TSI Workshop : Ireland 2026

Dublin, 27 October 2026

EUROPEAN UNION AGENCY FOR RAILWAYS



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Agenda

Time	Item	Speakers
09:00 -09:30	Opening	CRR, IRL and ERA
09:30-10:15	EU regulatory framework	ERA (OP)
10:15-10:45	Role of different actors in the Railway System	ERA (PM)
11:15-12:00	Technical Specifications of Interoperability	ERA (NB)
12:00-12:30	World of TSIs – Return of Experience (moderated)	Panel with ERA: RU, IM and NSA
13:30-14:30	Operational Safety	ERA (KD)
14:30-15:30	4RP – Vehicle Authorisation	ERA (NB)
15:45-16:15	4RP – Vehicle Authorisation – Return of Experience (moderated)	Panel with ERA: RU, IM and NSA
16:15-16:45	Fixed Installation : new, upgrade, renewal and APIS	ERA (PM)
16:45-17:15	ERTMS	ERA (DC)
17:15-17:30	Quiz & Closing remarks	ERA (JG)
17:30-17:45	ERA Closing | Ministry /NSA	ERA/Ministry/NSA

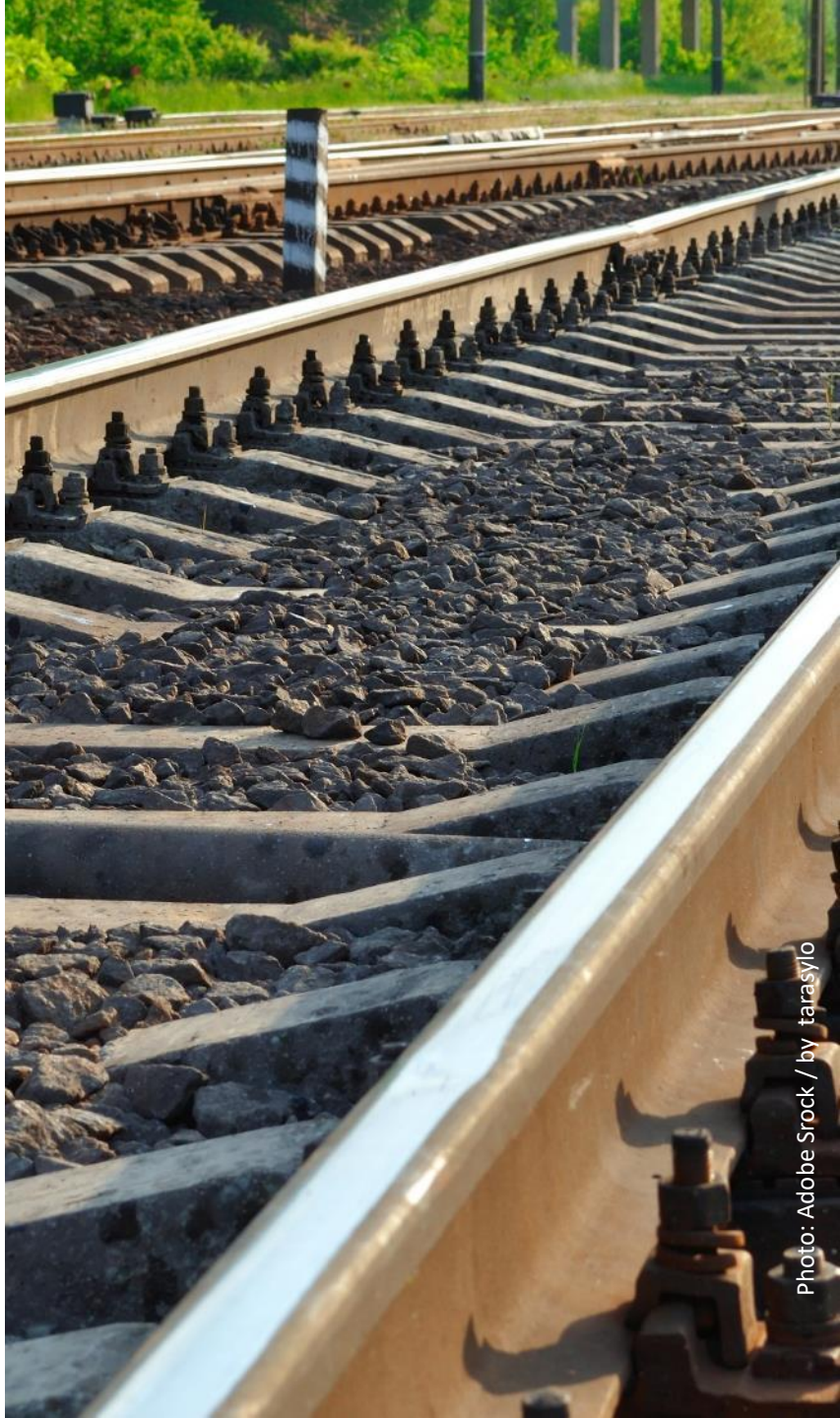


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EU regulatory framework - Interoperability

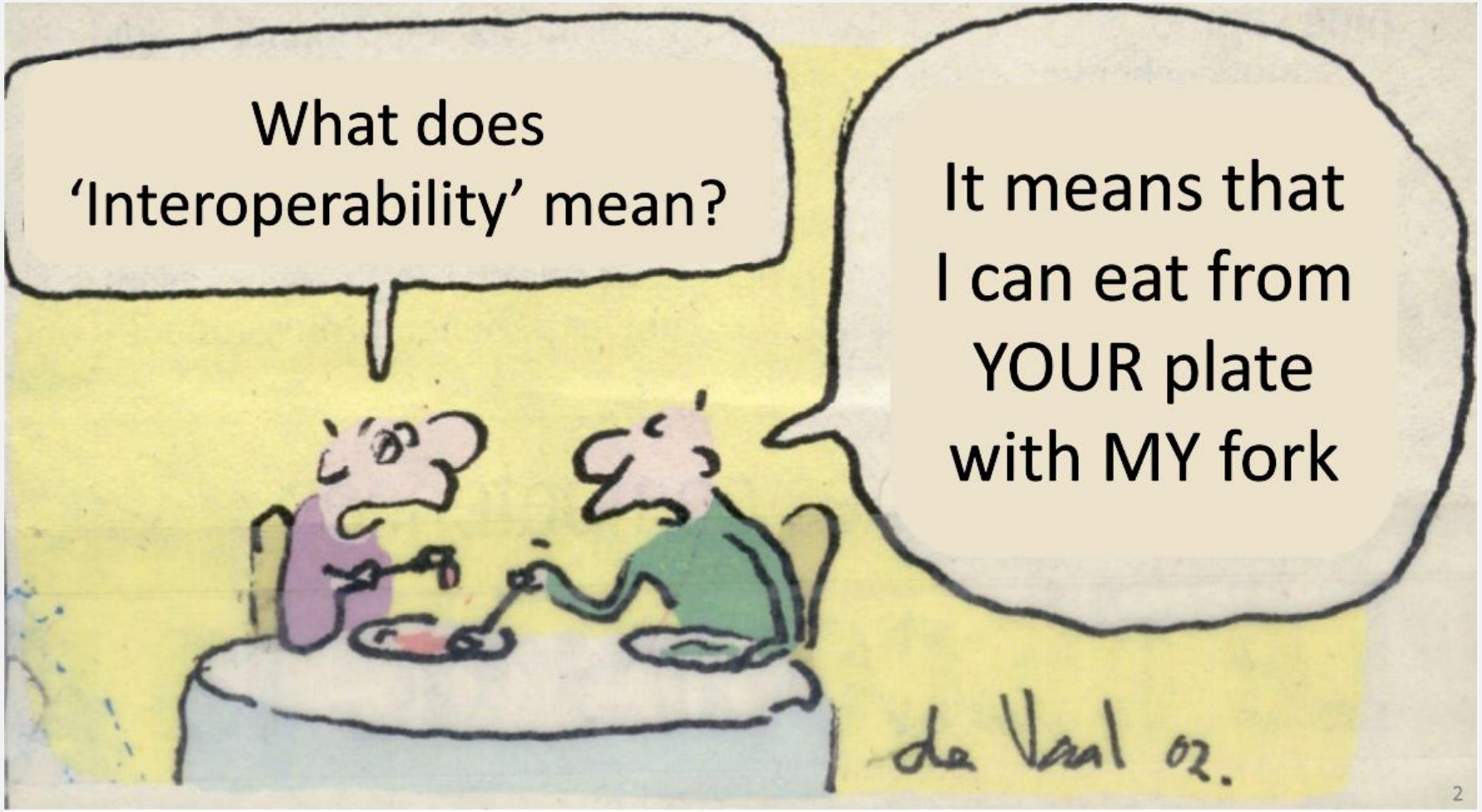




- Chronology of the Railway packages.
- Focus on the Interoperability Directive (EU) 2016/797

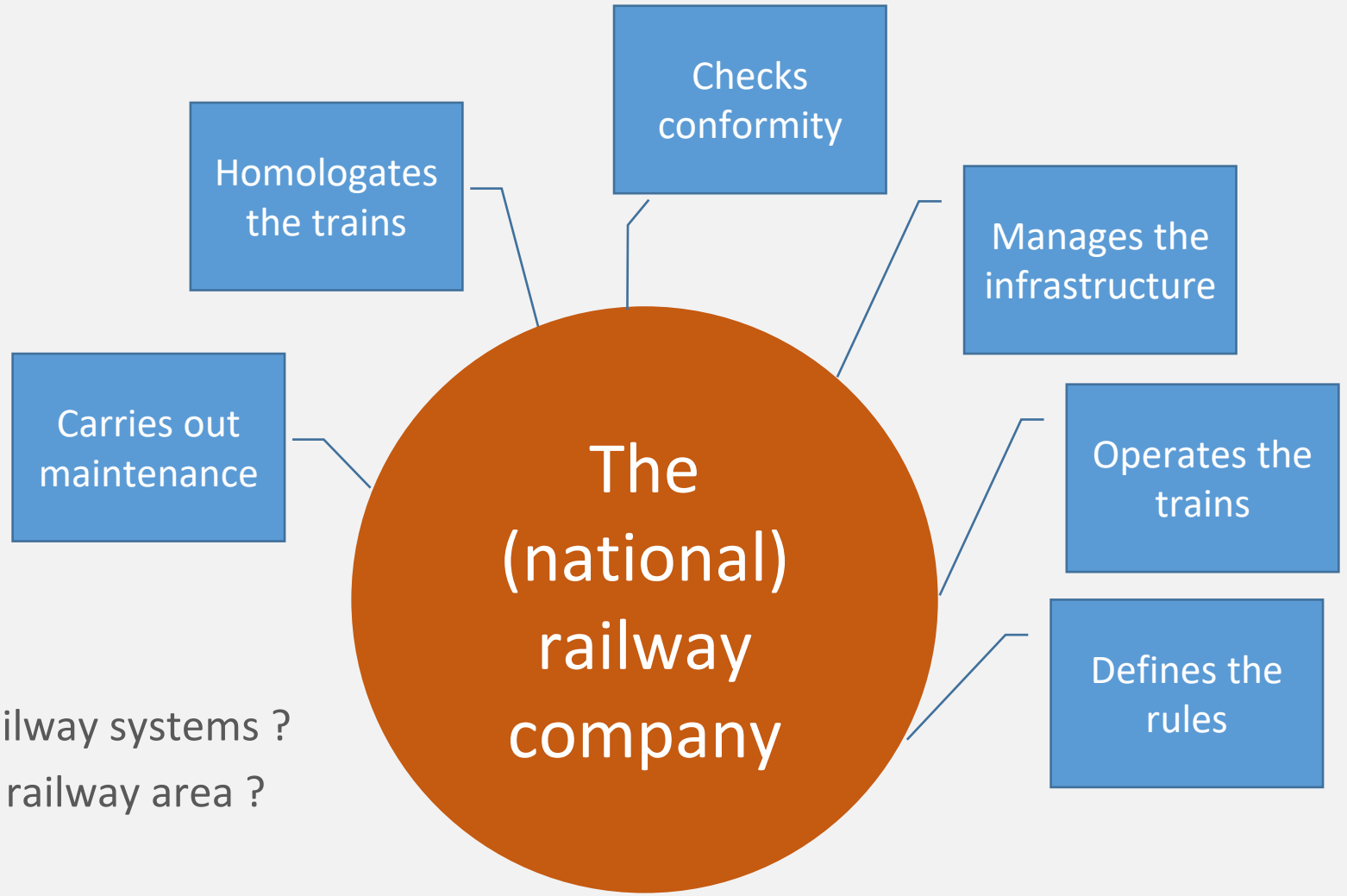
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How to understand this drawing?



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25 years ago – 1 actor per country



- open market ?
- interoperable railway systems ?
- single European railway area ?

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25 years of Commission efforts

Objectives

- Restructure the European rail transport market
- Strengthen the position of railways

Areas of action

- rail transport market,
- national networks
- rail transport infrastructure.

Four legislative packages to

- open up rail transport service markets for competition,
- make national railway systems interoperable
- define appropriate framework conditions for the development of a single European railway area

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Railway Packages





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First railway package of 2001

February 2001, the Council adopted three Directives known as the **"rail infrastructure package".**

- rail operators have access to the trans-European network on a non-discriminatory basis,
- levying of charges for the use of railway infrastructure
- licensing of railway undertakings

- *Directive 2001/12/EC of 26 February 2001 amending Council Directive 91/440/EEC on the development of the Community's railways*
- *Directive 2001/13/EC of 26 February 2001 amending Council Directive 95/18/CE on the licensing of railway undertakings*
- *Directive 2001/14/EC of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification*



2001 - High Speed 1, Britain's first high-speed rail line opens, allowing trains to run from London to Paris on dedicated high-speed track.

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High Speed 1, many control systems



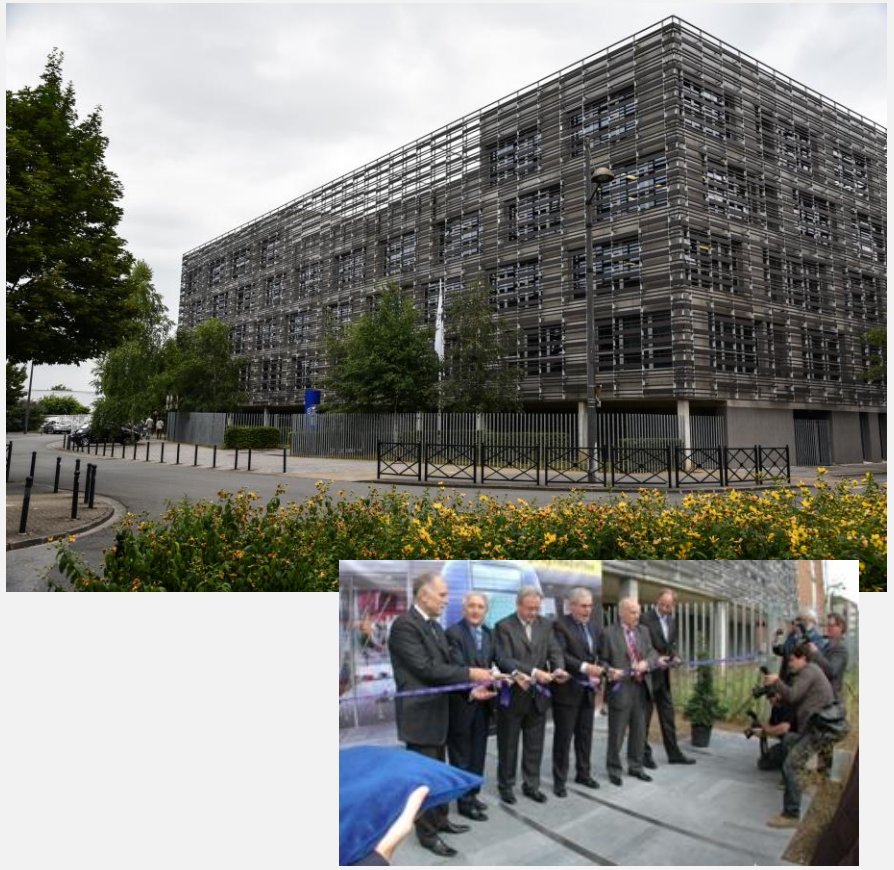
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Second railway package of 2004

April 2004, the **“second railway package".**

- Interoperability and Safety Directives
- Establishment of the **European Railway Agency**
  - A driving force in the policy for modernising the European railway sector.
  - Work to align technical regulations and establish common safety objectives for all Europe's railways.

- *Directive 2004/49/EC of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/CE on the licensing of railway undertakings and Directive 2001/14/CE on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification*
- *Directive 2004/50/EC of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system*
- *Directive 2004/51/EC of 29 April 2004 amending Council Directive 91/440/EEC on the development of the Community's railways*
- *Regulation (EC) No 881/2004 of the European Parliament and of the Council of 29 April 2004 establishing a European Railway Agency*



ERA headquarter
in Valenciennes inauguration on 16 June 2009,

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Third railway package of 2007

October 2007 **the "third railway package"**

- Introduction of the European driver licence allowing train drivers to circulate on the entire European network.
- Strengthened the rail passengers' rights.
- Access rights rail freight service from 2007
- Opening of the international passenger transport service market from 2010



2007 - TGV beats its world record at 574.8km/h

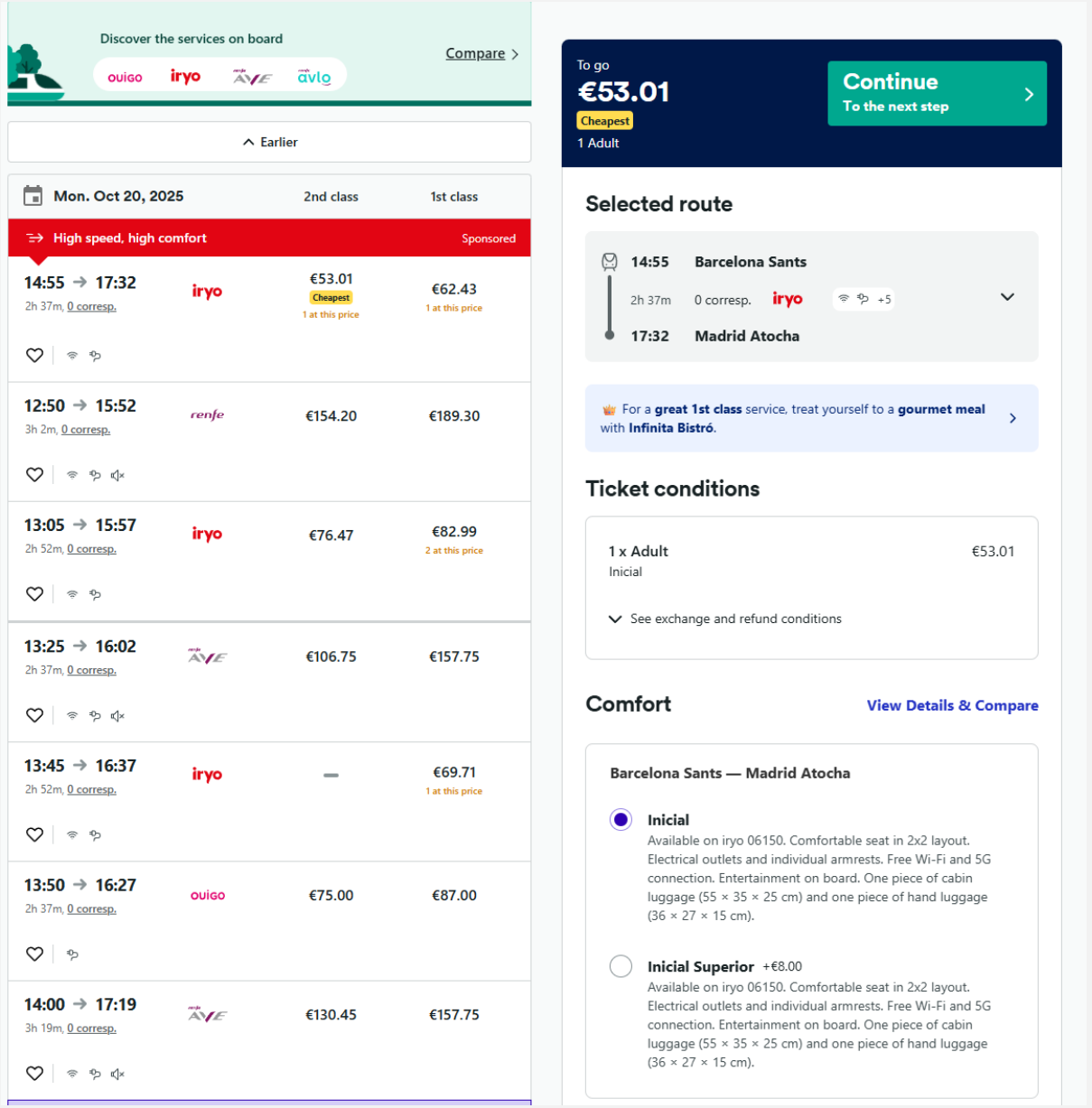
- *Directive 2007/58/EC of the European Parliament and of the Council of 23 October 2007 amending Council Directive 91/440/EEC on the development of the Community's railways and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure*
- *Directive 2007/59/EC of the European Parliament and of the Council of 23 October 2007 on the certification of train drivers operating locomotives and trains on the railway system in the Community*
- *Regulation (EC) No 1370/2007 of 23 October 2007 on public passenger transport services by rail and by road and repealing Council Regulations (EEC) Nos 1191/69 and 1107/70*
- *Regulation (EC) No 1371/2007 of 23 October 2007 on rail passengers' rights and obligations*
- *Regulation (EC) No 1372/2007 of 23 October 2007 amending Council Regulation (EC) No 577/98 on the organisation of a labour force sample survey in the Community*



2007 - High speed trains able of 350 km/h are introduced in Spain between Madrid and Barcelona

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Barcelona – Madrid offer today



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2008 - the Interoperability Directive not part of a package

Sets out the conditions to be met to achieve interoperability within the Union rail system:

- design, construction, placing in service, upgrading, renewal, operation and maintenance of the subsystems of this system
- professional qualifications, health and safety conditions of the staff who contribute to its operation and maintenance.

Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast)







2008 – Entry into force of the PRM TSI, first European specific sectoral regulation on accessibility

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Fourth Railway Package of 2016

A set of 6 legislative texts designed to complete the single market for Rail services (Single European Railway Area).

It comprises two 'pillars' which have been negotiated largely in parallel:

- The 'technical pillar', adopted by the European Parliament and the Council in April 2016
- The 'market pillar', adopted in December 2016



2016 – Opening of the Gotthard Base Tunnel, the world's longest and deepest rail tunnel.

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A set of 6 legislative texts

Technical pillar

- Regulation (EU) 2016/796 on the European Union Agency for Railways and repealing Regulation (EC) n° 881/2004 (AR)
- Directive (EU) 2016/797 on the interoperability of the rail system within the European Union (Recast of Directive 2008/57/EC) (IOD)
- Directive (EU) 2016/798 on railway safety (Recast of Directive 2004/49/EC) (RSD)

Market pillar

- Regulation (EU) 2016/2338 amending Regulation (EU) 1370/2007, which deals with the award of public service contracts for domestic passenger transport services by rail ('PSO Regulation')
- Directive 2016/2370/EU amending Directive 2012/34/EU, which deals with the opening of the market of domestic passenger transport services by rail and the governance of the railway infrastructure ('Governance Directive')
- Regulation (EU) 2016/2337 repealing Regulation (EEC) 1192/69 on the normalisation of the accounts of railway undertakings

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The market pillar objectives

To complete the process of gradual market opening started with the 1st railway package:

- General right for railway undertakings established in one Member State to operate all types of passenger services everywhere in the EU,
- Rules aimed at improving impartiality in the governance of railway infrastructure and preventing discrimination
- Principle of mandatory tendering for public service contracts in rail

The market pillar is expected to deliver more choice and better quality of rail services for European citizens, these being the overriding objectives.

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The technical pillar objectives

- To boost the competitiveness of the railway sector with:
  - Authorizations for placing vehicles on the market and safety certificates for railway undertakings valid throughout the EU.
  - A "One stop shop" which is a single entry point for all such applications, using easy, transparent and consistent procedures.
  - Interoperable European Rail Traffic Management System (ERTMS) equipment.
  - A reduction of the number of national rules, which create a risk of insufficient transparency and disguised discrimination of new operators.

- The **European Union Agency for Railways** replaced and succeeded the European Railway Agency

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Technical pillar, more than just the IOD



Directives & Regulations

- **Directive (EU) 2016/797 Interoperability**
- **Directive (EU) 2016/798 Safety**
- **Regulation (EU) 2016/796 The Agency regulation**

Commission Implementing Regulations

- **(EU) 2018/545 Practical arrangements for VA**
- **(EU) 2019/250 EC documents template**
- **(EU) 2021/1903 on the fees and charges**
- **(EU) 2018/867 on the Board(s) of Appeal**

Guidance

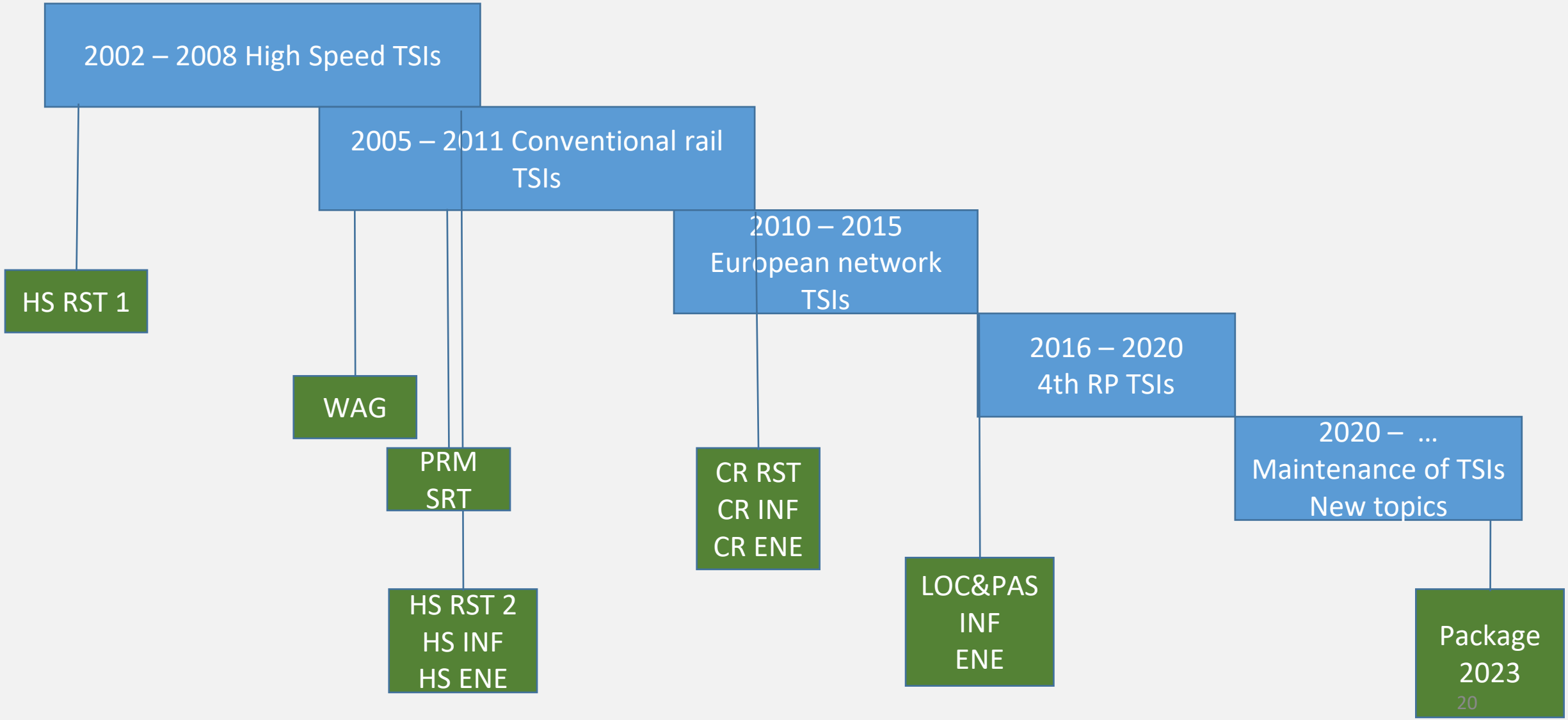
- **Guidelines for the practical arrangements for the vehicle authorisation process & flowcharts**
- **Catalogue of examples**
- **Clarification notes**

Agreements

- **Cooperation agreements between Agency and NSAs**
- **Multilateral agreements**

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In parallel, chronology of TSIs (not exhaustive)



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Today, many actors with defined roles

Authorises the trains

ERA
NSAs

Checks conformity of subsystems and interoperability constituents

NoBo
DeBo
AsBo

Provides infrastructure data
Manages the infrastructure

IM

Checks the route compatibility
Operates the trains

RU

Defines the rules

ERA
(NSAs)

Carries out maintenance

ECM



Towards the single European railway area

Roles and interfaces defined precisely for safe and efficient operation

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In a nutshell

Interoperability refers to the uninterrupted movement of trains.

It requires…

- An **optimal level** of **technical harmonization** *(infra & rolling stock)*
- Knowledge of the **technical characteristics** of the **network** *(RINF)*
- Clear rules of **certification and vehicle authorization**

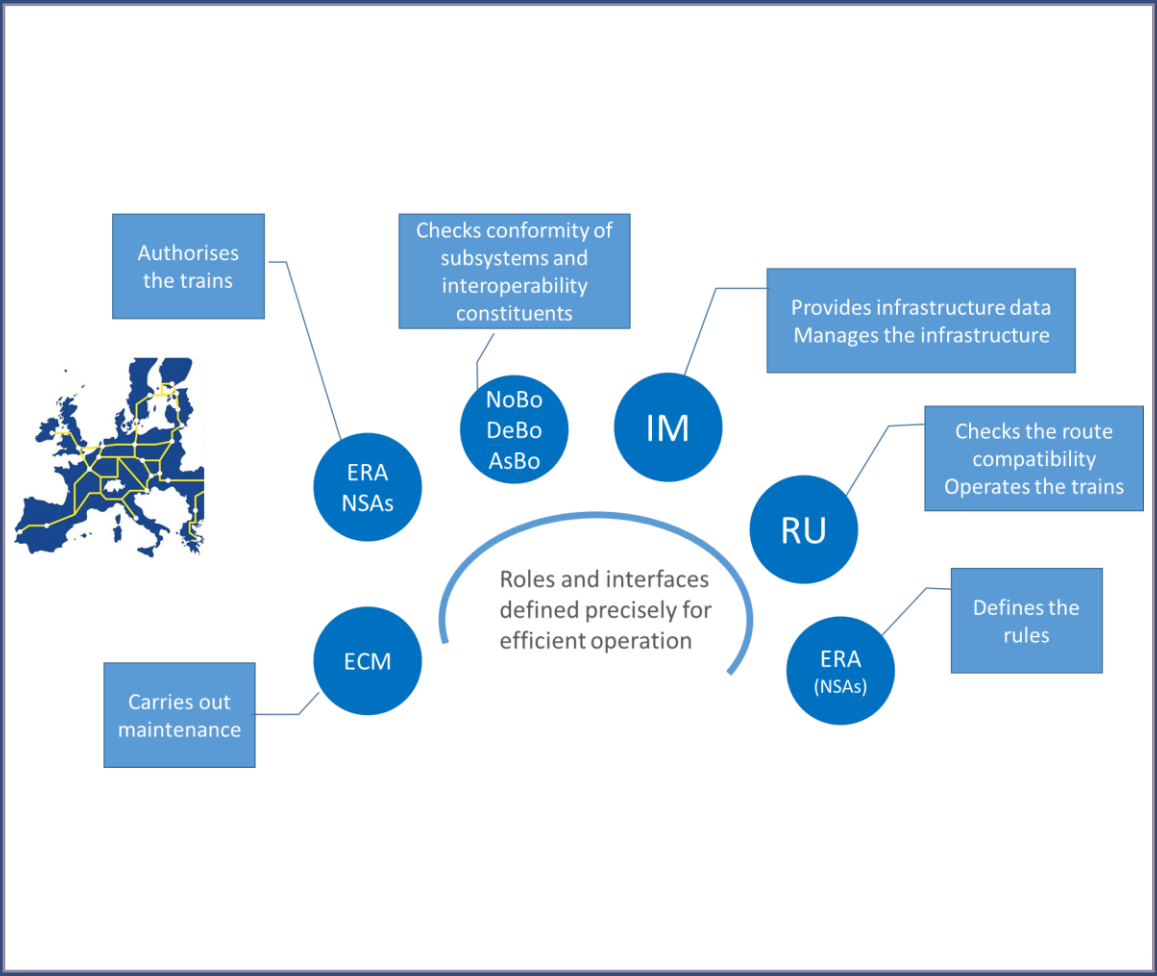
Questions?

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Photo: Adobe Srock / by Serjiob74

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Role of different actors in the Railway System



- Actors (Applicants, ERA, NSA, CABs (Conformity Assessment Bodies) and other actors.
- Relation/interaction with different concerned parties in the railway sector

! non-exhaustive; only some representative aspects for a better understanding !

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Railway Undertaking (RU)

Any public or private undertaking licensed according to Directive 2012/34/EU (establishing SERA), the principal business of which is to provide services for the transport of goods and/or passengers by rail with a requirement that the undertaking ensure traction; this also includes undertakings which provide traction only.

Example of responsibilities:

When during operation it appears that a vehicle or a vehicle type does not meet one of the applicable essential requirements, RUs concerned should take the necessary corrective measures in order to bring the vehicle(s) into conformity.

…

See also Interoperability Directive (2016/797) and Safety (2016/798)Directive

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Infrastructure Manager (IM)

Any body or firm responsible in particular for establishing, managing and maintaining railway infrastructure, including traffic management and control-command and signalling; the functions of the infrastructure manager on a network or part of a network may be allocated to different bodies or firms.

In the vehicle authorisation process:

- The IM plays no role in the authorisation of placing on the market.
- The IM is involved in providing access to the network whenever tests are necessary to provide evidence of compliance.

See also Interoperability Directive (2016/797) and Safety (2016/798)Directive

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Entity in Charge of Maintenance (ECM)

('ECM') means an entity in charge of the maintenance of a vehicle, and registered as such in a vehicle register referred to in Article 47 of Interoperability Directive (2016/797).

Each vehicle, before it is being used on the network, shall have an entity in charge of maintenance assigned to it and this entity shall be registered in the vehicle register.

…

See also Safety Directive (2016/798)

European Union Agency for Railways (ERA)

Draft Recommendations on TSIs.

Although the system is divided into several elements, the Agency should retain an overview of the system, in order to promote interoperability and safety.

Should cooperate with the NSAs and share competencies as appropriate for the issuing of authorisations with due regard to safety.

Act as the ERTMS system authority, being in charge of assessing the technical solutions envisaged before any call for tenders relating to ERTMS trackside equipment is launched or published, in order to check whether those technical solutions are compliant with the relevant TSIs and are fully interoperable.

…
See also Interoperability Directive (2016/797), Safety (2016/798)Directive and Agency Regulation (2016/796)

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National Safety Authority (NSA)

As ERA, the NSAs should take full responsibility for the authorisations they issue.

Responsible for the supervision of the circulation of the vehicle;

In case of non-conformity leading to a serious safety risk it should be possible to take the necessary temporary safety measures, including immediately restricting or suspending the relevant operation. If the corrective measures are insufficient and the serious safety risk generated by the non-conformity remains, national safety authorities (or the Agency) should be allowed to revoke or amend the authorisation.

Should cooperate with ERA and share competencies as appropriate for the issuing of authorisations with due regard to safety.

Authorises the placing in service of the energy, infrastructure and trackside control-command and signalling subsystems which are located or operated in the territory of its Member State.

…

See also Interoperability Directive (2016/797) and Safety (2016/798)Directive

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National Investigating Body (NIB)

National permanent body that conducts investigations of the accidents and incidents as referred to in Article 20 of Safety Directive (2016/798)

See also Safety Directive (2016/798).

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Conformity assessment bodies

- Notified Body - NoBo:
  - Designated by a Member State and is recognised throughout Europe.
  - Assess compliance with the TSIs
  - Issues verification certificates and Technical file.

- Designated Body - DeBo:
  - Designated by a MS , national recognition
  - Assess compliance with national rules.
  - Issues verification certificate and Technical file.

- Risk Assessment Body - AsBo:
  - Assesses the risk assessment procedures implemented by the applicant.
  - Issues Safety assessment report

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Some general philosophy (1)

The **manufacturer** is responsible for the conformity of product to applicable legislation.

The **user** is responsible to use the product in conformity with the applicable legislation.

The **authorities** have a duty of control on the conformity of products and their use to the applicable legislation. Two types of control:

- Control before the product is placed on the market = ‘A priori’
- Control after the product is placed on the market = ‘A posteriori’

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Some general philosophy (2)

Control a priori by conformity assessment bodies and authorities

Control a posteriori by authorities

- Conformity assessment bodies
  - Notified Bodies (NoBo)
  - Designated Bodies (DeBo)
  - Assessment Bodies (AsBo
- Authorities
  - National Safety Authorities
  - European Union Agency for Railways (ERA)
  - National Investigation Bodies (only control a posteriori)

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Applicant of vehicle (type) authorisation

- Select Assessment Bodies and assessment modules : design, manufacturing including testing.
- Ensure that product meets all the essential requirements (TSIs, National rules, other EU law ….).
- Prepare application files:
  - pre-engagement (optional),
  - authorisation: mandatory documents accompanying the application for authorisaion
- Select the authorising entity
- Introduce its VA application in **One Stop Shop**
- Sign risk declaration and EC declaration of verification of the subsystems
- Become the holder of the issued vehicle type authorization (manage configuration of the vehicle type)

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NSA / ERA in Vehicle authorisation

- Checks the documents accompanying the application for authorisation and provides proof of the adequacy of the verification procedure.
- This verification consists of checking the completeness, relevance and consistency of the file submitted. It is not :
  - a systematic in-depth verification of the work carried out by the applicants and the assessment bodies
  - a duplication of what has already been checked by the assessment bodies.
  - The NSA or ERA may only question the verifications carried out by the assessment bodies in the event of justified doubts...
- Issues the Authorisation of placing the Vehicle on the Market

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NSA / ERA in Vehicle authorisation

- In case the area of use covers more than one Member State, ERA issues the authorisation after :
  - ERA : Manage the project, assess application against the TSIs and deliver the APM,
  - NSA : assess the **part related to national rules**.
- Authorisation issued mentions:
  - Area of use
  - Values of TSIs and NRs parameters related to Technical compatibility between the vehicle and the networks of the Area of use
  - Compliance with the TSIs and National rules,
  - Conditions for uses and other restrictions

Questions?

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The Technical Specifications for Interoperability



- Why TSIs?
- General description of the structure
- Content of the TSIs
- The TSI package 2023

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Flashback: the EU ‘new approach’

“New Approach”: a legislative framework established in the EU in the **80’s** to facilitate technical harmonization, based on four principles:

1) **Legislative Harmonization**: adoption of essential safety requirements (or other in the general interest) that products must conform to. These products can enjoy free movement throughout the EU.

2) **Technical Specifications**: drawing up technical specifications needed for the production and placing on the market of products compliant to the essential requirements by standardization organizations.

3) **Voluntary Standards**: these technical specifications are not mandatory but voluntary standards (Harmonised Standards).

4) **Presumption of Conformity**: products manufactured in conformity with Harmonised Standards are presumed to conform to the Essential Requirements established by the Directive.

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If the railway system was a toy…



Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys:

"Toys may not be placed on the market unless they comply with the **essential safety requirements**"

"Toys which are in conformity with **harmonised standards** (…) shall be presumed to be in **conformity with the requirements**"

When a **conformity assessment body** notified under Art 22 ('notified body') carries out the EC-type examination, it shall evaluate…

CEN

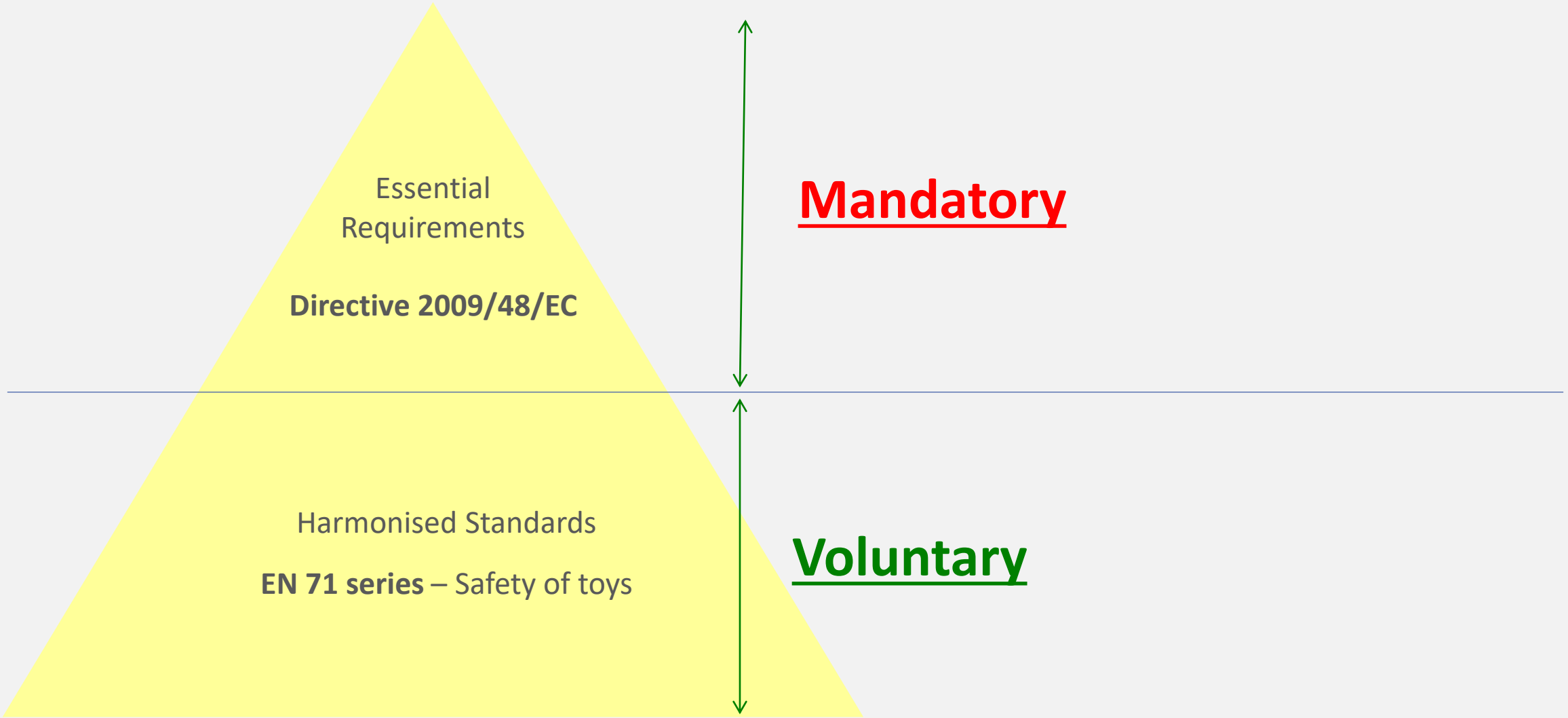
Toy Safety standards

EN 71-1 Mechanical and physical properties
EN 71-2 Flammability
EN 71-3 Migration of certain elements
EN 71-4 Experimental sets for chemistry and related activities
EN 71-5 Chemical toys (sets) other than experimental sets
EN 71-7 Finger paints
EN 71-8 Activity toys for domestic use
EN 71-9 Organic chemical compounds – Requirements
EN 71-10 Organic chemical compounds – Sample preparation
EN 71-11 Organic chemical compounds - Methods of analysis
EN 71-12 N-Nitrosamines and N-nitrosatable substances (2016-version)
EN 71-13 Olfactory board games, cosmetic kits and gustative games
EN 71-14 Trampolines for domestic use

EN 71 series – Safety of toys

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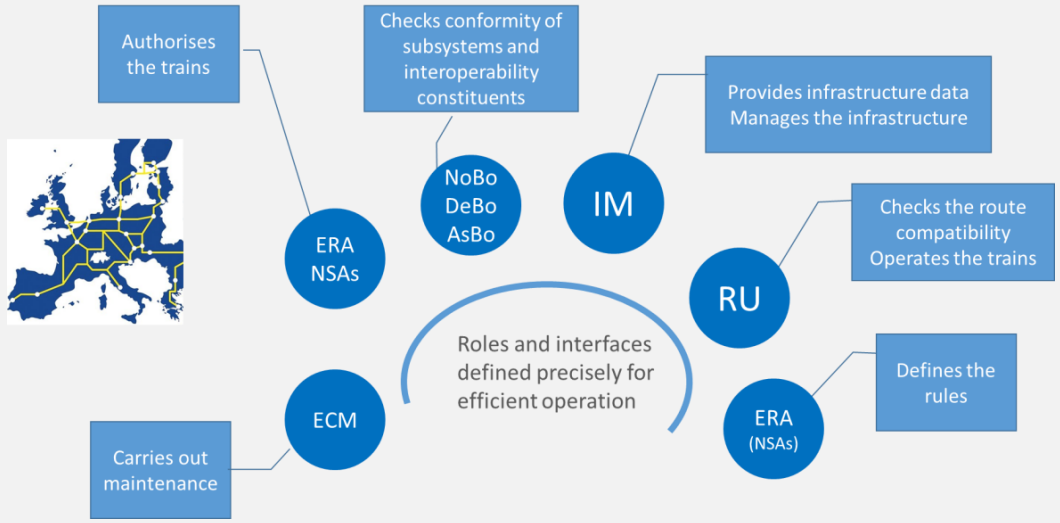
If the railway system was a toy…



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… but the railway system isn't a toy





Interoperability + A shared system with many actors

= Need for an intermediate layer, **the Technical Specifications for Interoperability**

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Technical Specifications for Interoperability

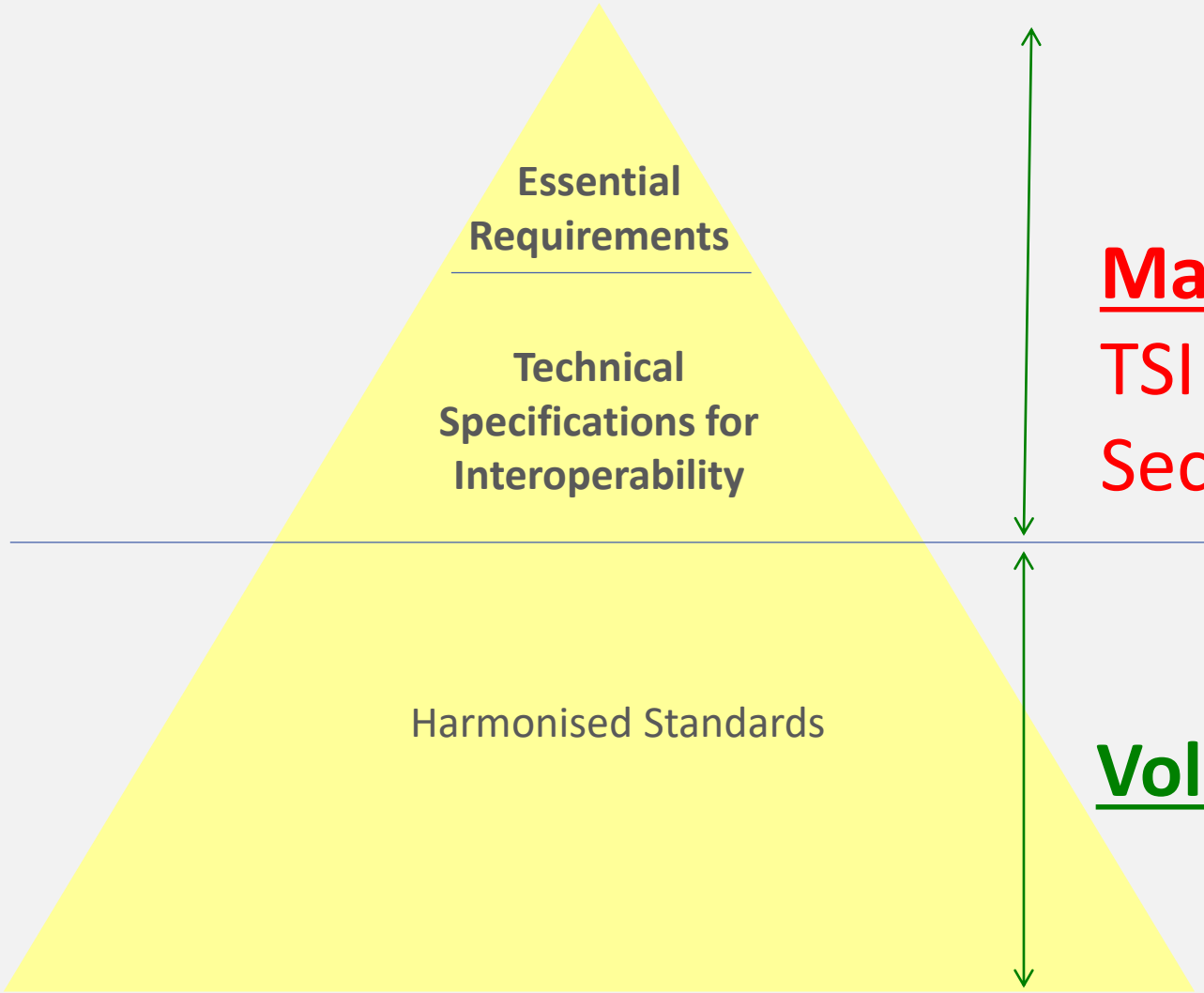
Remove structural and functional barriers

- Railways have greater or lesser interoperability depending on their conformity to standards on track gauge, couplings, brakes, signalling, communications, loading gauge, operating rules, etc.

- The EU **Technical Specifications for Interoperability** (TSIs) aim at removing these obstacles

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Where is the TSI intermediate layer?



Mandatory

TSI are regulatory documents

Secondary legislation

Voluntary

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What is a TSI?
(IOD* Art. 2)

‘technical specification for interoperability’ (TSI)

- a **specification adopted in accordance with this Directive** by which each **subsystem** or part of a subsystem is covered in order to **meet the essential requirements and ensure the interoperability** of the rail system;

‘essential requirements’

- means all the conditions set out in Annex III which must be met by the rail system, the **subsystems**, and the **interoperability constituents**, including interfaces;

**IOD = Interoperability Directive 2016/797*

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What are the subsystems covered by TSIs?
(IOD Annex II)

Structural subsystems

- Infrastructure
- Energy
- Trackside control-command and signaling
- On-board control-command and signaling
- Rolling stock

Functional subsystems

- Traffic operation and management
- Maintenance
- Telematics applications for passenger and freight services

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How many TSIs? Where to find them?

Energy TSI	Infrastructure TSI
Rolling Stock - Locomotives and Passengers TSI	Noise TSI
Rolling Stock - Freight Wagons TSI	Safety in Railway Tunnels TSI
Control Command and Signalling TSI	Persons with Disabilities and with Reduced Mobility TSI
Operation and Traffic Management TSI	Telematics Applications for Passenger service TSI
Telematics Applications for Freight service TSI	

Structural TSIs

Functional TSIs

Technical Specifications for Interoperability | European Union Agency for Railways (europa.eu)

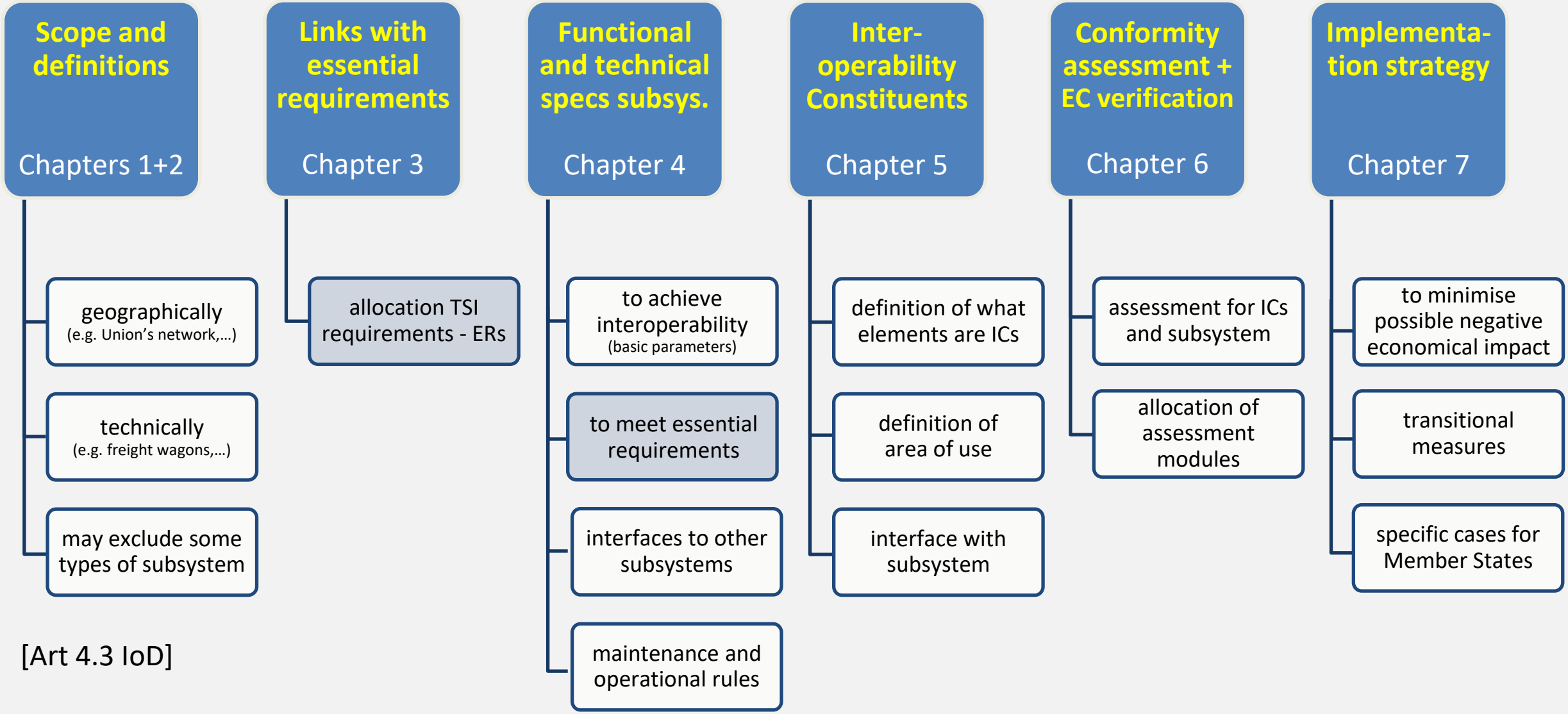
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Subsystems and applicable TSIs

Structural	Infrastructure	INF TSI	SRT TSI	PRM TSI	
	Energy	ENE TSI	SRT TSI		
	Trackside control-command signalling	CCS TSI	SRT TSI		
	On-board control-command signalling	CCS TSI			
	Rolling stock	Loc&Pas TSI or WAG TSI	SRT TSI	PRM TSI	NOI TSI
Functional	Operation and traffic management	OPE TSI	SRT TSI	PRM TSI	
	Maintenance	All TSIs in their respective chapter 4.5			
	Telematic applications passengers and freight	TAP TSI or TAF TSI			

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Structure and Content of TSIs



[Art 4.3 IoD]

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The essential requirements...

(IOD Annex III)

1. **Safety**

1.1.2. The parameters involved in the wheel/rail contact must meet the stability requirements needed in order to guarantee safe movement at the maximum authorised speed. The parameters of brake equipment must guarantee that it is possible to stop within a given brake distance at the maximum authorised speed.

2. **Reliability and availability**

The monitoring and maintenance of fixed or movable components that are involved in train movements must be organised, carried out and quantified in such a manner as to maintain their operation under the intended conditions.

3. **Health**

1.3.1. Materials likely, by virtue of the way they are used, to constitute a health hazard to those having access to them must not be used in trains and railway infrastructures.

4. **Environmental protection**

1.4.2. The materials used in the trains and infrastructures must prevent the emission of fumes or gases which are harmful and dangerous to the environment, particularly in the event of fire.

5. **Technical compatibility**

The technical characteristics of the infrastructure and fixed installations must be compatible with each other and with those of the trains to be used on the rail system.

6. **Accessibility**

1.6.1. The 'infrastructure' and 'rolling stock' subsystems must be accessible to persons with disabilities and persons with reduced mobility in order to ensure access on an equal basis with others by way of the prevention or removal of barriers, and by way of other appropriate measures.

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…are related to TSI parameters in chapters 4 and 5

TSI point	Title of TSI point	Safety	R&A	Health	Environ-mental protection	Tech. Compati-bility	Accessibility
4.2.3	Voltage and frequency	—	—	—	—	1.5 2.2.3	—
4.2.4	Parameters relating to supply system performance	—	—	—	—	1.5 2.2.3	—
4.2.5	Current capacity, DC systems, trains at standstill	—	—	—	—	1.5 2.2.3	—
4.2.6	Regenerative braking	—	—	—	1.4.1 1.4.3	1.5 2.2.3	—

The technical characteristics of the infrastructure and fixed installations must be compatible with each other and with those of the trains to be used on the rail system. This requirement includes the safe integration of the vehicle's subsystem with the infrastructure.

The electricity/thermal energy-supply systems used must:
— enable trains to achieve the specified performance levels,
— in the case of electricity energy-supply systems, be compatible with the collection devices fitted to the trains.

The rolling stock and energy-supply systems must be designed and manufactured in such a way as to be electromagnetically compatible with the installations, equipment and public or private networks with which they might interfere.

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What are Interoperability Constituents?

IOD Art. 2

‘**Interoperability constituents**’ means

- any elementary component, group of components, subassembly or complete assembly of equipment
- incorporated or intended to be incorporated into a subsystem,
- upon which the interoperability of the rail system depends directly or indirectly,
- including both tangible objects and intangible objects;

They are defined in each TSI

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Good example of IC: the wheel

Clause 5.3.3 of WAG TSI

A wheel shall be **designed and assessed for an area of use** defined by:

- nominal tread diameter,
- maximum vertical static force,
- maximum speed,
- in-service limits, and
- maximum braking energy.



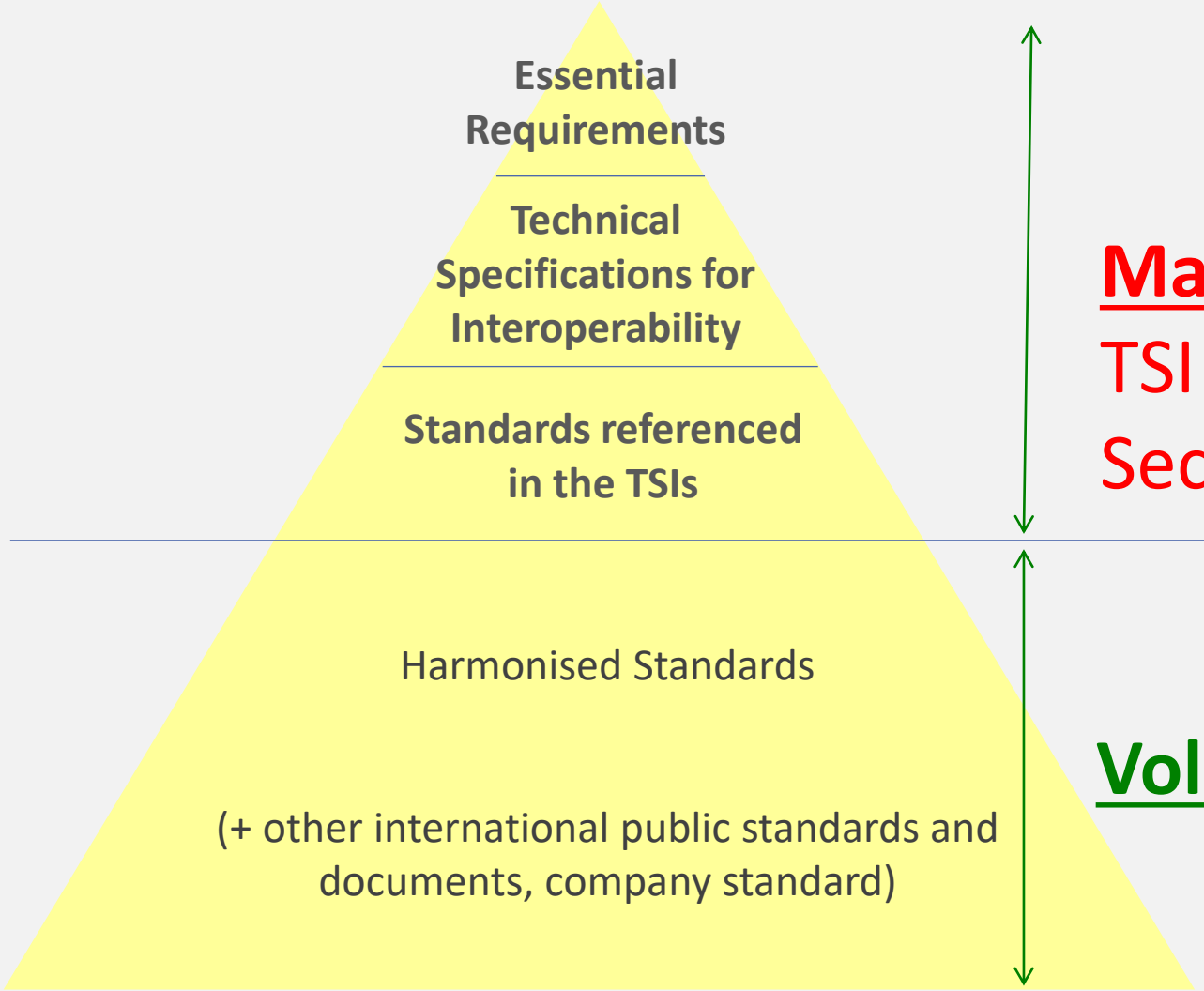
A wheel shall comply with the **requirements on geometrical, mechanical and thermo mechanical parameters** defined in point 4.2.3.6.3. These requirements shall be assessed at IC level.

Requirements really assessable at IC level

Not much customization to the subsystem

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Case of standards



Mandatory

TSI are regulatory documents

Secondary legislation

Voluntary

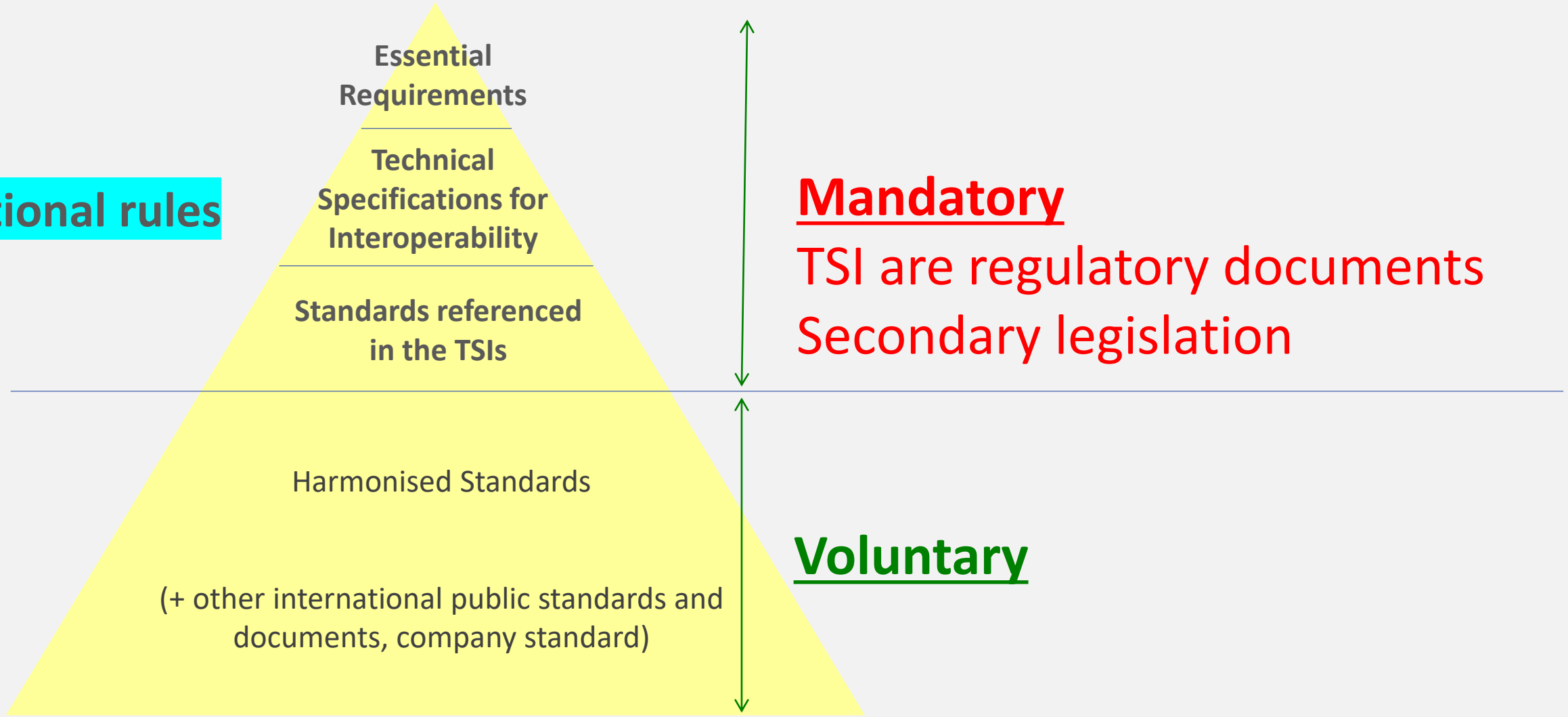
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In a nutshell

- TSIs aren’t design guidelines but EU Regulations
- They cover both structural and functional subsystems of the railway system
- They prescribe the technical requirements applicable to subsystems and interoperability constituents necessary to:
  - meet essential requirements to the extent that the parameter is not addressed elsewhere,
  - deliver interoperability, and
  - deliver an optimum level of harmonisation
- TSIs are as concise as possible, as extensive as necessary
  - only technical aspects critical for interoperability
  - only functional requirements, no specific technical solutions
- TSIs may refer to (part of) EU standards, making them compulsory

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Case of national rules



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National rules for vehicle authorisation

- Existing national rules (art 13(2)) are limited to :
  - Where the TSIs do not cover(..) aspects corresponding to the essential requirements, including **open points**,
  - Specific cases listed but not described in TSIs,
  - Ensure technical compatibility with existing network,
  - Case where non-application of one or more TSIs or parts of them,
  - Vehicles not covered by TSIs,
  - Urgent temporary preventive measure (..) following an accident.

- New national rules may only be adopted article 14(4)) :
  - when a TSI does not fully meet the essential requirements;
  - as an urgent preventive measure, in particular following an accident.

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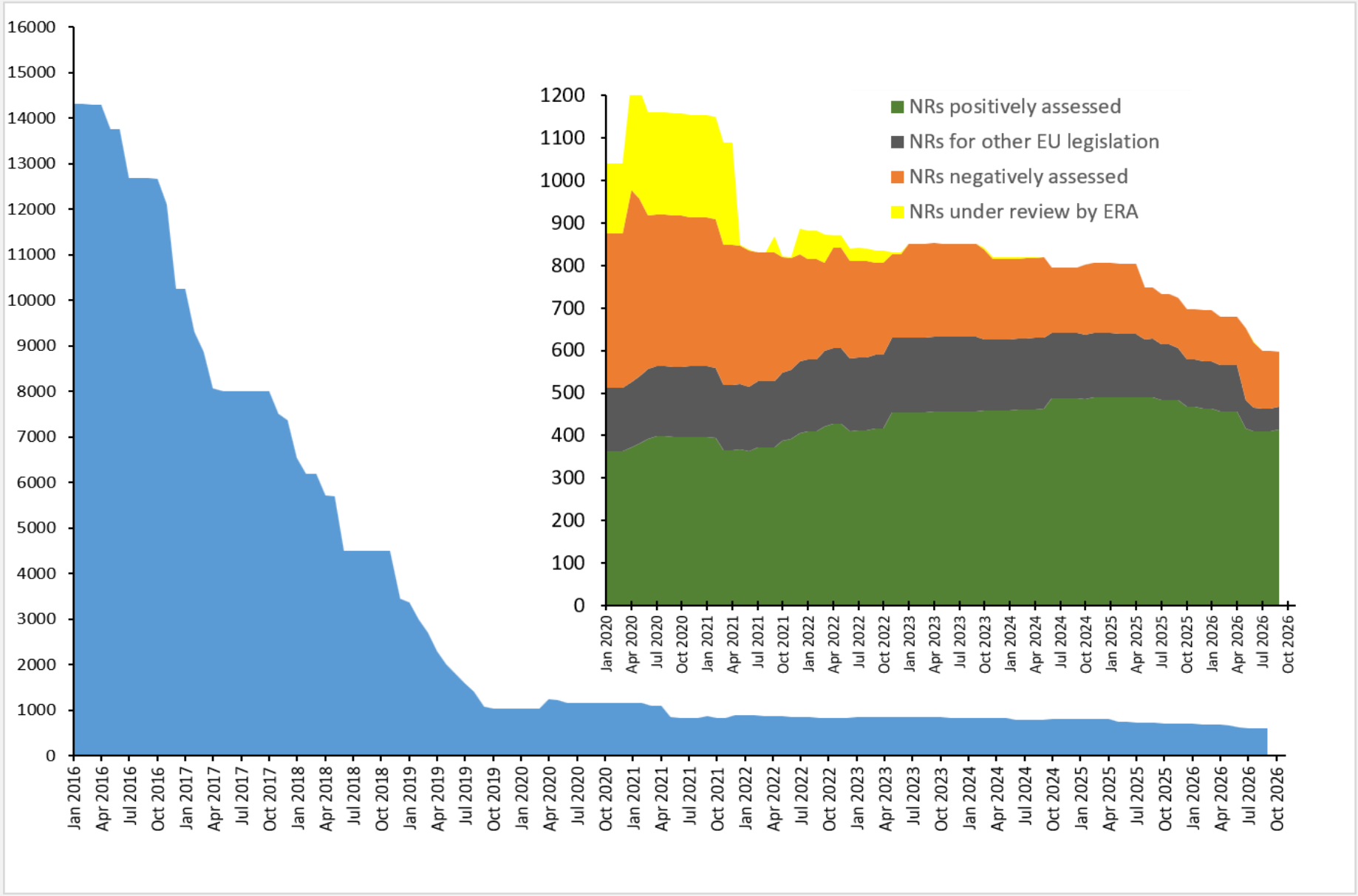
National rules status

- From **16 June 2019** and pending the SRD, **RDD is the reference** for applicants, NSAs and the Agency in terms of applicable NRs for VA.

- When the evaluation of NRs leads to a negative assessment, the Agency addressed to the relevant MSs, a technical opinion.

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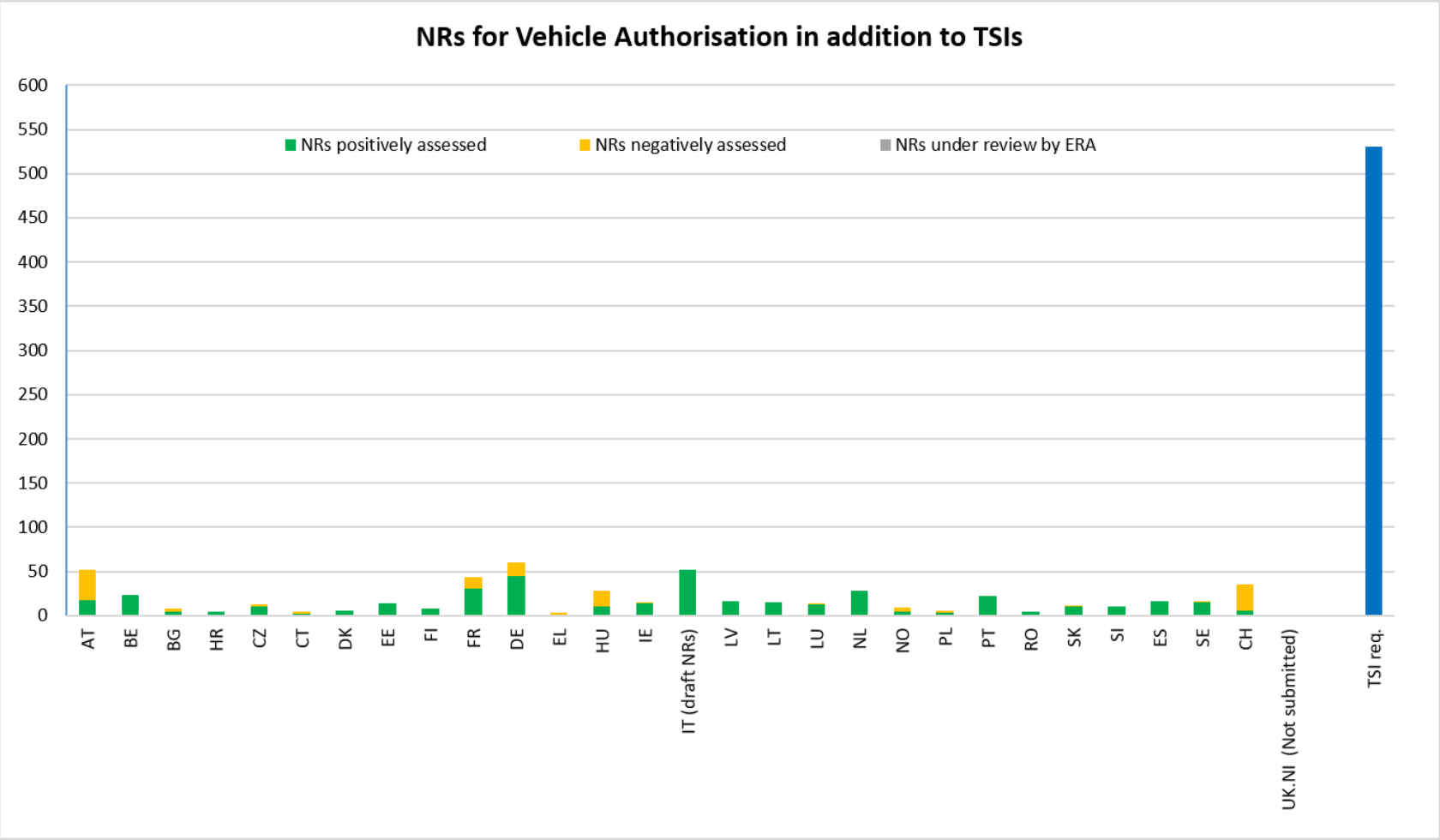
NRs for VA on top of TSIs



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National rules status

- Starting point : **13 459** (January 2016)- without UK
- Now : **596** (October 2026)



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The TSIs packages 2023

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TSIs package 2023

1. Commission Implementing Regulation (EU) 2023/1694 **amending** Commission Regulations (EU):
   - No 321/2013 (**WAG TSI**),
   - No 1299/2014 (**INF TSI**),
   - No 1300/2014 (**PRM TSI**),
   - No 1301/2014 (**ENE TSI**),
   - No 1302/2014 (**LOC&PAS TSI**),
   - No 1304/2014 (**NOI TSI**)
   - and Commission Implementing Regulation (EU) 2019/777 (**RINF**)

   Entry into force on **28 September 2023**

2. Commission Implementing Regulation (EU) 2023/1693 **amending** Implementing Regulation (EU) 2019/773 (**OPE TSI**)
3. Commission Implementing Regulation (EU) 2023/1695 **repealing** Regulation (EU) 2016/919 (**CCS TSI**)
4. Commission Implementing Decision (EU) 2023/1696 **amending** Implementing Decision 2011/665/EU (**ERATV**)

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TSIs package 2023 : key changes

1. Rolling Stock

- Unique authorisation of passenger coaches
- Derailment detection of freight wagons
- Noise assessment of composite brake blocks at IC level
- Codification of freight wagons used for combined transport
- Transition between TSIs and validity of types

2. Fixed installations

- TSI categories of lines
- Applicability of TSIs in case of upgrade/renewal
- Facilitation of the charging of traction batteries

3. Operation

- Communication between Railway Undertaking and Infrastructure Manager
- Operation of combined transport trains

4. CCS

- ETCS installation , interface RST / ETCS onboard, ATO
- Radio


Coach EU authorisation


Special vehicles

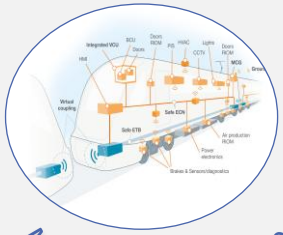

Derailment detection


Interface RST - ET


Composite brake blocks


Combined transport


Transitions


Modular architecture







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TSIs package 2023 : Webinars



15 June 2023 : TSI Revision Package 2023 - Key Changes (Part I - Rolling stock and CCS)

www.era.europa.eu

The TSI package 2023 was adopted by the Railway Interoperability and Safety Committee on 30 March 2023. It is now under translation and will be published and will enter into force during the summer 2023. That package includes amendments to the TSIs ENE, INF, LOC&PAS, NOI, OPE, PRM and WAG and a recast of the TSI CCS. The Register of Infrastructure R



24 October 2023 : How to understand the chapter 7 of TSIs applicable to rolling stock and on-board CCS?

www.era.europa.eu

New transition regime in TSIs LOC&PAS, PRM, NOI, WAG, CCS



10 November 2023: Focus on Rolling Stock

www.era.europa.eu

- Unique authorisation of passenger coaches
- Train Detection System
- Application of the TSIs to Special Vehicles
- Derailment Detection Device
- Composite brake blocks as IC in NOI TSI
- Referencing standards in the TSIs



07 December 2023: Focus on CCS

www.era.europa.eu

CCS TSI Scope
ETCS Installation requirements
Special vehicles
Interfaces between ETCS onboard and Rolling Stock
Appendix B: On-board, Trackside
Radio
ATO
TSI OPE App. A

Questions?

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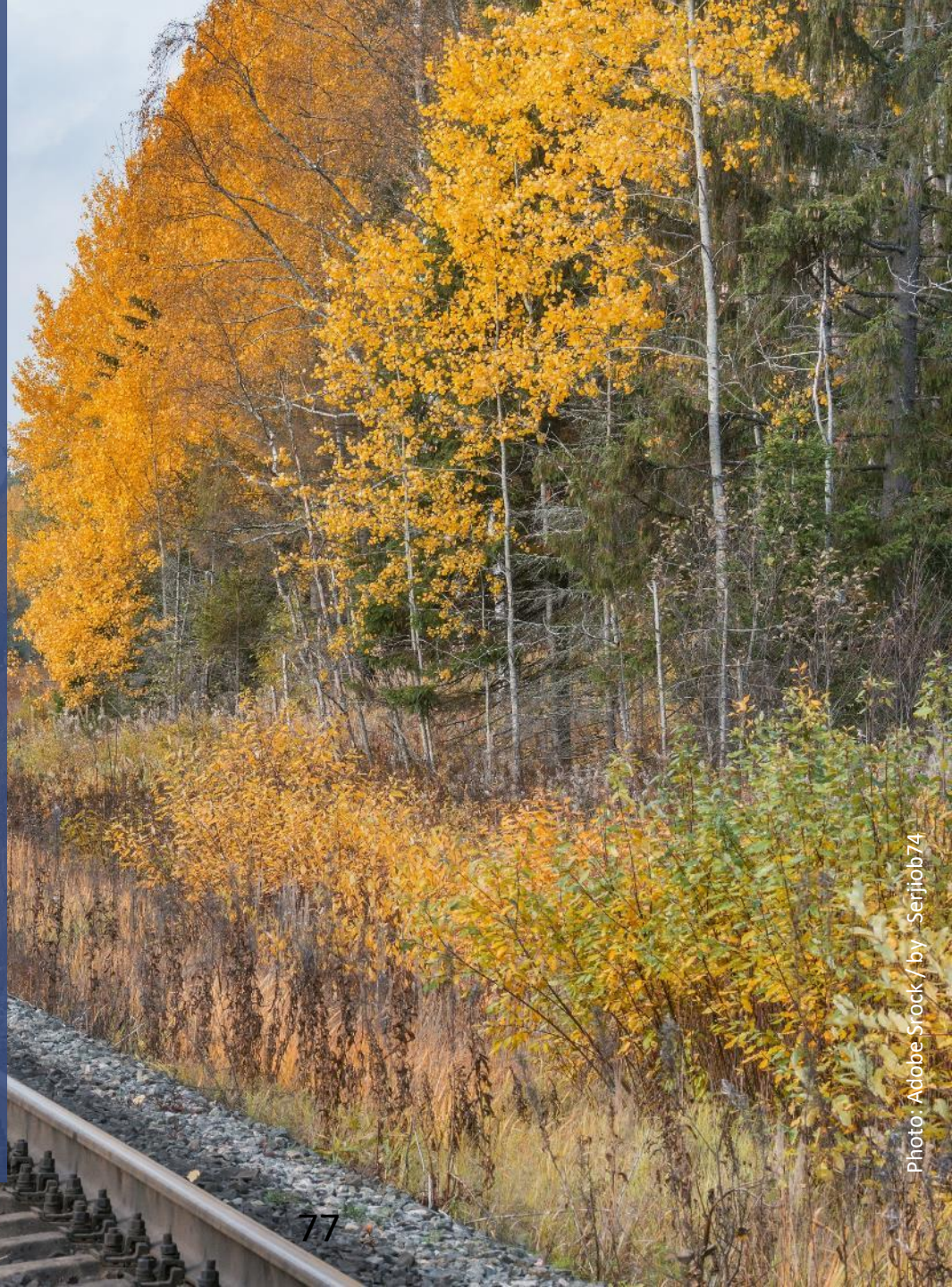


Photo: Adobe Srock / by _Serjiob74

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Future TSIs

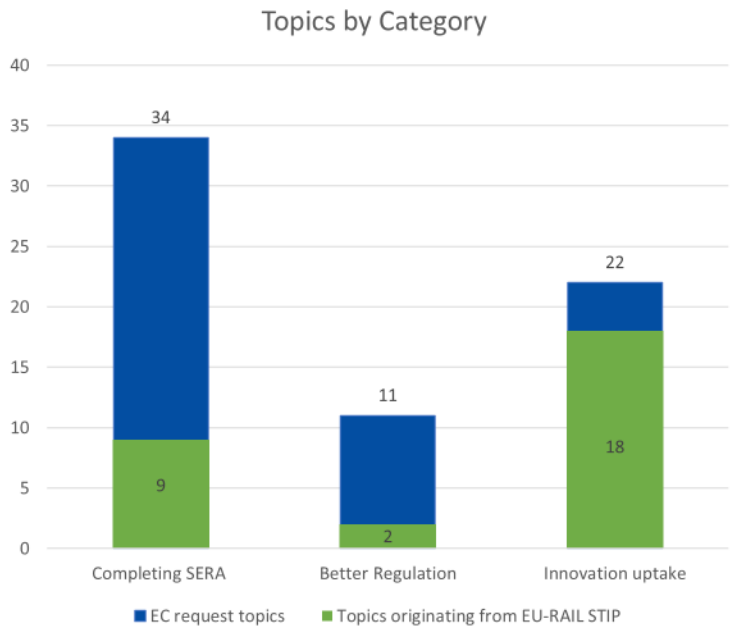
Multiannual request from European Commission to ERA for the next TSI revisions



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August 2024
EC request

Overview of topic categories and goals



Completing SERA

- Increase harmonisation, improve administrative processes, reach goals of Green Deal

Better Regulation

- Increase legal certainty and efficiency of implementation of legal framework

Innovation uptake and future-proof rail system

- Include innovation from eg. EU-RAIL and digitalisation-related activities to increase efficiency

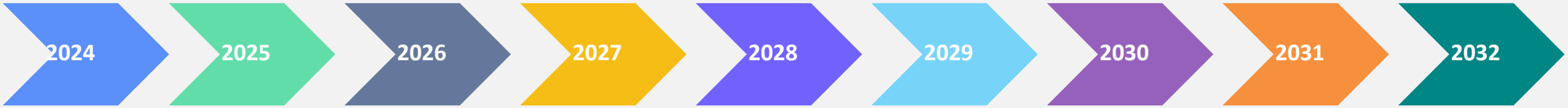
~40% of action items originating from/with interface to EU-RAIL STIP

European Commission

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Timeline for TSI revisions
(except TSI Telematics)

Apr 2027 2030+



August 2024

EC request

Apr 2027
Recommendation 1

Improvements and TSI maintenance

December 2028
Recommendation 2

Important topics of EC request

2030 +
To be decided

Long-term evolution
Innovation

Possible focused amendment on urgent issues

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Apr 2027 Recommendation 1 Improvements and TSI maintenance

Apr 2027 2030+

Scope of the amendment

- TSIs related to Rolling Stock and Fixed Installations and to Operations
- No amendment of TSI CCS foreseen

Content of the amendment

- Correction and clarifications
- Update of standards
- Editorial improvements
- Redistribution of parameters: TSIs LOC&PAS, SRT, OPE
- Closure of open points, e.g. Fire Control and Containment Systems
- Removal of national rules, e.g. Flange Lubrication
- Simplification and removal of parameters

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December 2028 Recommendation 2 Important topics of EC request

Apr 2027 2030+

Scope of the amendment

- All TSIs

Content of the amendment

- FRMCS (if not covered by a specific amendment)
- Specific requirements for Special Vehicles, including On-Track machines
- Integration of 1520mm networks
- Integration of Cybersecurity
- Improved accessibility at the platform-train interface
- Common criteria and priorities to upgrade stations
- Digital Automatic coupling for freight
- New propulsion (batteries and Hydrogen)
- Tool for recording driver’s driving, working and rest time
- Further removal of national rules
- Introduction of ERA Vocabulary

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2030 + To be decided
Long-term evolution & Innovation

Apr 2027 2030+

Scope of the amendment

- To be decided

Content of the possible amendment

- Automatic Train Operation ATO GoA3 & GoA4
- Absolute Safe Train Positioning
- Low-cost vehicles and infrastructure
- Digitalisation of Operational Communication
- Extended ERA ontology
- Bridge dynamics
- Multiple pantograph operation
- Introduction of virtual testing
- Etc.

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Focused amendment on urgent issues
Examples from recent past

Apr 2027 2030+

LOC&PAS: Commission Implementing Regulation (EU) 2025/675 of 4 April 2025

- Introduction of the category “Personnel carriage”
- Parameters for unique authorisation of those passenger carriages with area of use EU
- Urgency: covers the case of military escort coaches

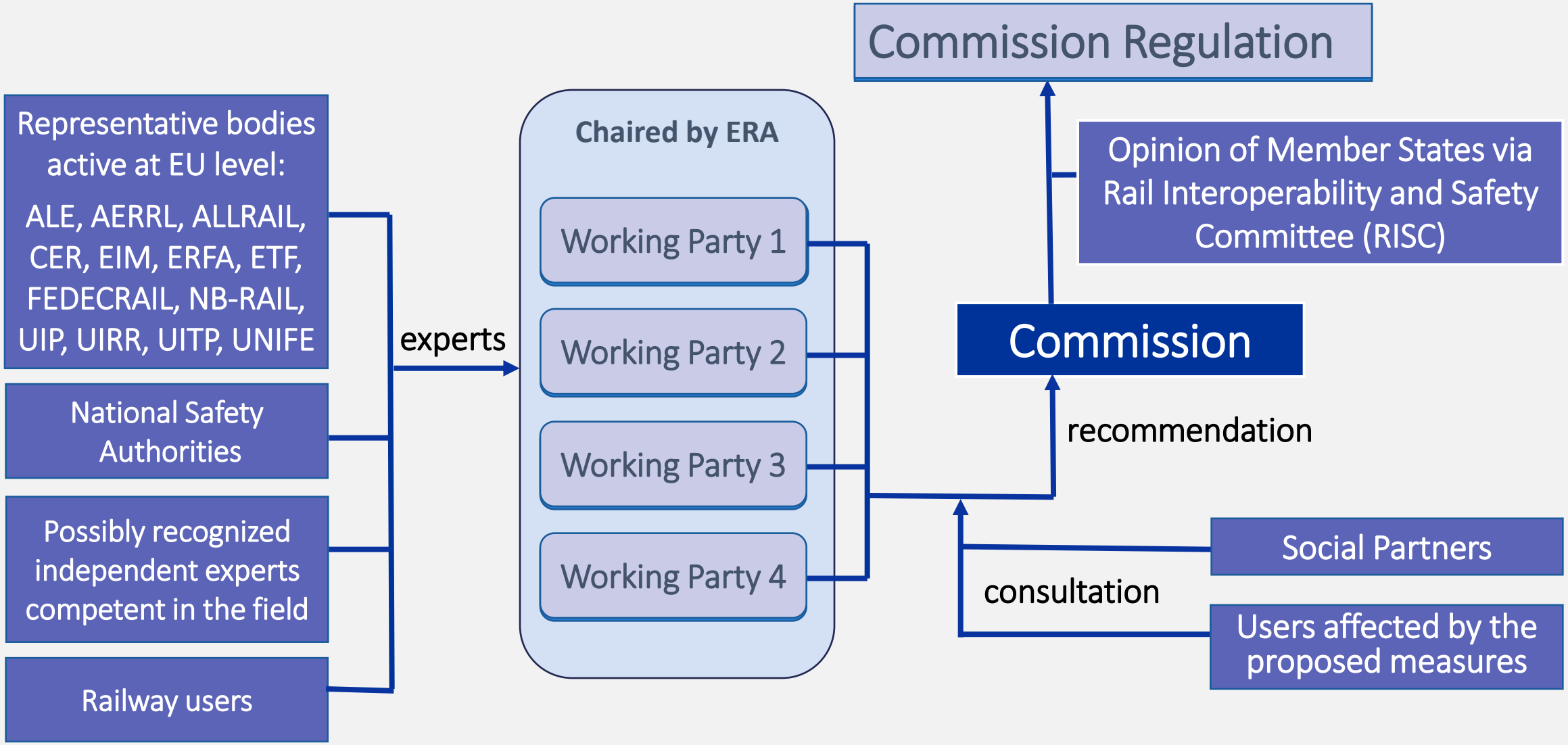
WAG: Commission Implementing Regulation (EU) 2025/2064 of 14 October 2025

- Introduction of requirements for the securisation of semi-trailers
- Parameters for the securing device (hitch) and requirements for upgrade of existing wagons
- Urgency: Great Belt Bridge accident in 2019 and subsequent Danish national rule

- Transfer of RID requirements to the TSI WAG
- Parameters transferred in new appendix I of the TSI
- Urgency: need for coordinated entry into force between TSI, UTP WAG of OTIF and RID

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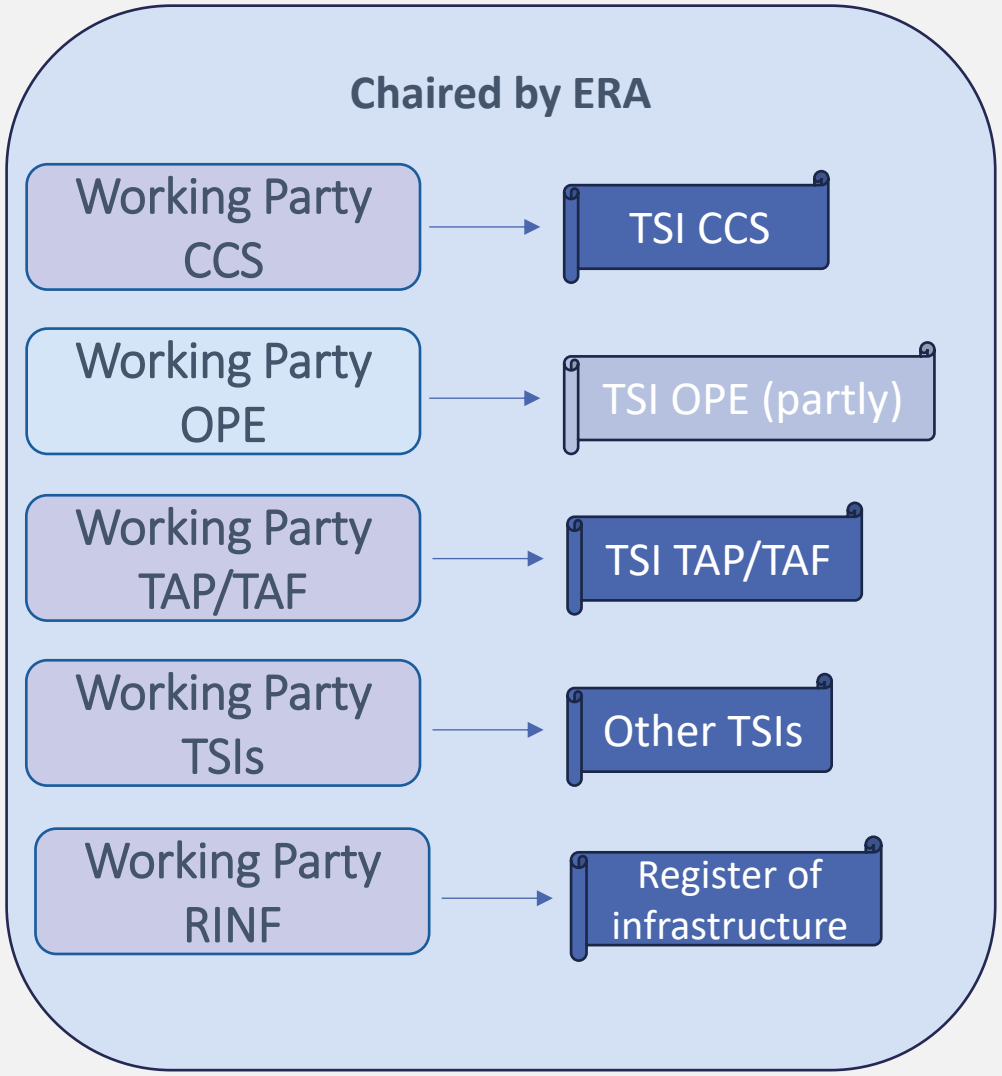
The TSI revision working process



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Since 2020

An organisation per topic to cover a subject transversally

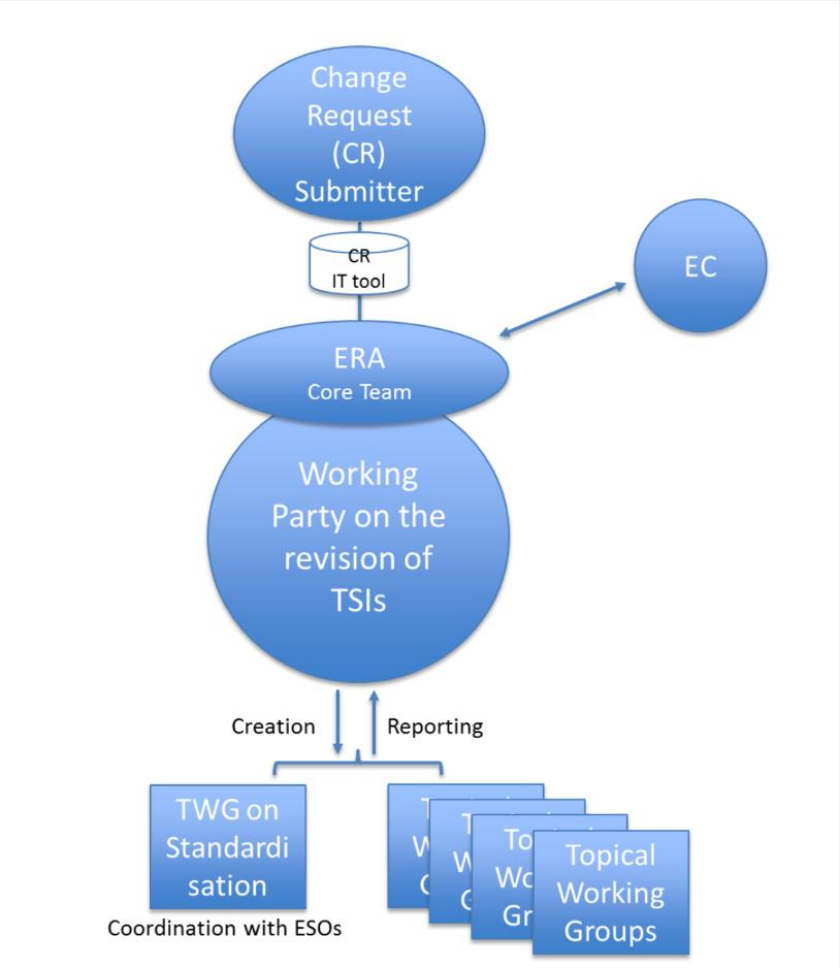


Working Groups

- Working Group Freight (DAC)
- Working Group Operational harmonisation
- Working Group Platform -Train
- Working Group Train detection
- Working Group Standards
- Working Group Special vehicles

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Working with change requests



Example:

EC list → Integrating special vehicles in the scope of TSI

ERA → Creation of Change Request CR698:

- For OTMs, review EN 14033-1 to ensure it is aligned with TSI
- Clarify the TSI requirements applicable to the special vehicles and the applicability of WAG TSI

ERA and Working Party → Proposal to create a dedicated working group

Working Group Special Vehicles → Work and make a proposal on the points above to the Working Party

Questions?

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Photo: Adobe Srock / by _Serjiob74

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4RP – Vehicle Authorisation



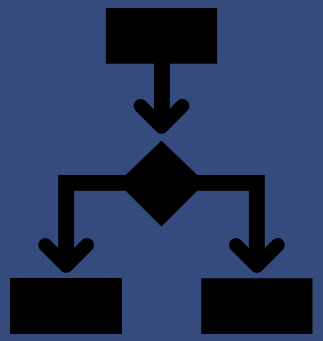
- Quick summary of the vehicle authorisation process :
  - General aspects
  - Modification of vehicles
  - Extension of area of use
- Other VA aspects

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VA process







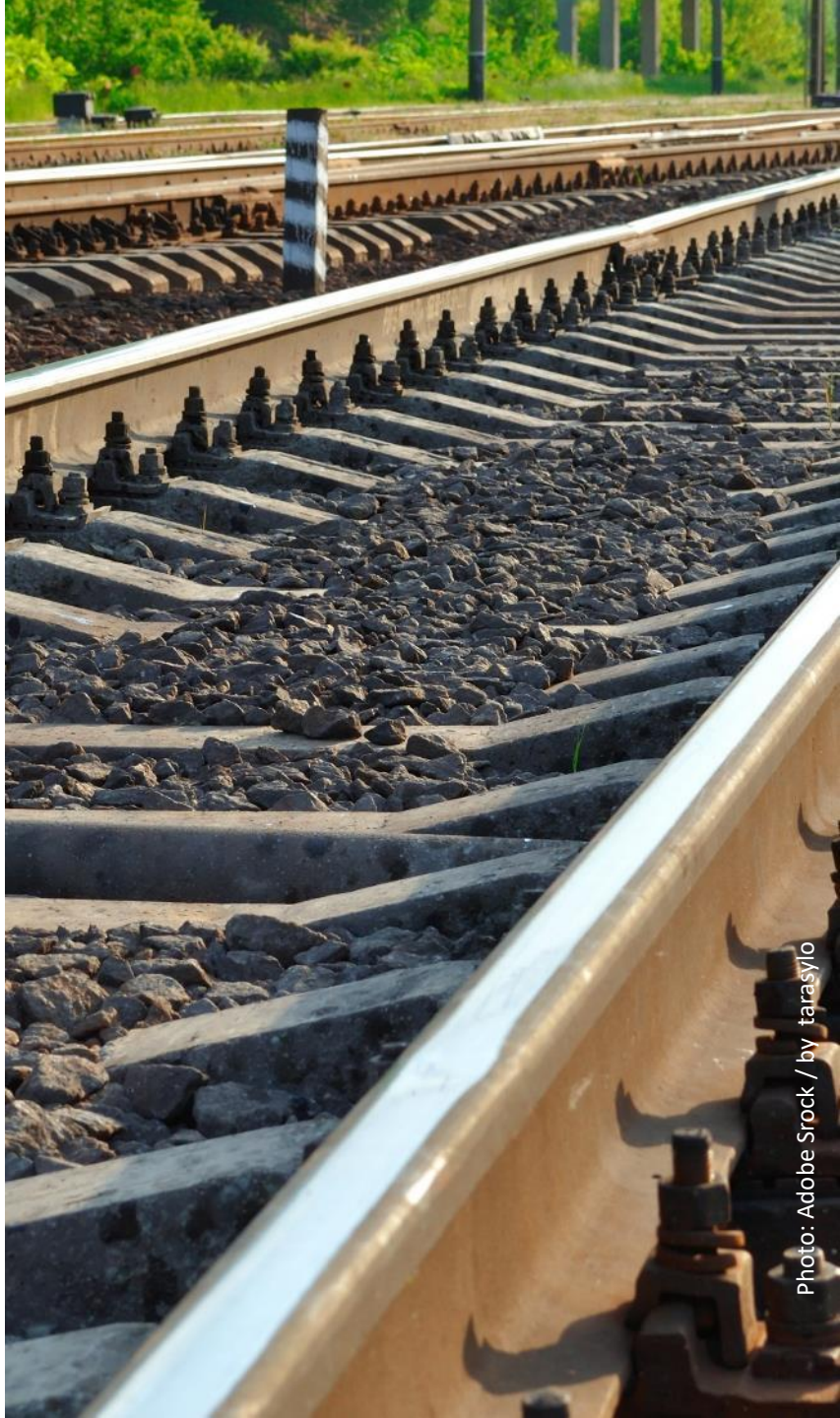


Photo: Adobe Srock / by_tarasyio

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We'll be talking about…



AUTORISATION OF PLACING ON THE MARKET



AREA OF USE OF A VEHICLE

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We'll be talking about…



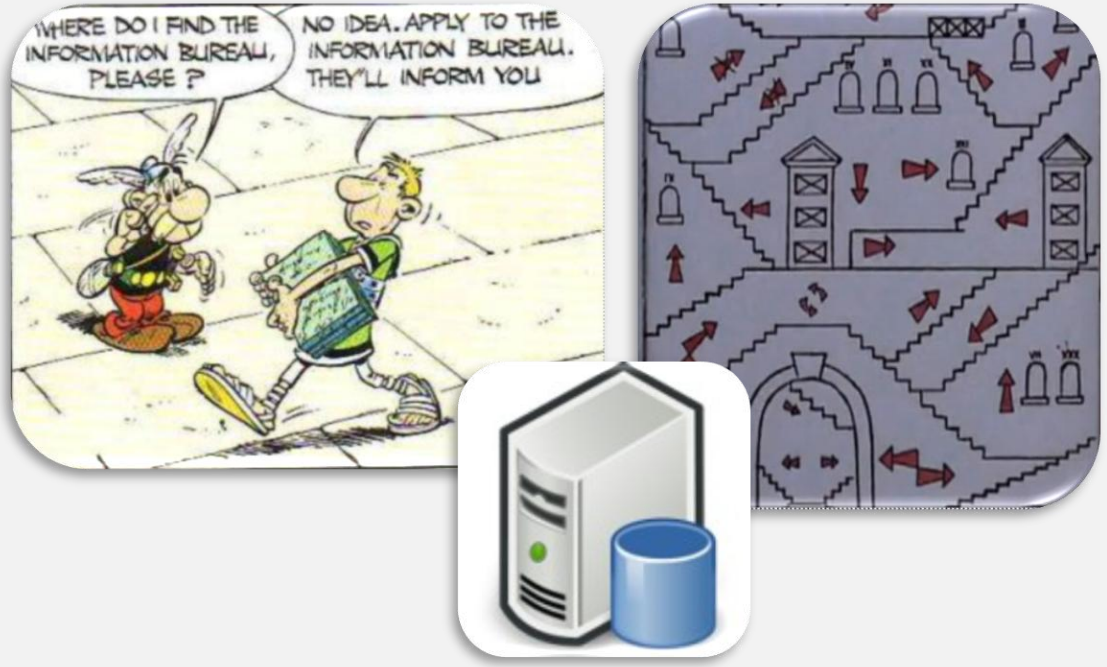
ROUTE COMPATIBILITY CHECK



TYPES, VARIANTS AND VERSIONS

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We'll be talking about…



OSS, ERATV, ERADIS
VA Toolbox

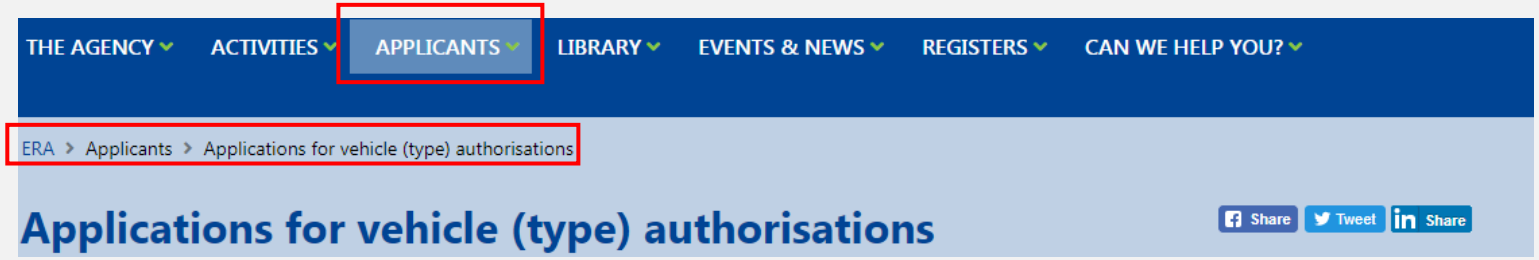


THE ROLES AND RESPONSIBILITIES
OF THE 'USUAL SUSPECTS

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Where to find the VA documents in ERA website

https://www.era.europa.eu/applicants/applications-vehicle-type-authorisations_en





APPLICANTS

- Applications for single safety certificates
- Applications for vehicle (type) authorisations
- Applications for ERTMS approval

Legal framework

- Regulation (EU) 2020/698 of the European Parliament and of the Council of 25 May 2020 laying down specific and temporary measures in view of the COVID-19 outbreak
- Rail Relief Package
- Commission Implementing Regulation (EU) 2019/250 of 12 February 2019 on the templates for 'EC' declarations and certificates for railway interoperability constituents and subsystems, on the model of declaration of conformity (...)
- Commission Implementing Regulation (EU) 2018/867 of 13 June 2018 laying down the rules of procedure of the Board(s) of Appeal of the European Union Agency for Railways
- Commission Implementing Regulation (EU) 2018/764 of 2 May 2018 on the fees and charges payable to the European Union Agency for Railways and their conditions of payment
- Commission Implementing Regulation (EU) 2018/545 of 4 April 2018 establishing practical arrangements for the railway vehicle authorisation and railway vehicle type authorisation process

Related guidance

- Practical arrangements for the vehicle authorization process – Guidelines (3.11 MB)
- Practical arrangements for the vehicle authorization process – Guidelines (pdf exported from word version) (5.72 MB) Other languages
- Practical arrangements for the vehicle authorisation process - Guidelines - Annex XVIII flowcharts (high-res) (1.89 MB)
- Practical arrangements for the vehicle authorisation process - Examples (170.19 KB)

GOT A QUESTION? Visit our extensive FAQ knowledge base

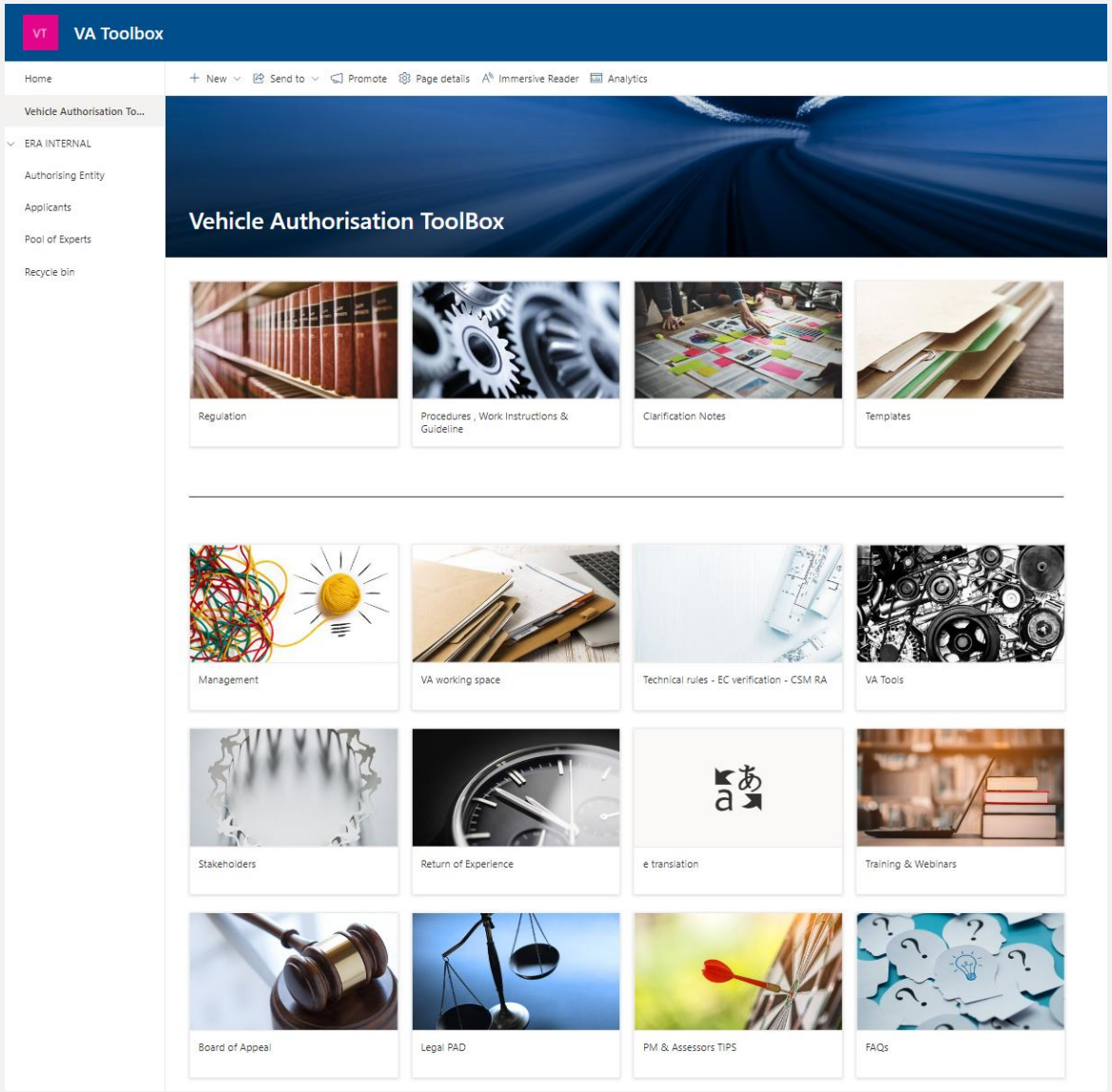
- Related documents
- Related links

Related documents

- OSS User Guide for Applicants (4.72 MB)
- Overview of applicable legal framework (VA) (247.9 KB)
- OSS Training guidelines (232.1 KB)
- ERA1209-001 Clarification about points 18.4 and 18.5 of Annex I of Regulation 2018-545.pdf (186.32 KB)
- ERA1209-003 Clarification about responsibilities for populating ERADIS (131.89 KB)
- ERA1209-006 Clarification about transitory measure for the uploading of EC Certificates and ISV information to ERADIS (225.16 KB)
- ERA1209-036 Clarification about applicability of phase A in LOCPAS and WAG TSI for extension of the area of use (139.17 KB)
- ERA1209-037 Clarification about the case to apply for changes (not extension) in the area of use (482.1 KB)
- ERA1209-063 Clarification note on safe integration (1.13 MB) Other languages

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VA Toolbox



- **VA Toolbox** provides in a single place :
  - Simple access to relevant information and tools on VA.
  - It is accessible to Applicants, Authorising entities (ERA,NSAs) and on request to NoBos.
  - It should also help stakeholders to be aware of all available documentation (guidance, clarification notes, FAQs etc.).

- **Where :** https://eraeuropaeu.sharepoint.com/sites/VATool/SitePages/Vehicle-Authorisation-ToolBox.aspx

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Key aspects of the 4RP: Single authorisation



3rd RWP → 4th RWP

FIRST AUTHORISATION MS1

ADDITIONAL AUTHORISATION MS2

ADDITIONAL AUTHORISATION MS3

ONE SINGLE AUTHORISATION

Vehicle type
+ Variant & Version

Vehicles

Authorisation for placing in service → Authorisation for placing on the market

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Key aspects of the 4RP: Authorising entity

The authorising entity depends on the area of use

Area of use = more than one Member State

ERA authorising entity, collaboration with NSAs

Area of use = one Member State

The applicant can choose the Agency or the NSA



All requests addressed via the OSS

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Key aspects of the 4RP: Main steps



Applicant submits request for VA to the **One-Stop-Shop**

- Specifying the area of use
- Including relevant documentation



ERA/NSA issues APOM
(or communicate negative decision)

- Within 4 months from reception of complete documentation
- Following detailed rules established in Reg. **(EU) 2018/545**



Vehicle registration

RU checks, including:

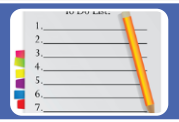
- Route compatibility
- Proper integration in the train composition

⇒ No need of „additional authorisations“
if vehicle stays within area of use, conditions for use and restrictions

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Overview of the VA Process





Stage 1 Preparation of the application



Stage 2 Pre-engagement



Stage 3 Conformity assessment



Stage 4 Submitting the application



Stage 5 Processing the application



Stage 6 Final documentation



Suspension, revocation or amendment

EU HARMONISED PROCESS

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Vehicle Authorisation overview

NSA(s) / ERA

APOM



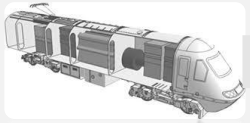
Applicant

Pre-engagement file



Rules : VA Process, Technical rules

Design



Manufacturing



Testing







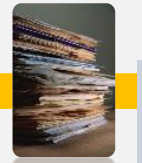
Authorisation application











Certificats

Technical Files

EC procedure : Conformity Assessment Bodies involved in all phases

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What means Area of use (AoU)?

- Area of Use of a Vehicle = MSs & list of networks

- An issued authorisation contains:
  - Area of use (MSs & Network(s))
  - Values of the parameters checked for technical compatibility
  - Conditions for use of the vehicle and other restrictions

- This means that **the actual lines on which a vehicle can operate can be smaller than the Area of use.**

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What means Area of use (AoU)?

(a) Area of Use: Networks of Belgium, France, CT

(b) Values of parameters checked for technical compatibility btw Vehicle and the Networks of the AoU:

Parameter*	Value(s)*
INF • Nominal track gauge • Axle load • Gauge • Minimum radius of horizontal curve • Rail inclination	 • 1435 m • 22,5 T • GB, GC • 100 m • 1/20, 1/30
ENE • Voltage and frequency • Pantograph gauge	 • 1,5kV,3kV, 25kV-50Hz • 1950 mm
CCS • ETCS baseline • Class B • Radio System	 B3R2 TBL1+, KVB GSM-R BL 1

** Illustrating purpose : list of parameters/values non exhaustive*

(c) Vehicle's compliance with the relevant TSIs and sets of national rules

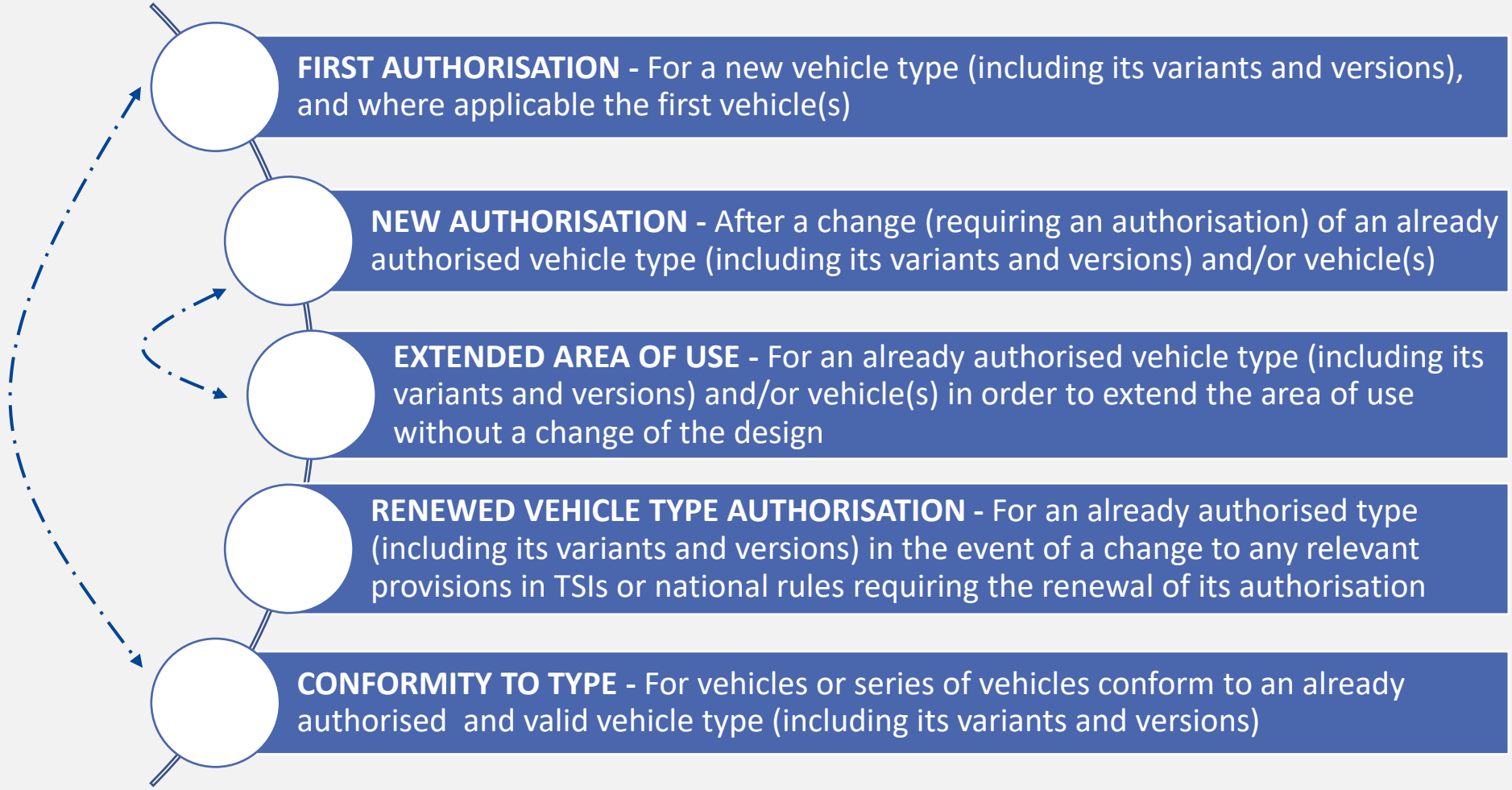
- TSIs: LOC&PAS, PRM TSI, NOI TSI, CCS
- National Rules: France, Belgium, CT

(d) Conditions for use of the vehicle and other restrictions:

- Maximum train current
- Braking performance
- Maximum Speed
- Weather conditions
- …

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Authorisation cases



FIRST AUTHORISATION - For a new vehicle type (including its variants and versions), and where applicable the first vehicle(s)

NEW AUTHORISATION - After a change (requiring an authorisation) of an already authorised vehicle type (including its variants and versions) and/or vehicle(s)

EXTENDED AREA OF USE - For an already authorised vehicle type (including its variants and versions) and/or vehicle(s) in order to extend the area of use without a change of the design

RENEWED VEHICLE TYPE AUTHORISATION - For an already authorised type (including its variants and versions) in the event of a change to any relevant provisions in TSIs or national rules requiring the renewal of its authorisation

CONFORMITY TO TYPE - For vehicles or series of vehicles conform to an already authorised and valid vehicle type (including its variants and versions)

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Pre-engagement

- **Pre-engagement**
  - Voluntary for the applicant, mandatory for authorising entity / NSAs for the area of use if requested
  - Content of the application: article 23 Regulation (EU) 2018/545
  - Baseline:
    - Opinion of the authorising entity and the NSAs for the area of use on the approach (strategy) proposed by the applicant
    - The approach (strategy) is described in the documents referred to in art 23 of Regulation (EU) 2018/545
    - Has a legal value, but cannot overcome other EU law (e.g. rules)
    - Validity of 84 months
    - Gives certainty to the applicant
  - Pre-engagement is not:
    - A consultancy/training service to be provided to applicants
    - A way to perform a continuous assessment

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Vehicle Type, Variant & Version

Vehicle Type

Defines the basic design characteristics of vehicle(s) [as covered by a type or design examination certificate]

Vehicle Type Variant

Option for the configuration of a vehicle type that requires an authorisation

Vehicle Type Version

Option for the configuration of a vehicle type or vehicle type variant that does not require an authorisation

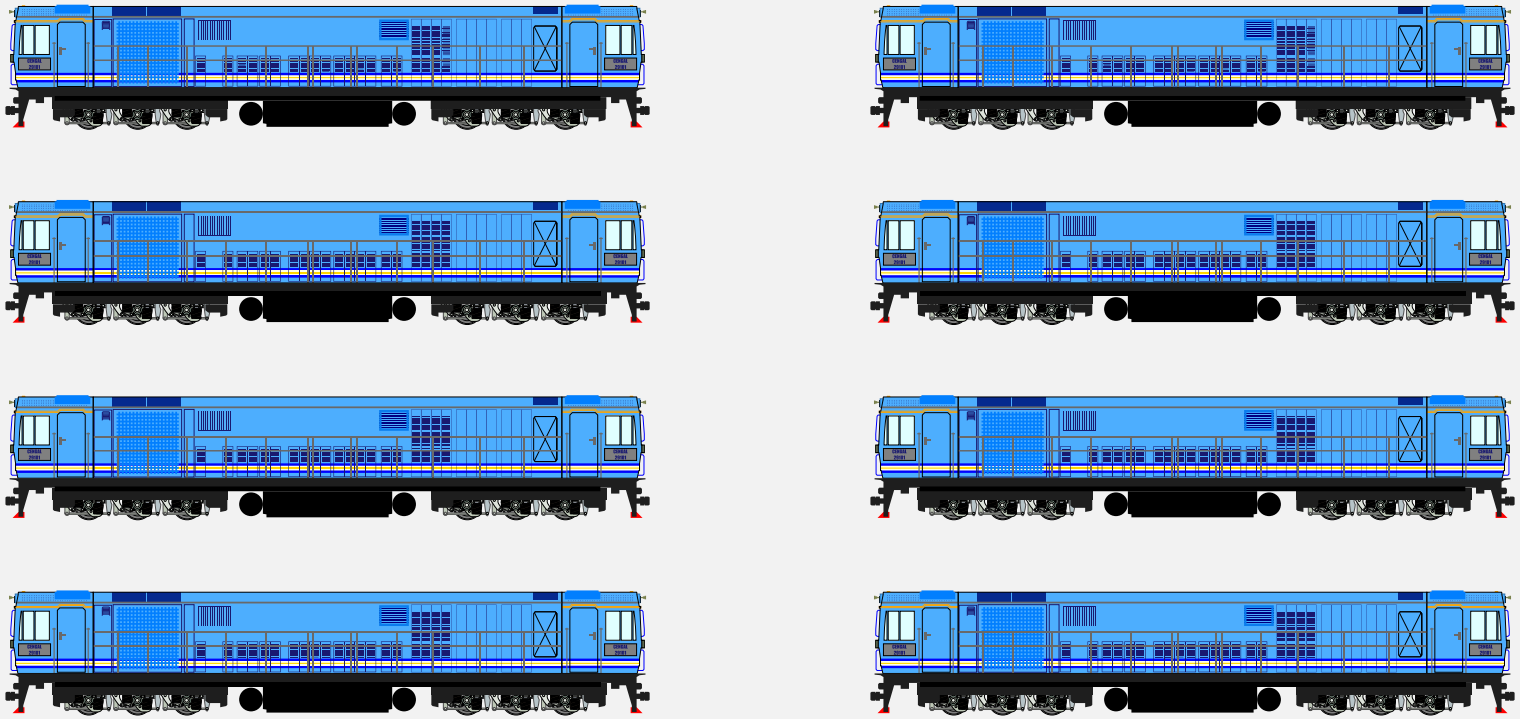
Vehicle

Railway vehicle suitable for circulation on wheels on railway lines, with or without traction; a vehicle is composed of one or more structural or functional subsystems

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Type, Variant & Version

Vehicle type = concept identified in ERATV



Conformity to Type :
All the vehicles conform to the same type

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Type, Variant & Version

Vehicle type = concept identified in ERATV

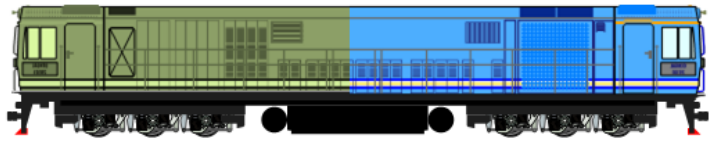


Shall be authorised

Vehicle variant A



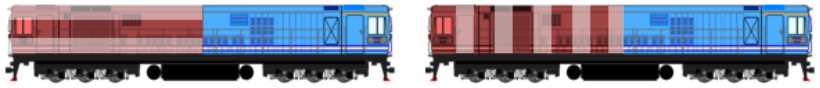
Vehicle variant B



Do not require a authorisation

Vehicle variant A version 1

Vehicle variant A version 2



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Case of New authorisation

When is a new authorisation required?

In case of a change to an authorised vehicle/vehicle type

Article 21(12) of Directive (EU) 2016/797

At least one of the following criteria shall be triggered:

- **Art 21(12)(a)**: changes beyond the thresholds defined in the TSIs (basic design characteristics)
- **Art 21(12)(b):** change has the potential to impact safety adversely (even if in the real implementation it does not)
- **Art 21(1)(c)**: it is required by the relevant TSIs (specific changes always require a new authorisation)

A change that does not require authorisation on the grounds of rules compliance, namely 21(12)(a) or (c), may still affect adversely safety, and may require a new authorisation.

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Case of New authorisation Categories of changes

The Regulation 2018/545 defines 4 categories of changes:

- Art 15(1)(a): the change does not introduce a deviation in the technical files accompanying the EC declaration(s) of verification — *no changes in the design*
- Art 15(1)(b): change that introduces a deviation in the technical files but does not impact basic design characteristics nor triggers article 21(12) of Directive (EU) 2016/797 — *change in the design that does not require a new authorisation*
- Art 15(1)(c): change that impacts basic design characteristics but does not trigger article 21(12) of Directive (EU) 2016/797 and does not require a new authorisation — *change that needs to be reflected in ERATV, no need for a new authorisation*
- Art 15(1)(d): change that triggers article 21(12) and requires a new authorisation — *change in the design that requires a new authorisation*

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Case of changes to existing RST (Type)
Point 7.1.2 of LOC&PAS

- Compliance with TSIs (LOC&PAS TSI, NOI and PRM) for **only** TSIs parameters **which may be affected by the change(s).**

- Particular provisions applicable to existing RST **not covered by an EC DofV** with a 1st authorisation **before June 2015** :
  - Compliance with TSIs is deemed established when :
    - basic parameters improved in direction of the TSI defined performance and
    - demonstration that corresponding essential requirements are met and
    - the safety level is maintained and, where reasonably practicable, improved.

  - Justify the reasons for which the **TSI performance was not met,** included in the technical file, if any, or in the original technical documentation of the vehicle.

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Case of changes to existing RST (Type)
Point 7.1.2 of LOC&PAS - Basic design characteristics

- Basic Design characteristics is a **subset of the vehicle design** describing the important/significant elements relevant for technical compatibility or operation of the vehicle.

- A change having an impact to a basic design characteristic can generate either :
  - A **new vehicle type version : no authorisation needed only update of ERATV** or
  - A **vehicle type variant** or **new vehicle type: new authorisation needed**.

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Case of changes to existing RST (Type)Point 7.1.2 of LOC&PAS - Basic design characteristics

TSI clause	basic design characteristic(s)	Changes generating vehicle type version	Changes generating vehicle type variant
4.2.2.2.3 End coupling	Type of end coupling	Change of end coupler type	N/A
4.2.3.1 Gauging	Reference profile	N/A	Change of reference profile the vehicle is conform to
	Minimum vertical convex curve radius capability	Change in minimum vertical convex curve radius capability the vehicle is compatible with of more than 10 %	N/A
	Minimum vertical concave curve radius capability	Change in minimum vertical concave curve radius capability the vehicle is compatible with of more than 10 %	N/A

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Case of Extension of the area of use

Authorisation case defined in Article 14(1)(c) of Regulation (EU) 2016/797

1. Change of the area of use of an authorised type without changes in the design (**without modifications**)
2. The checks to be performed shall be limited to the **technical compatibility** between the vehicle and the extended network :
   - For existing vehicle particular rules applies and are defined in point : 7.1.4 of LOC&PAS TSI , 7.2.2.4 of WAG TSI and 7.4.2.4 of CCS TSI.
3. Checks already carried out af the first authorisation shall not be repeated
4. If the extension of the area of use covers networks in another MS, the Agency shall be the authorising entity.
5. Extension of the area of use also applies within 1 MS. The applicant can choose the NSA or the Agency as Authorising Entity

Questions?

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Other VA aspects process

Requirements capture



Registers



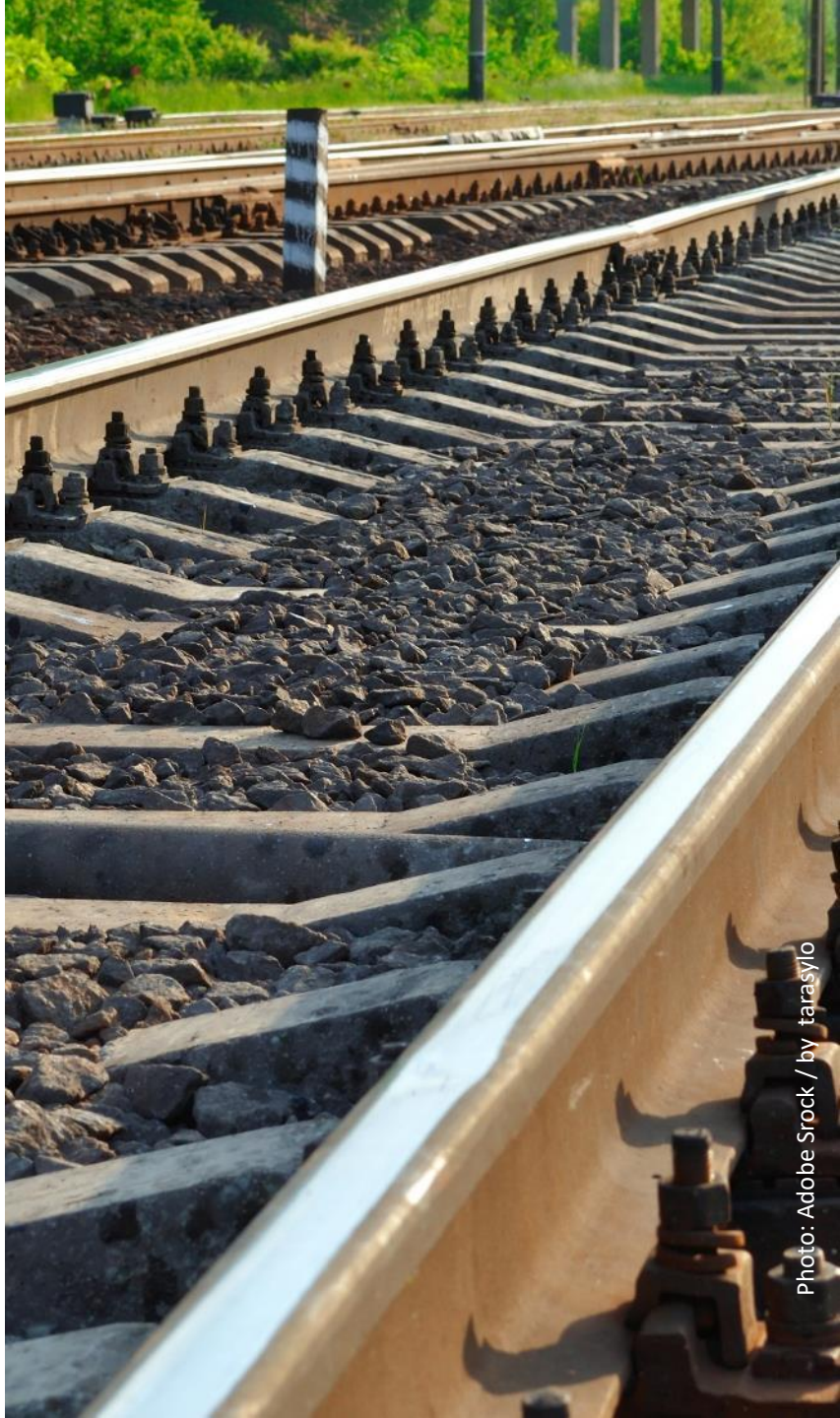


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Requirements capture



Ensure that requirements applicable to the Vehicle are:

- Identified
- Assigned to functions/subsystems
- Implemented; Validated and
- Addressed through conditions for use or other restrictions

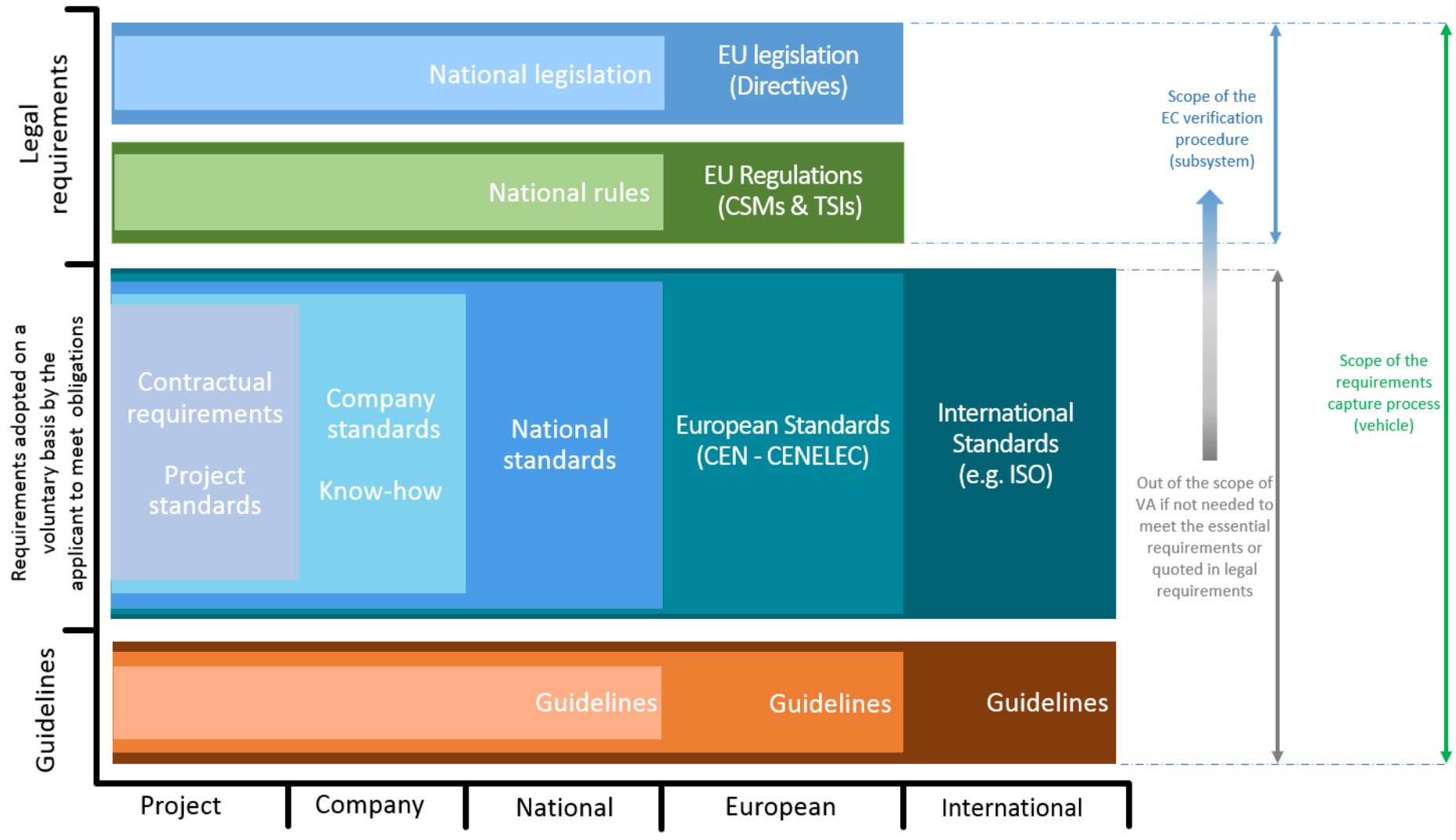
with the objective of managing and mitigating the identified risks to an acceptable level

Covers:

- Essential requirements for subsystems
- Technical compatibility of the subsystems within the vehicle
- Safe integration of the subsystems within the vehicle
- Technical compatibility of the vehicle with the network in the area of use

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Requirements capture scope



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Requirements capture roles

- **Applicant** :
  - Perform requirements capture process
  - Use Risk management process (Annex I of Reg (402/2013) for **safety** related aspects
  - Can use Risk management process for requirements capture for other essential requirements
- **Assessment body (CSM RA):**
  - Gives assurance and judgment that the processes are systematic and are able to capture, understand, analyze and mitigate hazards
  - Focus on the process. Not an exhaustive check of all the evidence supporting the requirements capture
  - Some detailed assessments (sampling) may be needed (vertical slice assessment of key aspects)

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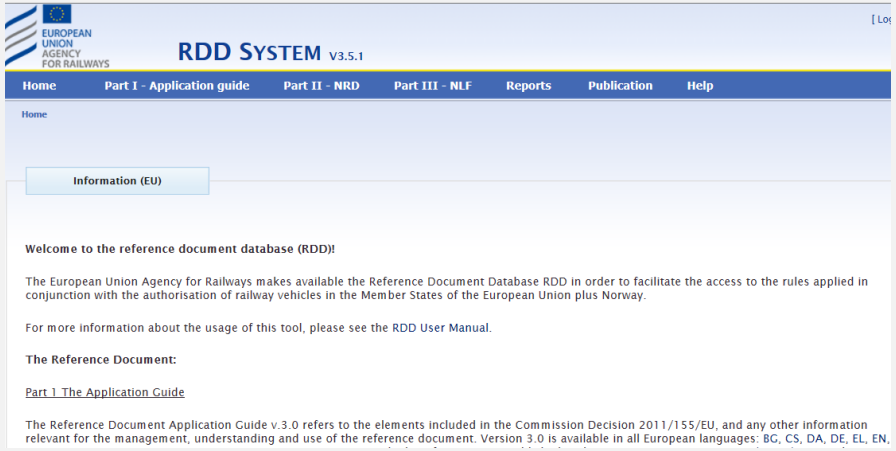
Requirements capture roles

- **Authorising entity :**
  - Checks completeness, relevance and consistency of evidences (Risk declaration, safety assessment report) when regulation (EU) 402/2013 is used
  - May challenge the assessment report if it demonstrates existence of serious safety risk (burden of proof allocated to authorities)
  - Performs further checks if another methodology is used (when allowed) :
    - Assess the details of the methodology
    - Assess the details of the evidences of the application of the methodology

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Registers: National rules VA Reference Document Database (RDD)

- Contains Vehicle authorisation national rules and acceptable national means of compliance
- Management and **publication** of the content in RDD is the responsibility of the MSs.
- Publicly available: https://rdd.era.europa.eu/rdd/

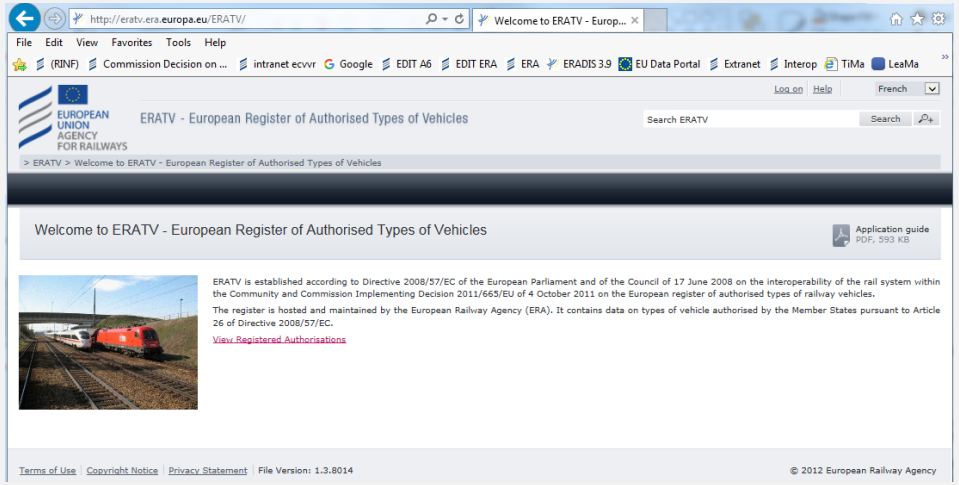


- Single Rule Database in future will replace RDD

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European Register of Authorised Types of Vehicles (ERATV)

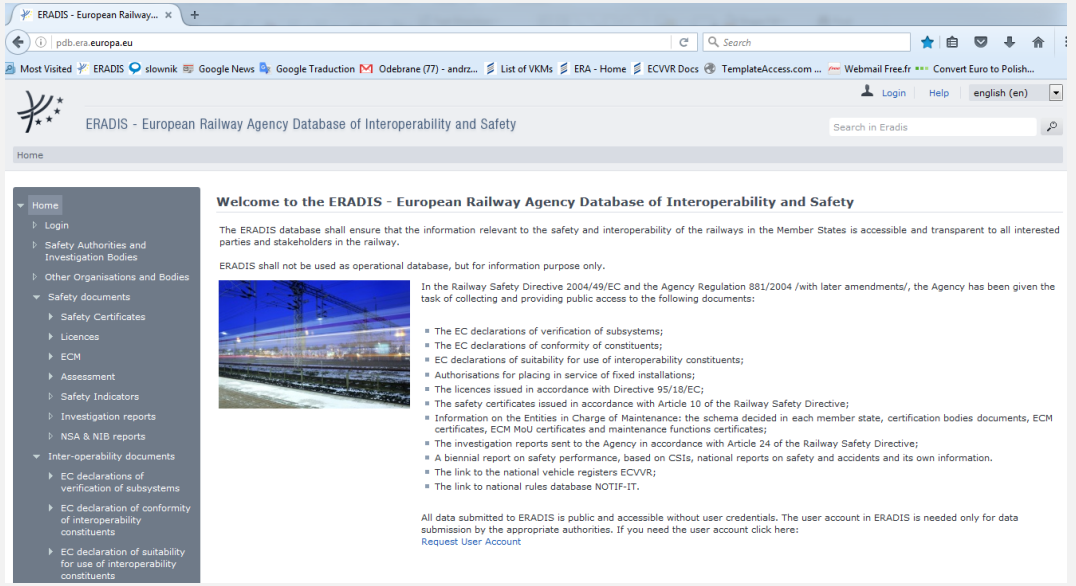
- In operation since beginning of 2013 & contains authorised vehicle type
- Publicly available: https://eratv.era.europa.eu/eratv
- **Applicant:**
  - Responsible for the integrity of the data provided
  - Can fill-in part of the required data (technical data) on behalf of the authorising entity.
- **Authorising entity:**
  - Always issues a vehicle type authorisation even if the applicant has requested to have only a vehicle authorisation for placing on the market.
  - Responsibility for the data recorded in ERATV



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ERA Database on Interoperability and Safety (ERADIS)

- Contains certificates, declarations
- Publicly available: http://eradis.era.europa.eu
- **Applicant** of **subsystem**, Manufacturer of **ICs** submits **EC declarations**
- **NoBo** submits **EC certificates**
- **DeBo**: No obligation however, the principle of ‘’mutatis mutandis’' could be applied
- **Authorising entity** ensures that ERADIS is **updated before** issuing authorisation



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Register of Infrastructure RINF (RINF)

- Provides main features of the European Railway infrastructure.
- Publicly available: http://rinf.era.europa.eu/RINF
- In particular, provides the value of the parameters to be used to check the **compatibility between vehicle and route**
- **May be used** for **VA** when RINF is referenced by TSIs (e.g TSI Loc&Pas 4.2.8.2.9.4.2 on contact strip) or NRs



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National Vehicle Register (NVR)

- Not part of vehicle authorisation
- National Vehicle Register: NVR Decision amendedby Decision (EU) 2018/1614
- Register of all vehicles in service:
  - Kept by each MS
  - Contains information on authorisation and associated Keeper, Owner, ECM
  - NVRs and search engine ‘Virtual Vehicle Register’ in ERA constitute European Centralized Virtual Vehicle Register.
  - All the information on every vehicle is available via the ECVVR.
- ECVVR in operation since 2009: https://vvr.era.europa.eu/VVR
- Over 1 million vehicles available in ECVVR

Questions?

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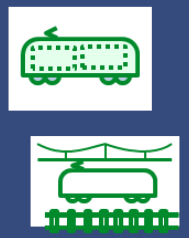
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Vehicle authorisation and route compatibility checks

2 VEHICLE AUTHORISATION FOR PLACING ON THE MARKET/ VEHICLE TYPE AUTHORISATION

- Technical compatibility of the subsystems within the vehicle
- Safe integration of the subsystems within the vehicle
- Technical compatibility of the vehicle with the network in the area of use



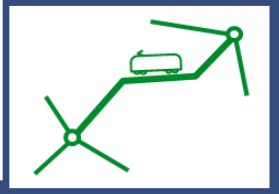
Authorising entity

The Agency (in collaboration with concerned NSAs)	The Agency or NSA (Applicant's choice)

One-Stop Shop

3 CHECK BEFORE THE USE OF AUTHORISED VEHICLE

Route compatibility on the basis of the Register of Infrastructure (RINF)



Railway Undertaking



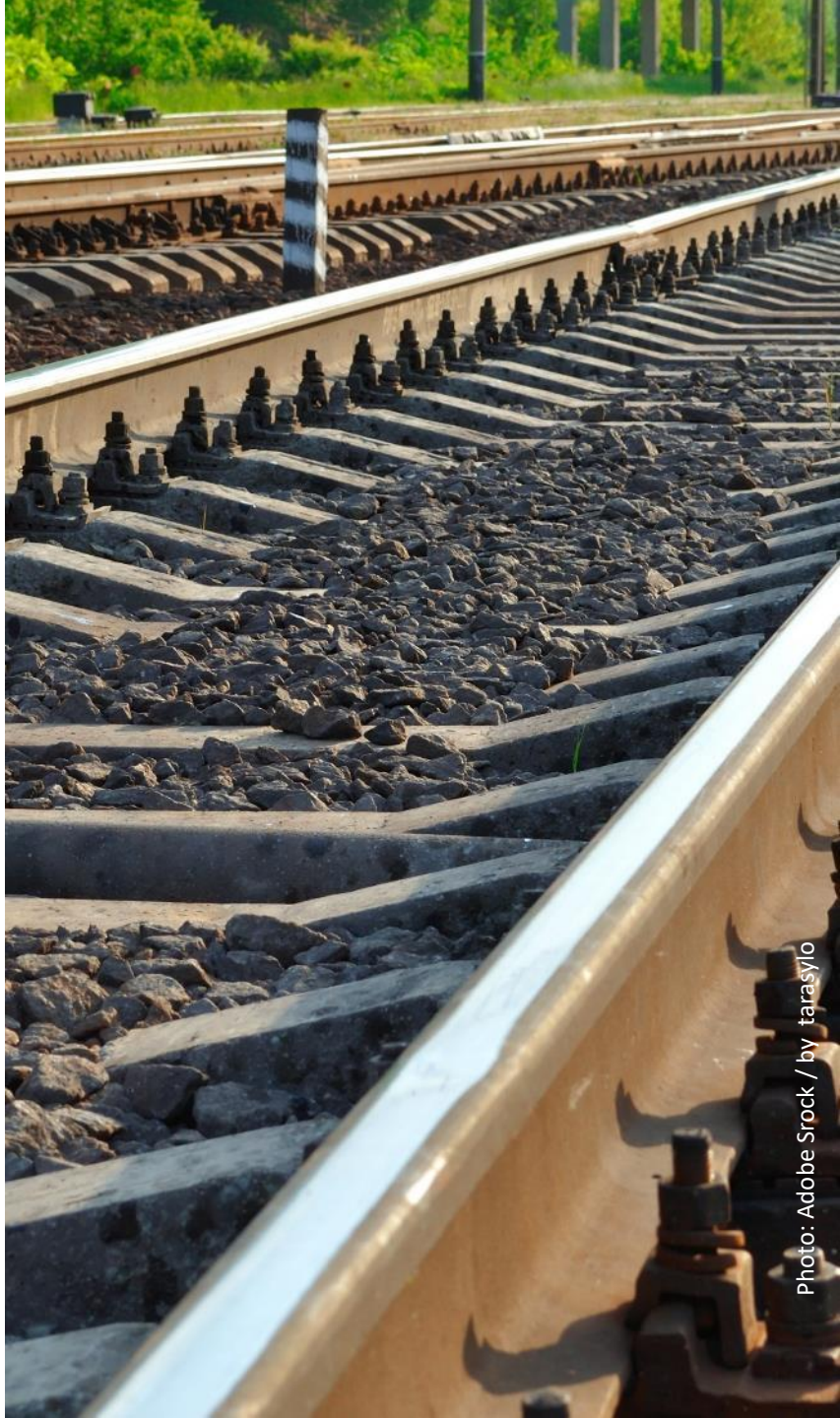


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Vehicle Authorisation & Checks before use of vehicles

Applicant defines and demonstrates:

- ❑ **Area of use** (e.g France, Belgium)
- ❑ **Vehicle Technical compatibility with the Network(s) of the area of use** (e.g 3kV, 25kV, KVB, TBL1+, D4 etc.)
- ❑ **Conditions for use and other restrictions** (e.g max speed 140km/h)

Railway Undertaking checks using its SMS process :

- ❑ Vehicle(s) is authorised and Registered
- ❑ Compatibility between Vehicle(s) and indented Route(s)
- ❑ Proper integration in the train composition

Vehicle authorisation for placing on the Market (art 21)



Checks before the use of authorised vehicles (art 23)



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Checks before use of vehicles

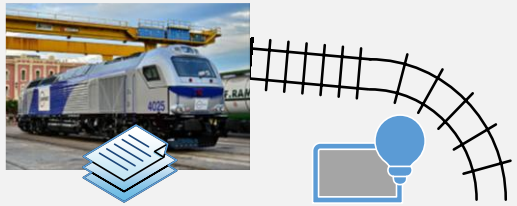
Path request

Operation

Authorised & Registered



Vehicle Route Compatibility Check



Vehicle data

RINF

Train composition & other aspects



Under Safety Management System



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Compatibility check between Vehicle and Route

RU task

Most of the Route compatibility items require a simple comparison

Interface	Vehicle data in ERATV and technical file		Route information available in RINF or provided by IM		Results
	ERATV	Value	RINF ref	Value	
Gauge	4.2.1	G1	1.1.1.1.3.1.1 1.2.1.0.3.4	G1	
Train detection systems	4.14.1	track circuits axle counters loops	1.1.1.3.7.1	track circuits axle counters	
Wheel set gauge	4.1.3	1435 mm	1.1.1.1.4.1 1.2.1.0.4.1	1435 mm	
Minimum in-service wheel diameter	4.8.2	991 mm	1.1.1.1.5.2	330 mm	

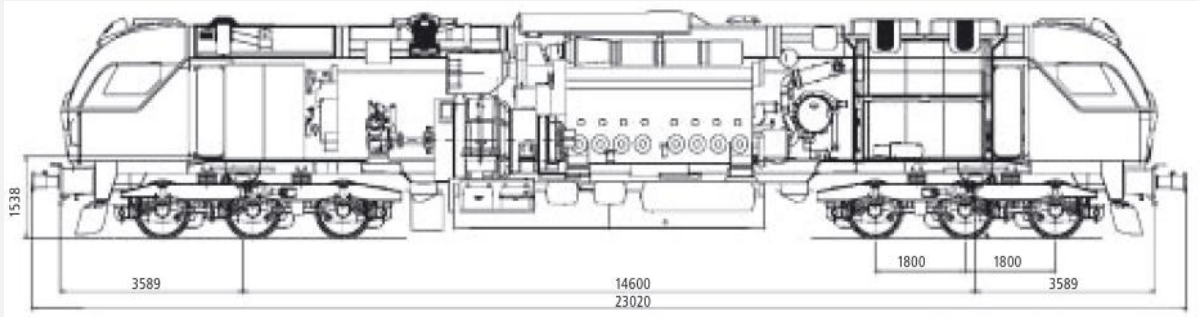
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Compatibility check between Vehicle and Route

RU task

Some items to be checked need specific competencies
(e.g Traffic loads and load carrying capacity of infrastructure)

RU performs static and dynamic compatibility checks with the IM procedures

Interface	Vehicle data in ERATV and technical file		Route information available in RINF or provided by IM		Results
	ERATV	Value	RINF ref	Value	
• Design mass (working order, normal and exceptional payload), 4.5.2 : 121000 kg • Static axle load (working order, normal and exceptional payload), 4.5.3: 20160 kg • Maximum design speed , 4.1.2.1 : 120km/h • Vehicle length, 4.8.1 : 23,02m • Position of the axles along the unit (axle spacing): 					 Compatible with lines classified D4

Fixed installations

TSIs INF,ENE and PRM

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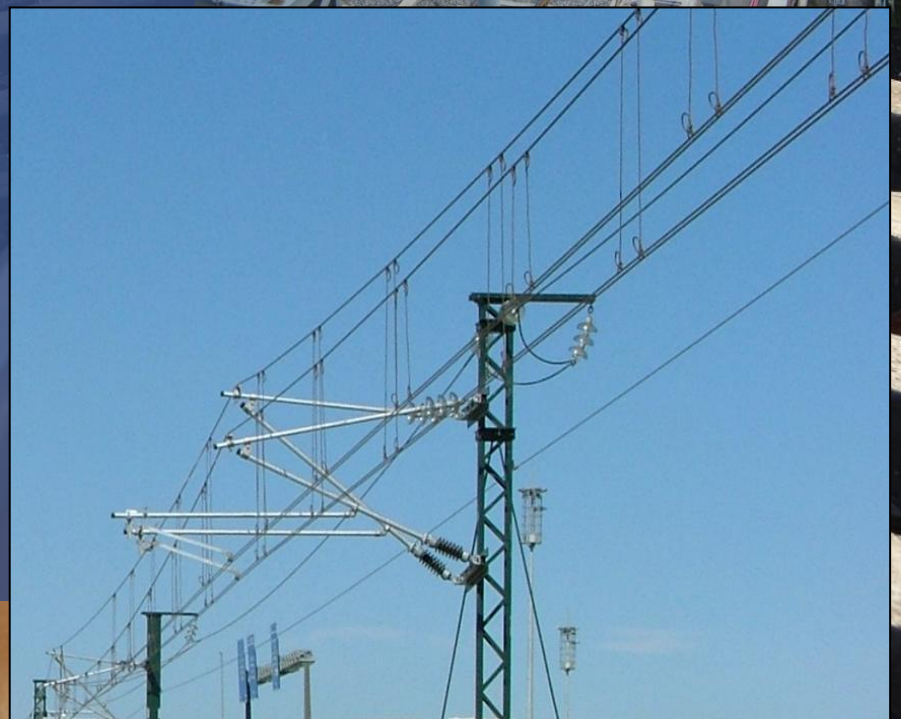


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What is covered by the Infrastructure Subsystem?



Infrastructure :

*The track, points, level crossings, engineering structures (bridges, **tunnels***, etc.), rail-related elements of stations (including entrances, platforms, zones of access, service venues, toilets and information systems, as well as their **accessibility features for persons with disabilities and persons with reduced mobility****), safety and protective equipment.*

* Covered by **TSI Safety Railway Tunnel**

** Covered by **TSI Person with Reduced Mobility**

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FIXED INSTALLATIONS (INF AND ENE) TSIs: SCOPE

- Applicable to **all new, upgraded or renewed** subsystems of the rail system in the EU.

- The TSIs shall apply to **the network of the Union rail system** with exclusion of :
  - Metro,
  - Infrastructure used by trams and light rail vehicle and
  - Networks functionally seprarated from the union rail system and used only for local, urban or suburban passenger services

- The TSIs shall apply to networks with the following **nominal track gauges: 1435 mm, 1520 mm, 1524 mm, 1600 mm and 1668 mm**.

- **Metric gauge is excluded from the technical scope of this TSI.**

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TSI INF & TSI ENE
Characteristics of the subsystem (Chapter 4)

- 4.1. Introduction
- 4.2. Functional and technical specifications of infrastructure subsystem
- 4.3. Functional and technical specification of the interfaces
- 4.4. Operating rules
- 4.5. Maintenance rules
- 4.6. Professional qualifications
- 4.7. Health and safety conditions

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TSI INF
Functional and technical specifications (chapter 4.2)

- The **Basic Parameters,** characterising the **infrastructure subsystem**, are grouped according to the **following aspects**:

Line Layout	Immediate action limits on track geometry defects
Track Parameters	Platforms
Switches & Crossing	Health, safety and environment
Track resistance to applied loads	Provision for operation
Structure resistance to traffic loads	Fixed installations for servicing trains

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TSI INF Functional and technical specifications (chapter 4.2)

Line layout

- Structure gauge (4.2.3.1)
- Distance between track centres (4.2.3.2)
- Maximum gradients (4.2.3.3)
- Minimum radius of horizontal curve (4.2.3.4)
- Minimum radius of vertical curve (4.2.3.5)

Track parameters

- Nominal track gauge (4.2.4.1)
- Cant (4.2.4.2)
- Cant deficiency (4.2.4.3)
- Abrupt change of cant deficiency (4.2.4.4)
- Equivalent conicity (4.2.4.5)
- Railhead profile for plain line (4.2.4.6)
- Rail inclination (4.2.4.7)

Switches and crossings

- Design geometry of switches and crossings (4.2.5.1)
- Use of swing nose crossings (4.2.5.2)
- Lateral track resistance (4.2.6.3)

Track resistance to applied loads

- Track resistance to vertical loads (4.2.6.1)
- Longitudinal track resistance (4.2.6.2)
- Lateral track resistance (4.2.6.3)

Structures resistance to traffic loads

- Resistance of new bridges to traffic loads (4.2.7.1)
- Equivalent vertical…..earthworks and…. new structures (4.2.7.2)
- Resistance of new structures over or adjacent to tracks (4.2.7.3)
- Resistance of existing bridges and earthworks to traffic loads (4.2.7.4)

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TSI INF Functional and technical specifications (chapter 4.2)

- Immediate action limits on track geometry defects
  - IAL for alignment (4.2.8.1)
  - IAL for longitudinal level (4.2.8.2
  - IAL for track twist (4.2.8.3)
  - IAL of track gauge as isolated defect (4.2.8.4)
  - IAL for cant (4.2.8.5)
  - IAL for switches and crossings (4.2.8.6)
- Platform
  - Usable length of platforms (4.2.9.1)
  - Platform height (4.2.9.2)
  - Platform offset (4.2.9.3)
  - Track layout alongside platforms (4.2.9.4)
- Health, safety and environment
  - Maximum pressure variation in tunnels (4.2.10.1)
  - Effect of crosswinds (4.2.10.2)
  - Aerodynamic effect on ballasted track (4.2.10.3)
- Provision for operation
  - Location markers (4.2.11.1)
  - Equivalent conicity in service (4.2.11.2)
- Fixed installations for servicing trains
  - Toilet discharge (4.2.12.2)
  - Train external cleaning facilities (4.2.12.3)
  - Water restocking (4.2.12.4)
  - Refuelling (4.2.12.5)
  - Electric shore supply (4.2.12.6)

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TSI INF: Horizontal curve example

- **4.2.3.4. Minimum radius of horizontal curve**

The minimum design radius of horizontal curve shall be selected with regard to the local design speed of the curve.

(1) The minimum horizontal design curve radius for new lines shall not be less than 150 m.

(…)

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TSI INF
Interoperability constituents

- Following Interoperability Constituents (ICs) are defined:
  - Rail (5.3.1)
  - Rail fastening systems (5.3.2)
  - Track sleepers (5.3.3)
- **Point 5.3** defines the specifications of **rail, rail fastening systems and track sleepers as ICs**, and **point 6.1** defines the conformity assessment procedures.

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What is covered by the Energy Subsystem?





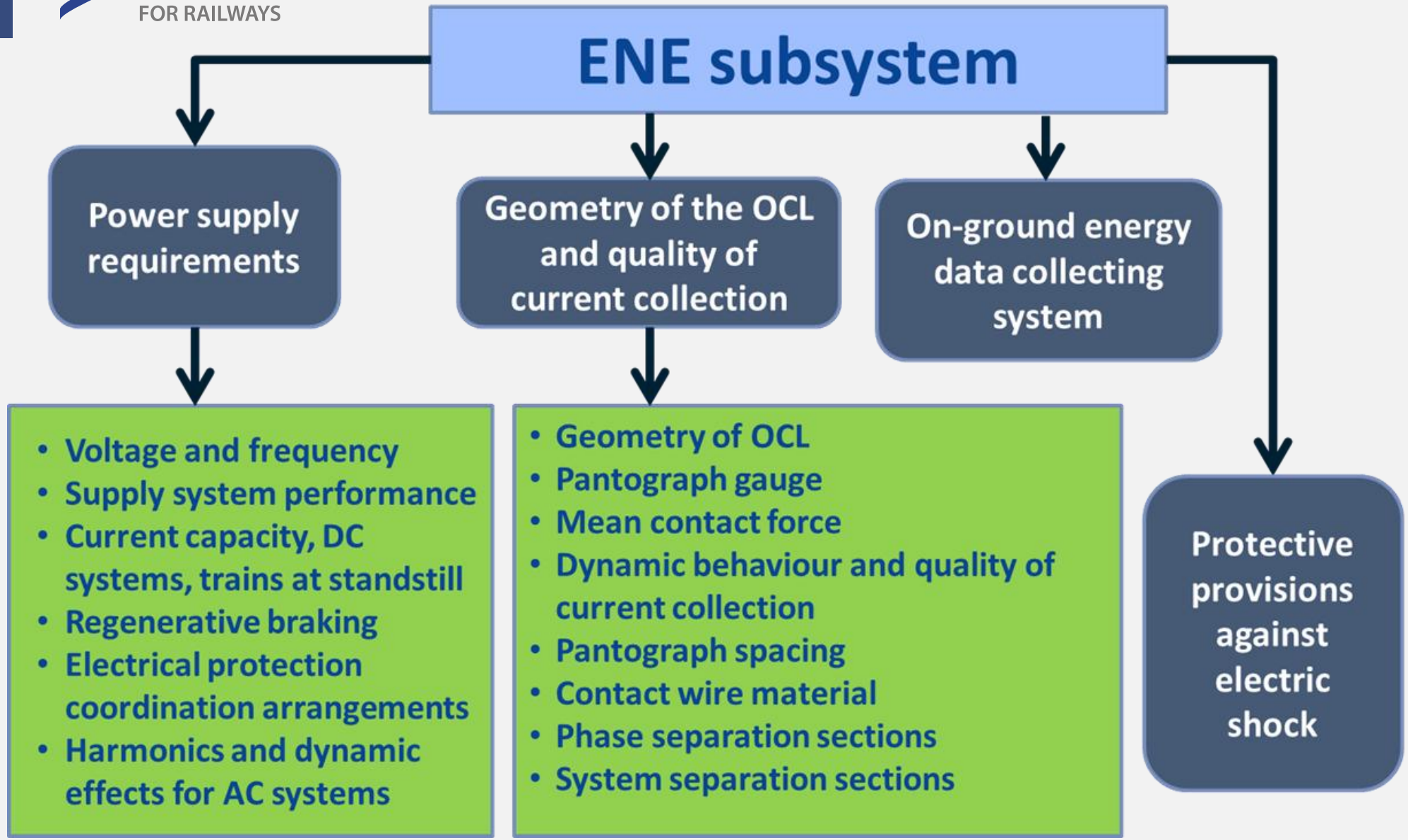




Energy subsystem consist of :

- **Electrification system**: substations, sectioning points, separation sections
- **Overhead lines :** distribute electricity to trains by means of current collection
- **Return circuit :** path for traction return current
- **on-ground energy data collection system :** trackside of the electricity consumption measuring system.

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TSI ENE : Examples

4.2.3. Voltage and frequency

Nominal voltage and frequency shall be one of the four systems

- *(a) AC 25 kV, 50 Hz;*
- *(b) AC 15 kV, 16,7 Hz;*
- *(c) DC 3 kV;*
- *(d) DC 1,5 kV.*



4.2.9.1. Contact wire height

(1) The permissible data for contact wire height is:

Table 4.2.9.1

Contact wire height

Description	v ≥ 250 [km/h]	v < 250 [km/h]
Nominal contact wire height [mm]	Between 5 080 and 5 300	Between 5 000 and 5 750
Minimum design contact wire height [mm]	5 080	In accordance with the specification referenced in Appendix E, Index [3] depending on the chosen gauge
Maximum design contact wire height [mm]	5 300	6 200 (1)

(1) Taking into account tolerances and uplift in accordance with the specification referenced in Appendix E, Index [3], the maximum contact wire height shall not be greater than 6 500 mm.

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TSI ENE:
Interoperability constituent

Following **Interoperability Constituent (IC)** is defined:

- **Overhead contact line that** consists of components listed in TSI to be installed within an energy subsystem and the associated design and configuration rules:
  - arrangement of wire (s) suspended over the railway line for supplying electricity to electric trains, together with associated fittings, in-line insulators and other attachments including feeders and jumpers. It is placed above the upper limit of the vehicle gauge, supplying vehicles with electrical energy through pantographs.

Note. Supporting components such as cantilevers, masts and foundations, return conductors, self-processing power supplies, disconnectors and other insulators **are not part of the interoperability constituent overhead contact line. They are covered by subsystem requirements so far as interoperability is concerned.**

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IMPLEMENTATION OF TSIs INF and ENE



- Will I need to move to the latest TSIs INF and ENE?
- How is my project impacted?

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New infrastructure and energy subsystems

No transition regime apply to INF and ENE TSIs – Application since **28 September 2023**

- TSI INF - 7.2 Application of this TSI to a **new infrastructure subsystem**:
  - (1) For a new infrastructure subsystem, the application of this TSI shall be compulsory.
  - (2) A 'new infrastructure subsystem' means an infrastructure subsystem placed into service after 28 September 2023 which creates a route or a part of a route where none currently exists.

    Any other infrastructure subsystems shall be considered as '**existing infrastructure subsystems**'
- TSI ENE - 7.2 Application of this TSI to a **new energy subsystem**:
  - (1) For a new energy subsystem, the application of this TSI shall be compulsory.
  - (2) A 'new energy subsystem' means an energy subsystem placed into service after 28 September 2023, which is created where no traction power supply and OCL previously existed.

    Any other energy subsystem shall be considered as an '**existing energy subsystem**'.

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Implementation of policy for the events of “upgrading”

Objective:

Using the “upgrading” events in infrastructure and/ or energy existing subsystems as an opportunity to streamline a TSI compliant fixed installation, in a more effective way.

Application of INF and ENE TSIs to existing subsystems

<u>Cases considered as upgrading and not as the placing into service of a new infrastructure and/or energy subsystem</u>

In 7.2 (3) of both INF and ENE TSIs:

(a) the realignment of part of an existing route;

(b) the creation of a bypass;

(c) the addition of one or more tracks on an existing route, regardless of the distance between the original tracks and the additional tracks.

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Application of INF and ENE TSIs to existing subsystems

Performance criteria of the infrastructure subsystem

In addition to the cases referred to in point 7.2.(3), **'upgrading' is a major modification work** of an existing infrastructure subsystem **resulting in at least compliance with one additional traffic code or a change in the declared combination of traffic codes** (referred to Table 2 and Table 3 in point 4.2.1).

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Application of INF and ENE TSIs to existing subsystems

Table 2

Infrastructure performance parameters for passenger traffic

– Route compatibility checks are subject to point 4.2.2.5 and Appendix D.1 of the OPE TSI

Traffic code	Structure gauge	Axle load [t]	Line speed [km/h]	Usable length of platform [m]
P1	*GC*	*17(1) / 21.5(2)*	*250-350*	*400*
P2	GB	20(1)/ 22.5(2)	200-250	200-400
P3	DE3	22,5(3)	120-200	200-400
P4	GB	22,5(3)	120-200	200-400
P5	GA	20(3)	80-120	50-200
P6	G1	12(3)	n.a.	n.a.
P1520	S	22,5(3)	80-160	35-400
P1600	IRL1	22,5(3)	80-160	75-240

(1) Minimum required values of axle load to be used for checks of bridges using a dynamic appraisal, based on design mass in working order for power heads and locomotives and operational mass under normal payload for vehicles capable of carrying a payload of passengers or luggage (mass definitions in accordance with the specification referenced in Appendix T Index [1].

(2) Minimum required values of axle load to be used for checks of infrastructure using a static loading, based on design mass under exceptional payload for vehicles capable of carrying a payload of passengers or luggage (mass definitions in accordance with the specification referenced in Appendix T Index [1] with regard of the specification referenced in Appendix T Index [2]). This axle load may be linked to limited speed.

(3) To be used for checks of infrastructure used for static loading, based on design mass in working order for power heads and locomotives and design mass under exceptional payload for other vehicles (mass definitions in accordance with the specification referenced in Appendix T Index [1] with regard of the specification referenced in Appendix T Index [2]). This axle load may be linked to limited speed.

Table 3

Infrastructure performance parameters for freight traffic

Route compatibility checks are subject to point 4.2.2.5 and Appendix D.1 of the OPE TSI

Traffic code	Structure gauge	Axle load [t]	Line speed [km/h]	Train length [m]
F1	GC	22,5(1)	100-120	740-1050
F2	GB	22,5(1)	100-120	600-1050
F3	GA	20(1)	60-100	500-1050
F4	G1	18(1)	n.a.	n.a.
F1520	S	25(1)	50-120	1050
F1600	IRL1	22,5(1)	50-100	150-450

(1) To be used for static checks of infrastructure, based on design mass in working order for power heads and locomotives and design mass under normal payload for other vehicles (mass definitions in accordance with the specification referenced in Appendix T Index [1]). This axle load may be linked to limited speed.

TSI INF

Categories of lines (Tables 2 and 3)

Application of INF and ENE TSIs to existing subsystems

Performance criteria of the energy subsystem

In addition to the cases referred to in point 7.2.(3), **'upgrading' is a major modification work** of an existing energy subsystem **resulting in an increase of the line speed of more than 30km/h.**

Application of INF and ENE TSIs to existing subsystems

For the **upgraded infrastructure or energy subsystem, the application of the TSI* shall be compulsory**, and **applied to the upgraded subsystem within the geographical coverage of the upgrading**. The geographical coverage of the upgrading shall be defined based on locations on tracks and metric references and shall result in the compliance of all basic parameters of the infrastructure or energy subsystem associated with the tracks that are subject to the upgrading of the subsystem.

Exceptions permitted in 7.3.2 (7) TSI INF: Cant, cant deficiency, platform height and offset

Exception permitted in 7.3.2 (6) TSI ENE: Maximum lateral deviation of the OCL

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Application of INF and ENE TSIs to existing subsystems

In the event of a change other than an upgrading of the existing subsystem, the application of the TSI* for each basic parameters (referred to in point 4.2.2) affected by a change shall be compulsory when the change requires to carry out a new 'EC' verification procedure in accordance with **Implementing Regulation (EU) 2019/250*. Provisions defined in Articles 6 and 7 of Implementing Regulation (EU) 2019/250 shall apply.**

*TSI INF for the case of the infrastructure subsystem and TSI ENE for the case of the energy subsystem.

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PRM - Transition for fixed installations New stations

No transition regime apply to PRM TSI **for fixed installations** – Application since **28 September 2023**

7. IMPLEMENTATION OF THE TSI

7.1. Application of this TSI to new Infrastructure and Rolling Stock

7.1.1. *New Infrastructure*

This TSI is applicable to all new stations in its scope.

It is **not mandatory** to apply this TSI to new stations which have **already been granted a building permit or which are subject to a contract for major construction works that is either already signed or in the final phase of a tendering procedure at the date of application of this TSI**. However, an earlier version of this TSI must be applied within its defined scope. The consistence of applicable requirements of partial application of different versions of this TSI to particular sections of the station must be justified by the applicant certified by the notified body.

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PRM – Upgrade / Renewal of existing stations

RENEWAL - UPGRADING PROJECT - Application since 28 September 2023

7.2.2. ***Application of this TSI to existing Infrastructure***

For infrastructure, **the conformity with this TSI is mandatory for those parts that are renewed or upgraded**. However, the TSI recognizes that, due to the characteristics of **the inherited railway system**, compliance of existing infrastructure may be achieved through **a gradual improvement of accessibility**.

In addition to this gradual approach, 3 exceptions:

1. obstacle free route created from **existing footbridges, stairways and subways :** requirement related to **width is not mandatory**

2. **width of the platform is not mandatory for existing stations** if the cause of non-compliance is the presence of certain platform obstacles or existing tracks that are unlikely to be moveable

1. **historic building protected by national law**,

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Principle of application of the PRM TSI to existing stations

Improvement of accessibility :

1. A coordinated approach : National Implementation Plans
   Persons with reduced mobility - PRM TSI NIP (europa.eu)
   - a strategy, including a prioritisation rule laying down the criteria and priorities for stations to be designated for renewal or upgrading
   - extent of the upgrade or renewal of stations

2. Other upgrades/renewals
   - case by case approach

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APIS



Fixed Installations Authorisation for placing in service

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Interoperability Directive - Article 18

*"1. The trackside control-command and signalling, **energy and infrastructure subsystems** shall be **placed in service only** if they are designed, constructed and installed in such a way as to **meet the essential requirements**, and the relevant authorisation is received in accordance with paragraphs 3 and 4."*

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Interoperability Directive - Article 18

*"2. Each **national safety authority shall authorise the placing in service** of the **energy, infrastructure** and trackside control-command and signalling **subsystems** which are **located or operated in the territory of its Member State.**"*

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Interoperability Directive - Article 18

*"3. **National safety authorities shall provide detailed guidance on how to obtain the authorisations** referred to in this Article. An **application guidance document** describing and explaining the requirements for those authorisations and listing the documents required shall be made available to applicants free of charge. The Agency and the national safety authorities shall cooperate in disseminating such information."*

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Interoperability Directive - Article 18

*"4. **The applicant shall submit a request for authorisation of the placing in service of fixed installations to the national safety authority**. The application shall be accompanied by a file which includes documentary evidence of: (a) the declarations of verification referred to in Article 15;*

*(a) **the declarations of verification** referred to in **Article 15** (Procedure for establishing the 'EC' declaration of verification);*

(b)…

…"

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Interoperability Directive - Article 15

*"**Procedure for establishing the 'EC' declaration of verification***

*1. In order **to establish the 'EC' declaration of verification** necessary for placing on the market and placing in service referred to in Chapter V, **the applicant shall request the conformity assessment body or bodies** that it has selected for that purpose **to apply the 'EC' verification procedure** set out in Annex IV.*

2. …

…"

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Regulation (EU) 2019/250 - Article 5

*"**Procedure for establishing the 'EC' declaration of verification***

*1. In order **to establish the 'EC' declaration of verification** necessary for placing on the market and placing in service referred to in Chapter V, **the applicant shall request the conformity assessment body or bodies** that it has selected for that purpose **to apply the 'EC' verification procedure** set out in Annex IV.*

2. …

…"

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Regulation (EU) 2019/250 - Articles 6 and 7

The Articles 6 and 7 of Reg. 2019/250 refer to the Verification procedure in case of a change to a subsystem.

To a certain extent they are the basis for the TSI implementation for an existing subsystem, and conditions for the decision for a need of an ‘EC’ verification, in case of a change to a Basic Parameter in the technical file.

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Interoperability Directive - Article 18

"...

*6. **In the event of renewal or upgrading of existing subsystems**,... ... The national safety authority, in close cooperation with the Agency in the case of trackside ERTMS projects, shall examine the file and shall decide whether a new authorisation for placing in service is needed, on the basis of the following criteria:*

(a) the overall safety level of the subsystem concerned may be adversely affected by the works envisaged;

(b) it is required by the relevant TSIs;

(c) it is required by the national implementation plans established by the Member States; or

(d) changes are made to the values of the parameters on the basis of which the authorisation was already granted.

..."

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TSI implementation vs APIS process

The whole processes of the new, renewal and upgrading of ENE and INF fixed installations cover much more than the ENE and INF TSIs implementation and have to be treated in the APIS framework (in the sense of IoD).

The whole process of ENE and INF subsystems APIS shall be taken into account in the development of ‘guidance on how to obtain the authorisations (…) ’ by relevant NSA, in accordance to **Art. 18.3 of IoD, and not in the TSIs**.

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TSI implementation vs APIS process

Please remember that:

- TSIs are not a manual on how to build a subsystem;
- TSIs contain only requirements, which have to be harmonized at EU level and are important for interoperability – mainly interfaces with RST;
- There are MANY of other technical, safety requirements – not in TSIs- which have to be fulfilled by ANY (not only interoperable) railway system and ANY construction;
- Fixed installations are “constructions” which have to fulfil the construction code requirements, procedures and other legislation;
- It is not possible to build any fixed installations based on and put in service only on the TSIs basis.

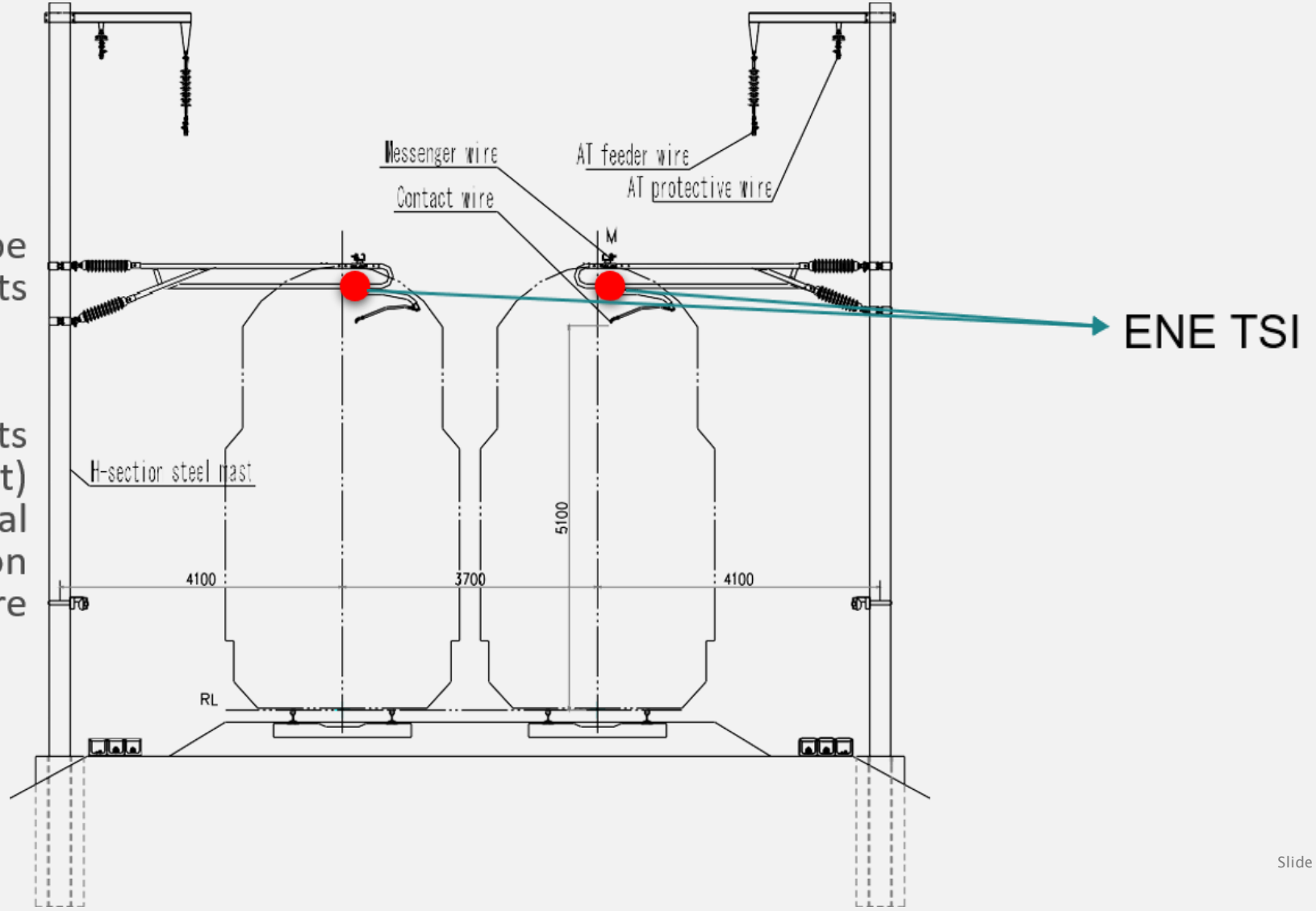
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Scope of Fixed installations TSIs (e.g. OCL in TSI ENE)

Note for the presented example:

ENE TSI sets out interoperable (to be harmonised at EU level) requirements for the ENE subsystem.

Other requirements and rules, aspects of performance of a whole (or part) railway system, which contains several other elements and has influence on other (not railway) systems, are beyond the TSIs scope.



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Disclaimer

- Interoperability Directive (IoD) - Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union (recast).

- Regulation (EU) 2019/250 - Commission Implementing Regulation (EU) 2019/250 of 12 February 2019 on the templates for 'EC' declarations and certificates for railway interoperability constituents and subsystems, on the model of declaration of conformity to an authorised railway vehicle type and on the 'EC' verification procedures for subsystems in accordance with Directive (EU) 2016/797 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 201/2011

- Technical Specifications for Interoperability (TSIs) (in ERA website)

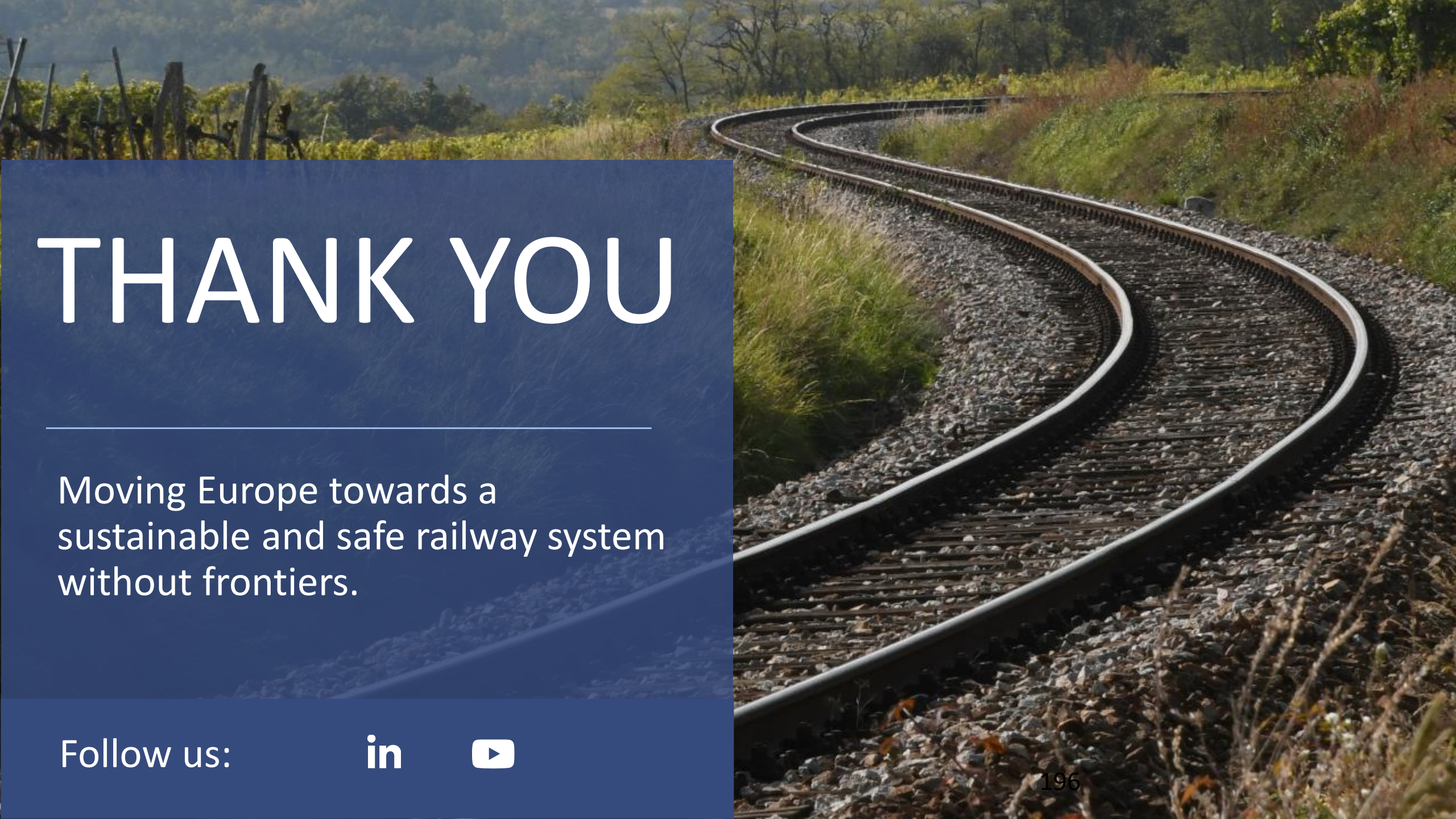
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