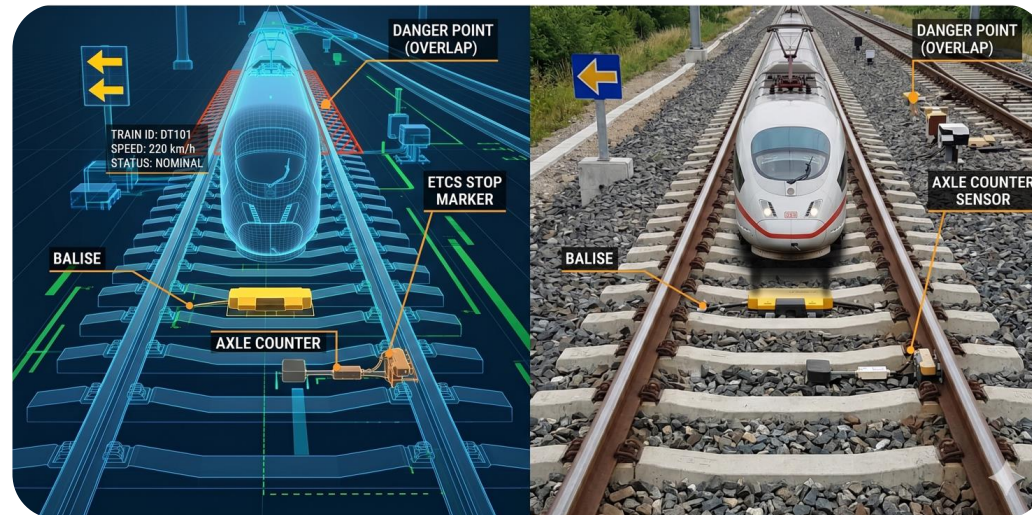
Operated

Safely & efficiently across borders

M

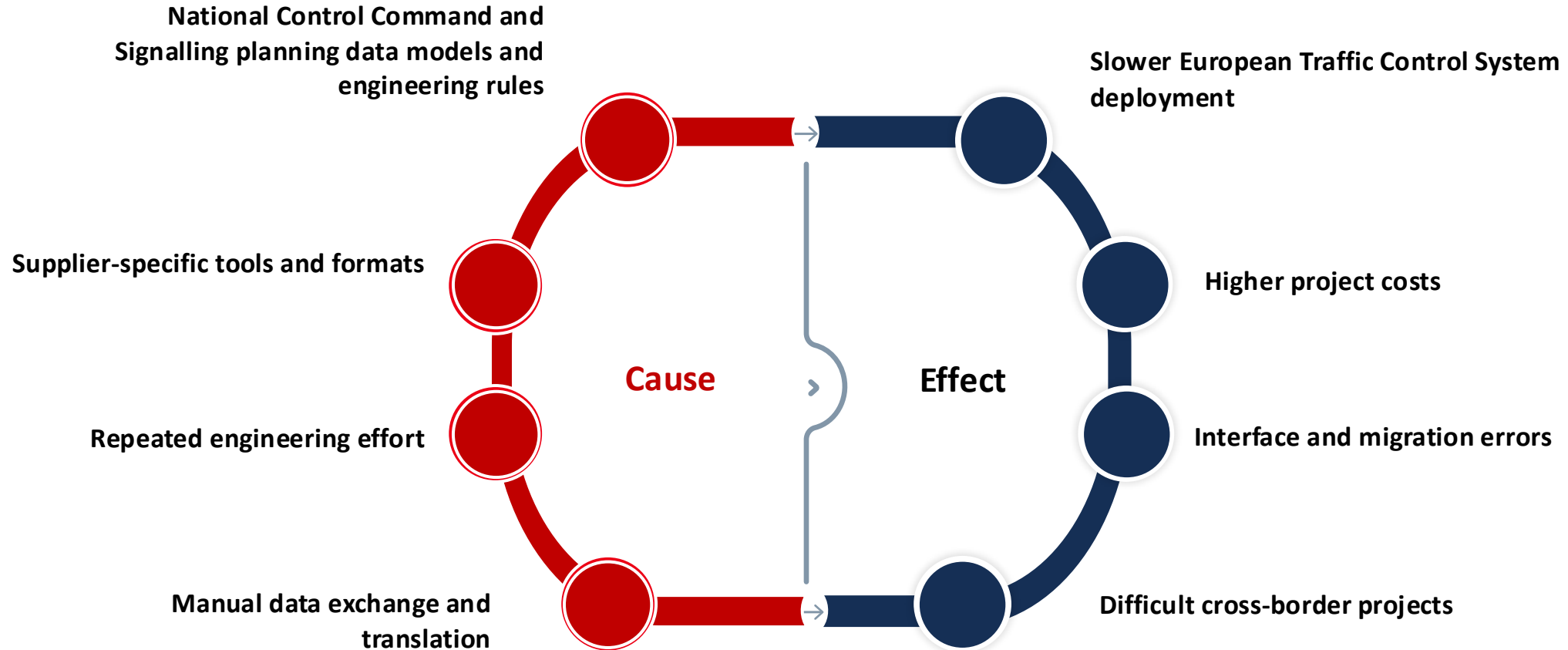
Maintained

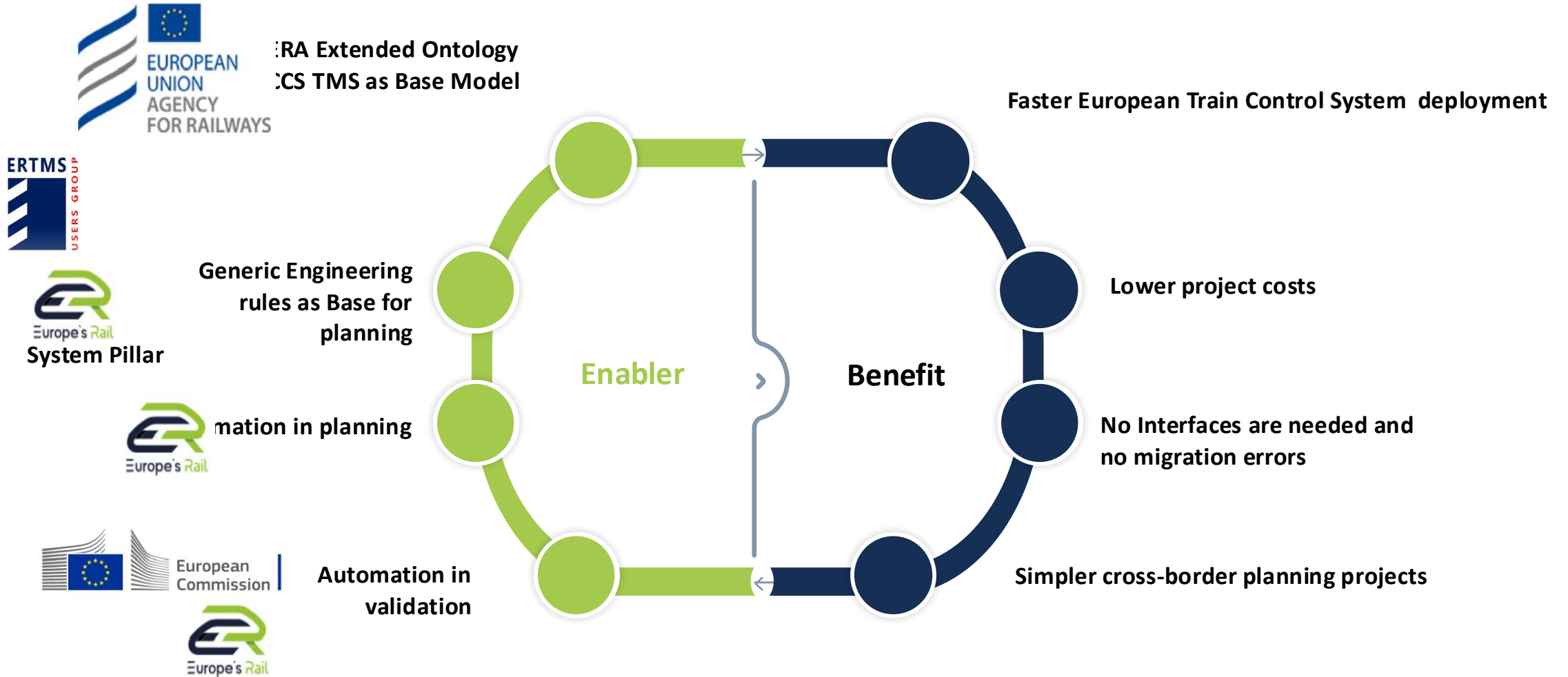
Through trusted, machine-readable data

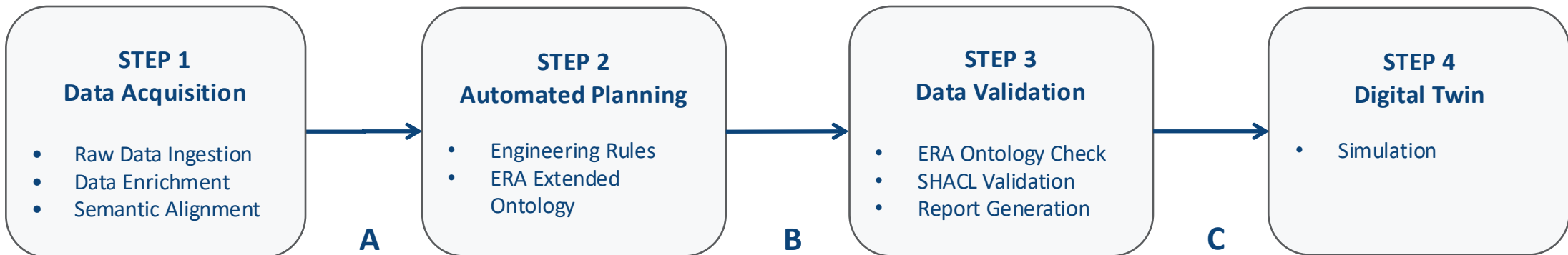
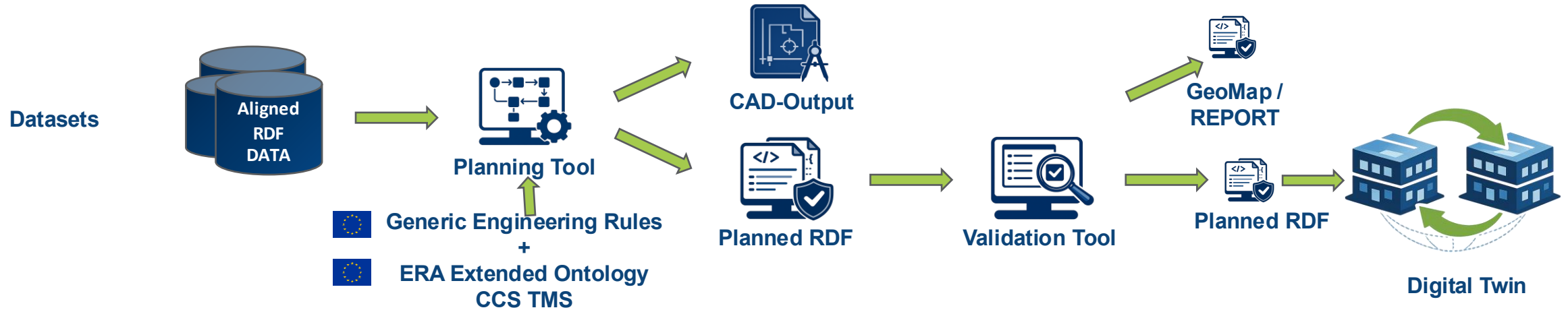


„Digitales Stellwerk (DSTW) in Wamünd“ - Deutsche Bahn AG / Vdler Emersleben

The Problem Today | Impact on Europe

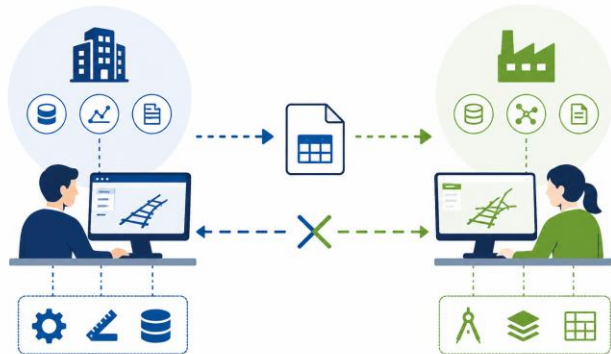






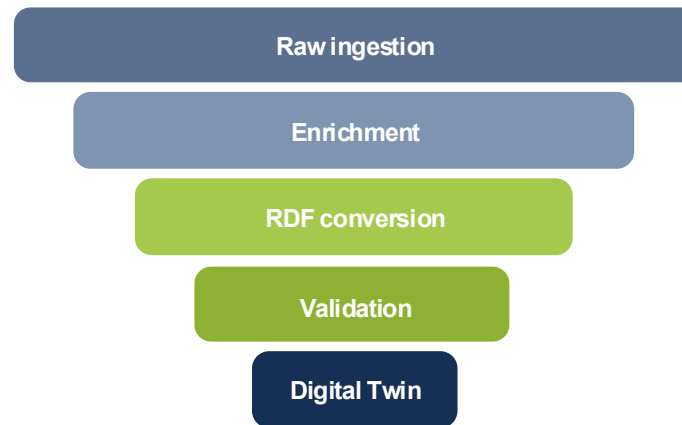
01 · SEMANTIC

Different Infrastructure Managers and suppliers use different tools and rules — so even when data is exchanged, the **meaning** often isn't.



02 · INTEGRATION

The pipeline spans many stages and formats. Each needs to align cleanly into a shared, machine-readable representation.



03 · FEDERATION

Owners must keep control of their data while still participating in shared ecosystems — the role of European data spaces.



Overview of ERA Extended Ontology

Shared Vocabulary

Represent railway concepts consistently

Interoperability

Enable cross-system data exchange

Semantic Understanding

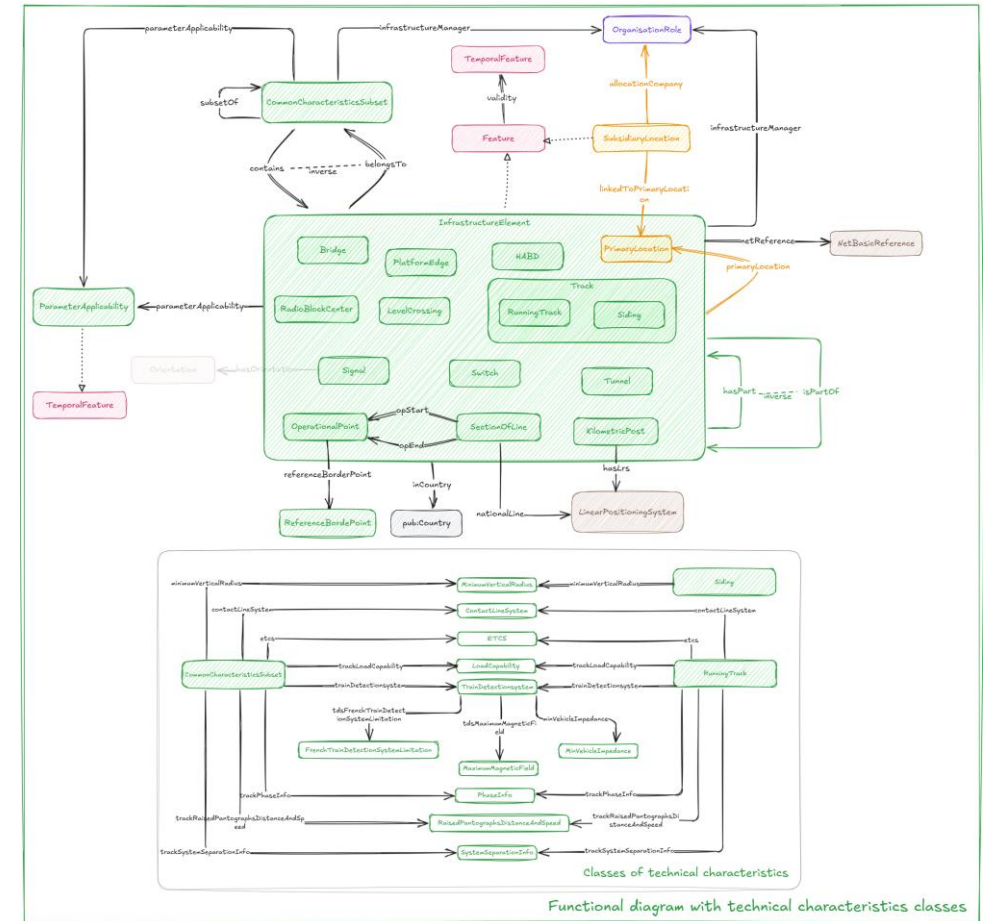
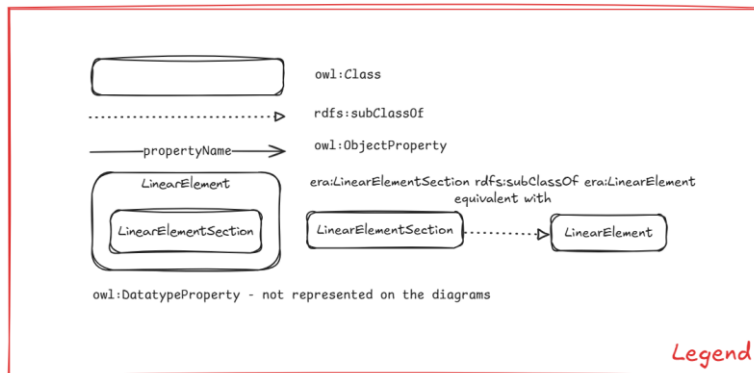
Preserve meaning across tools and infrastructure managers

27

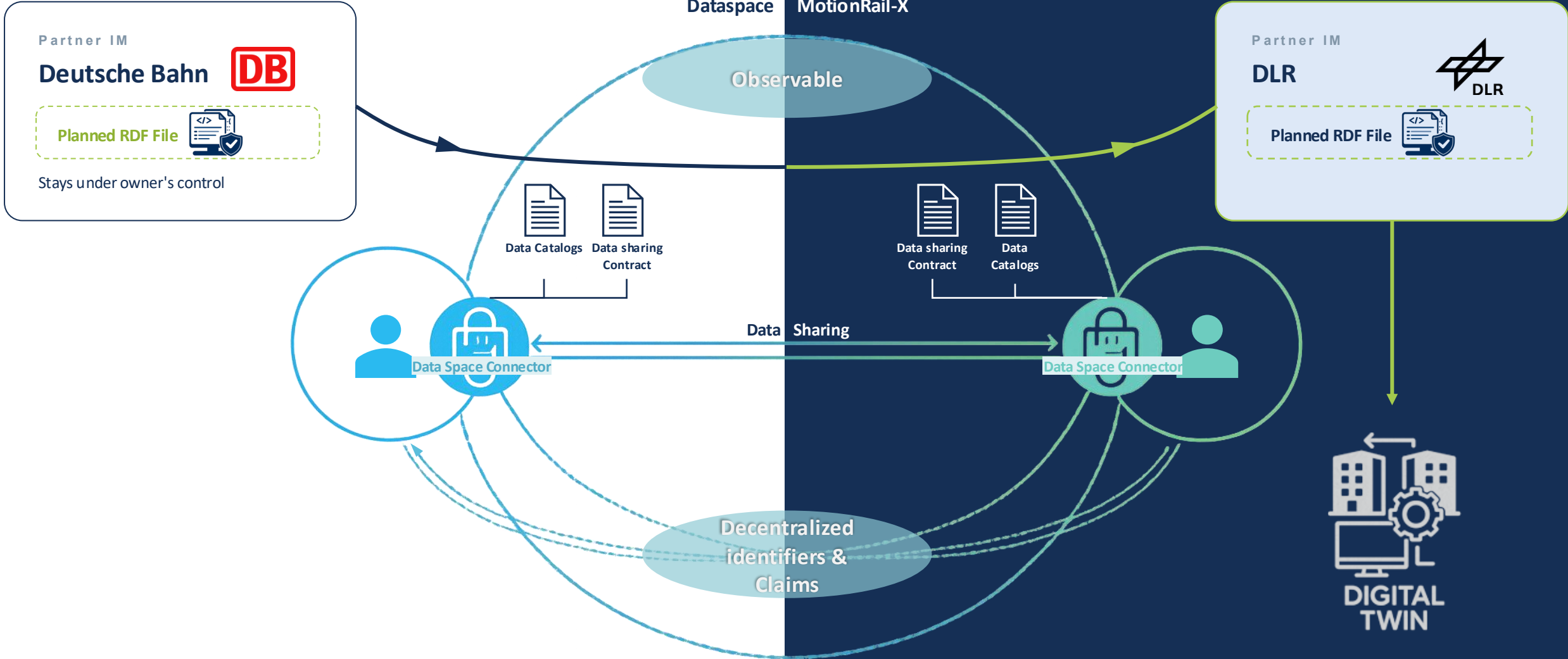
EU member states aligned

1 Ontology

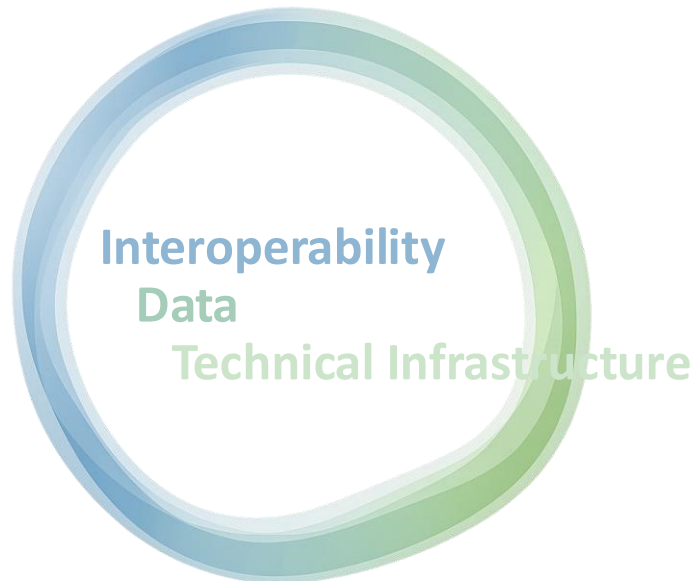
ERA Extended CCS/TMS



Data Sharing Digital Twin



Digital Twins are often presented as highly technical systems — but their success depends less on visualisation, and more on **interoperability**.



01 SEMANTIC

Shared meaning across tools and borders

A common vocabulary so data exchanged between systems carries the *same* meaning.

02 TECHNICAL

Open standards & reusable services

RDF, SHACL etc. – open formats for everyone

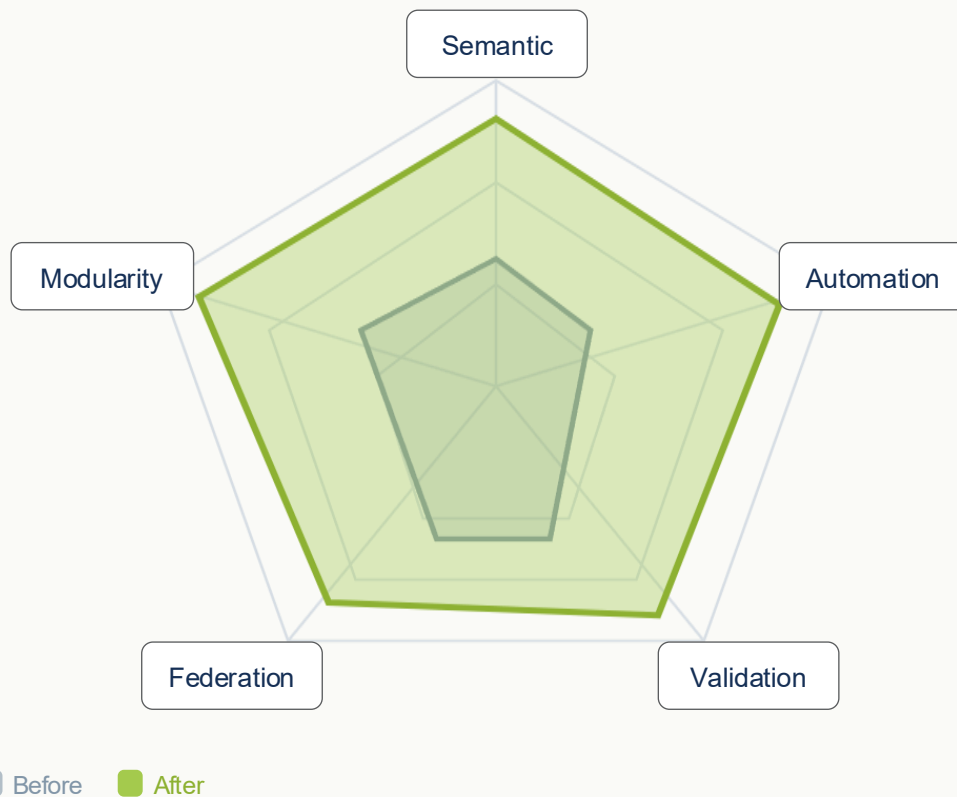
03 ORGANIZATIONAL

Who owns/manages...?

...

CAPABILITY · BEFORE / AFTER (REPRESENTATIONAL)

Maturity across 5 dimensions



FOUNDATION

01

Shared semantic foundations matter

A common foundation through the **ERA ontology** cut ambiguity, manual translation and integration complexity — and unlocked automation.

MACHINE-READABLE

02

RDF turns rules into automation

Encoding engineering knowledge as RDF enables automated validation, SHACL checking, semantic querying and scalable interoperability.

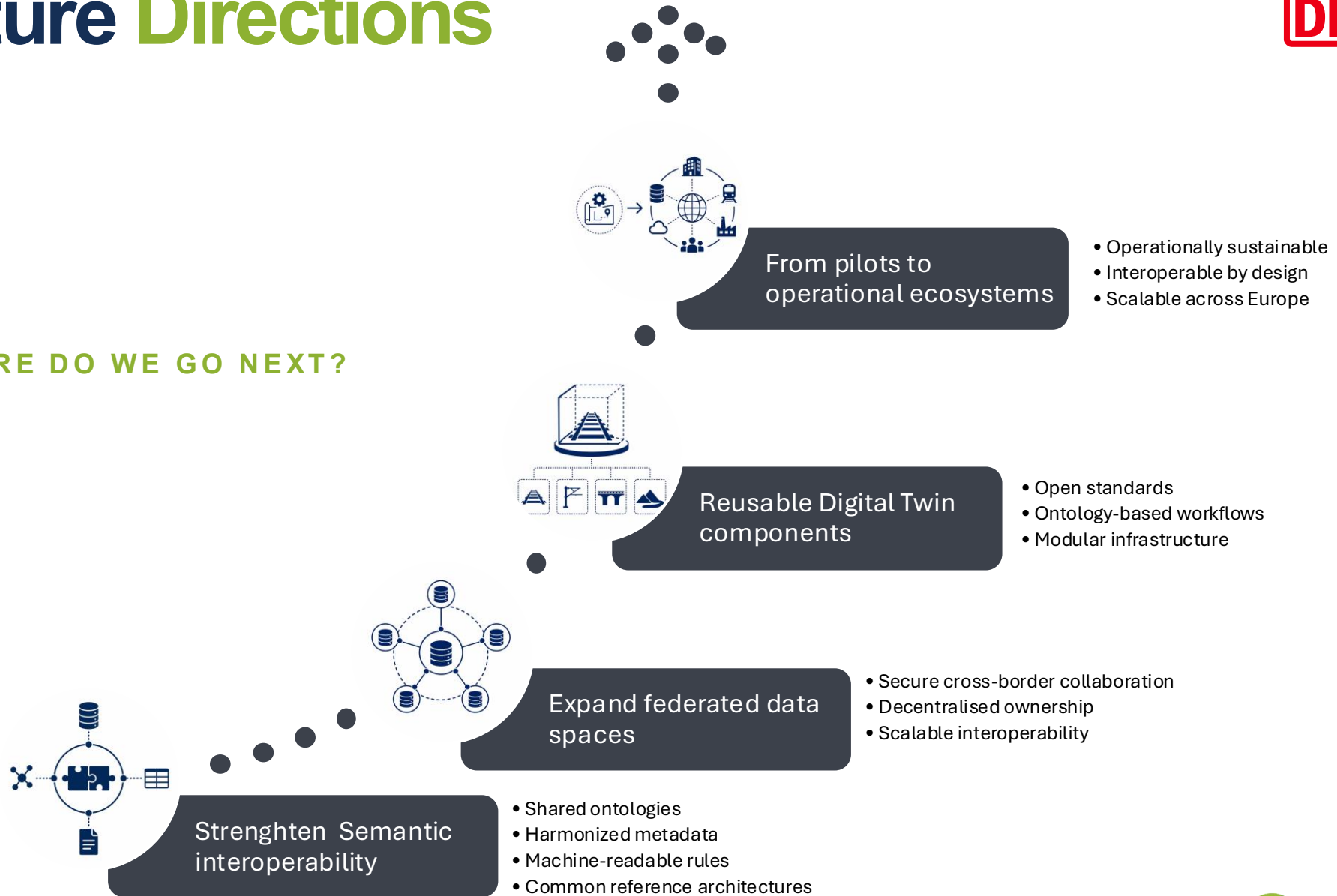
MODULARITY

03

Modular architecture = reuse

Splitting the workflow into reusable components makes the system reusable overall.

WHERE DO WE GO NEXT?





Co-funded by
the European Union



FP1 MOTIONAL
European Rail Network and Mobility Management



Thank You.

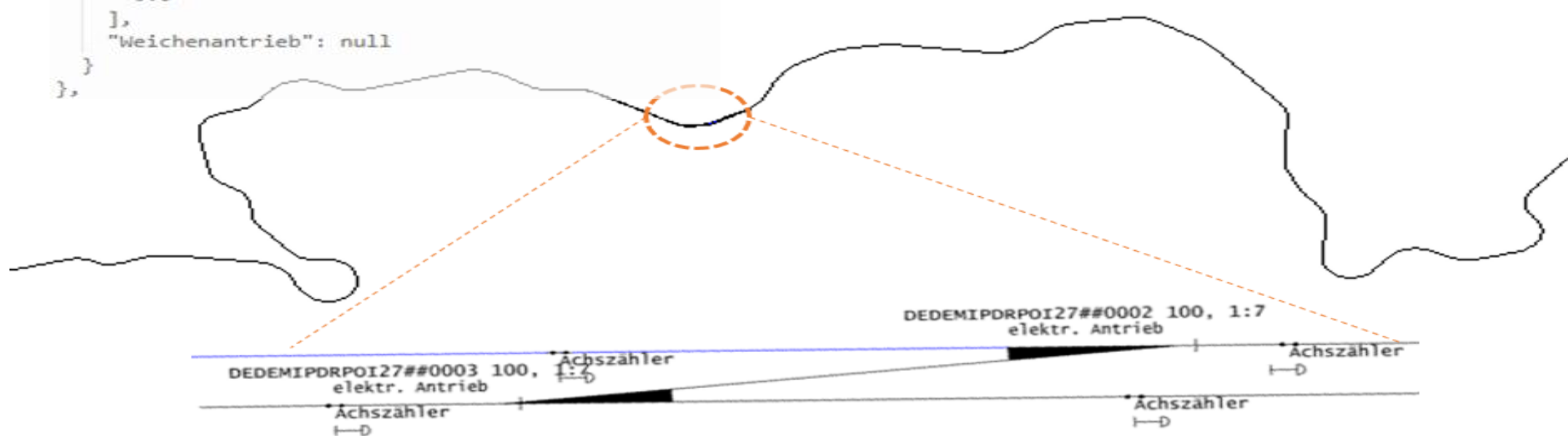
The project is supported by the Europe's Rail Joint Undertaking and its members.

Co-funded by the European Union. Views and opinion expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Europe's Rail Joint Undertaking. Neither the European Union nor the granting authority can be held responsible for them.

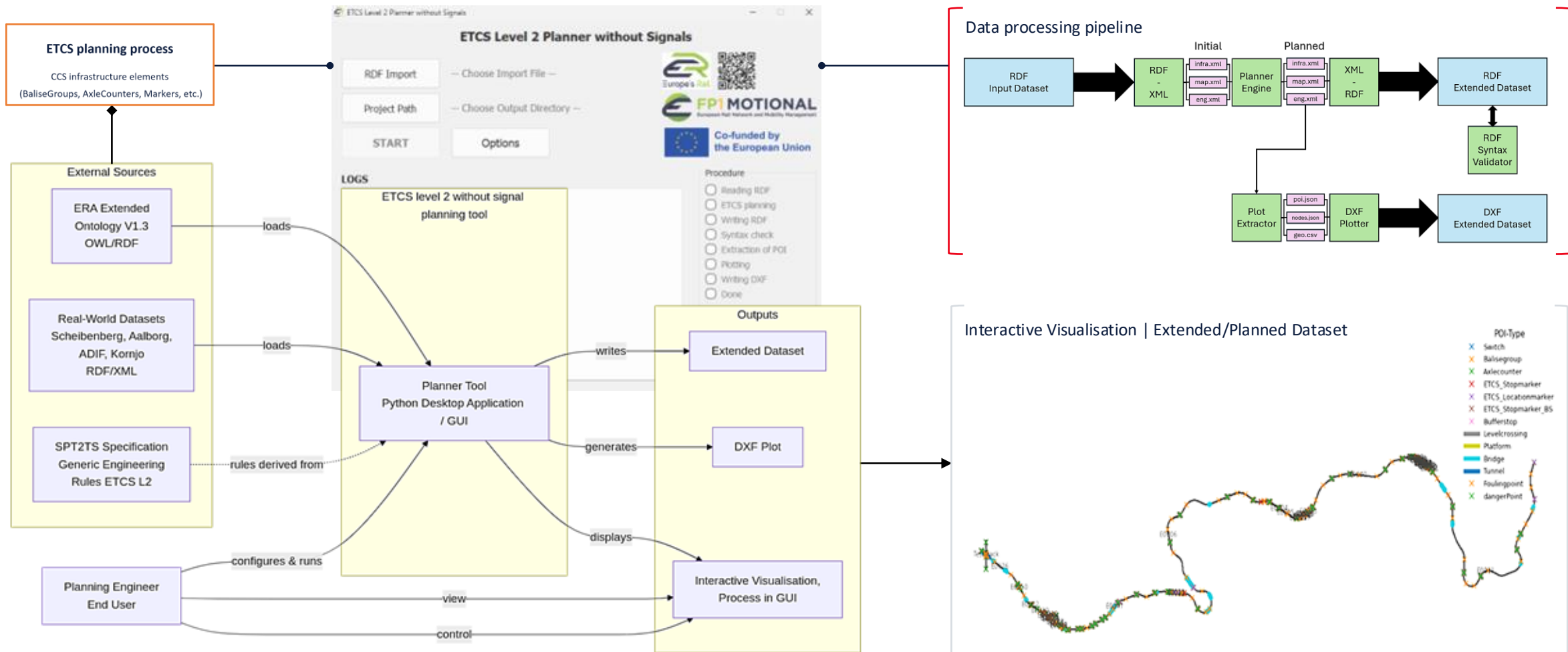


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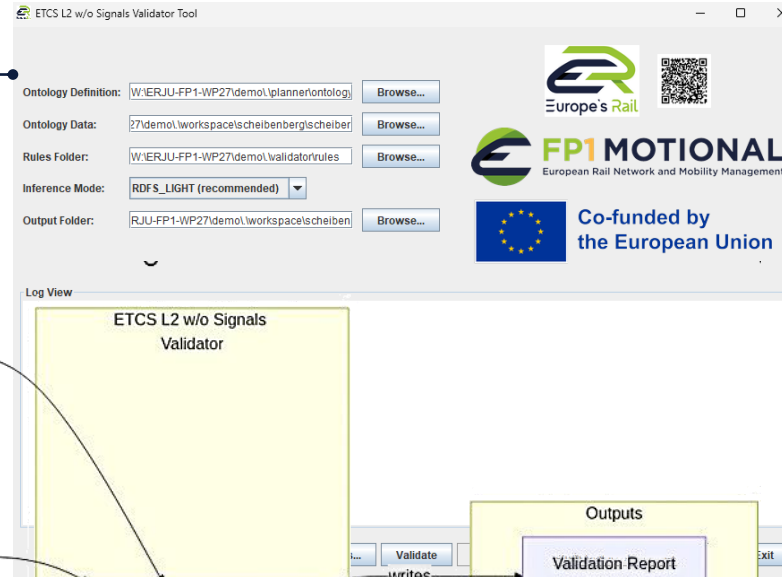
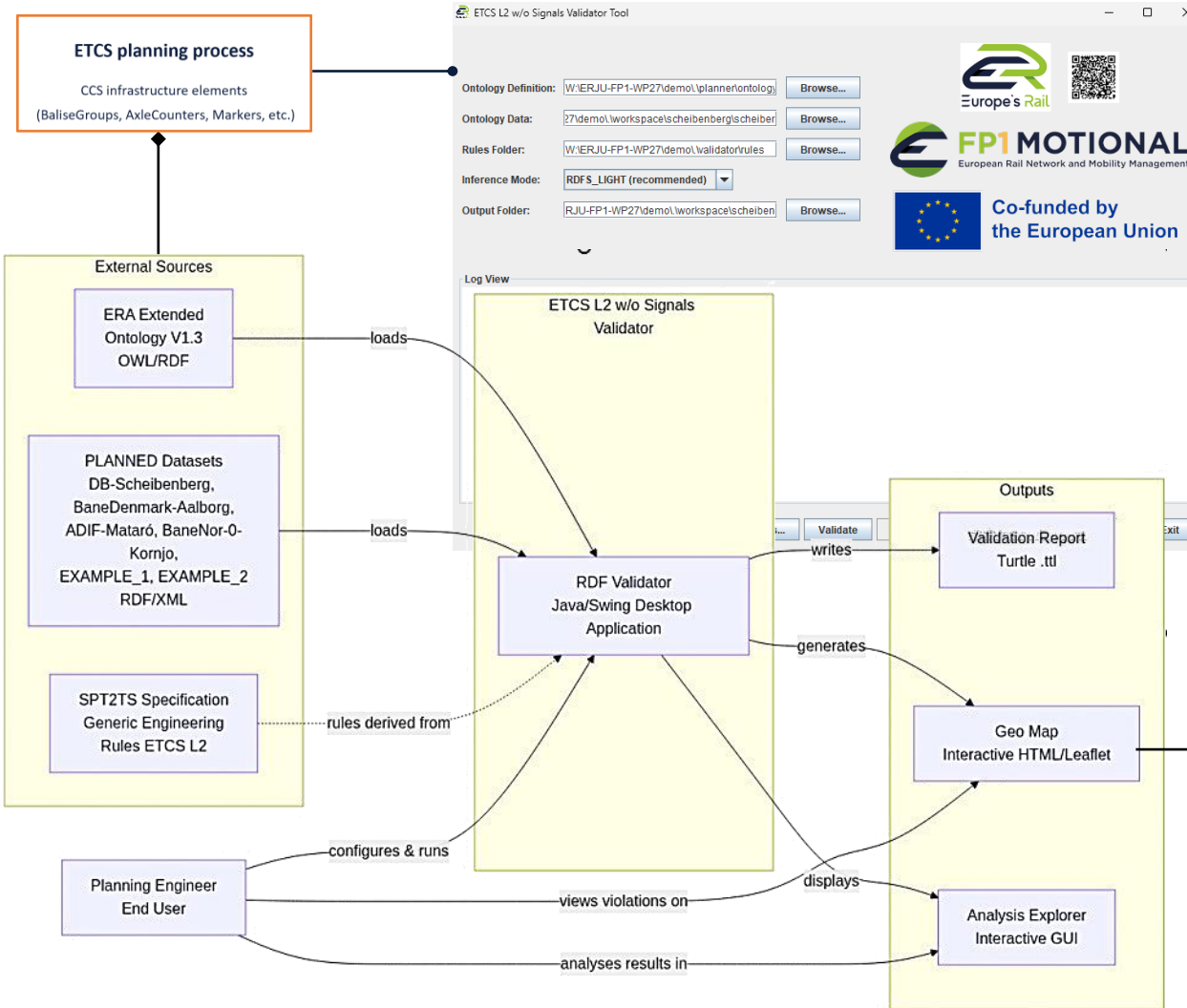
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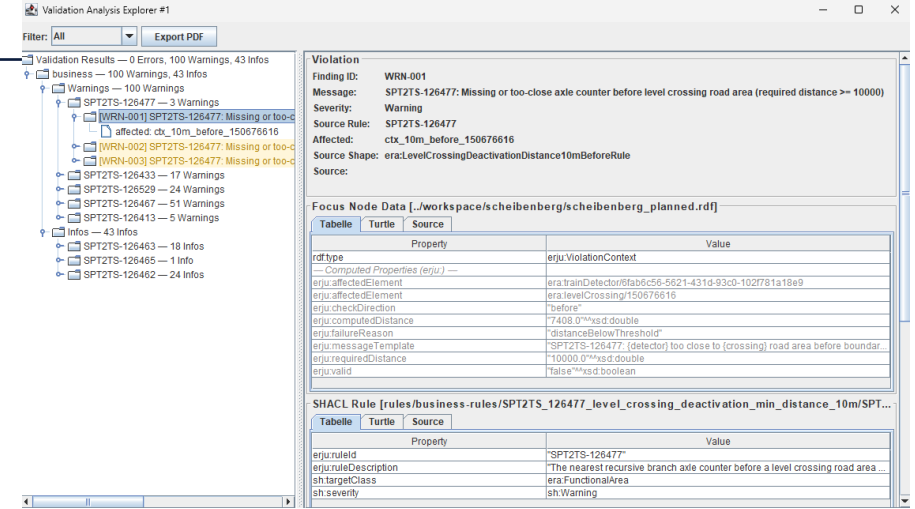
Overview | WP27 workflow | ETCS Level 2 w/o Signals Planner



Overview | WP27 workflow | ETCS Level 2 w/o Signals Validator



Analysis Explorer | SHACL-rules and validation results



GeoMap | Planned site, with overlays for validation results

