Infrastructure TSI as an example of the implementation of the “Interoperability” idea

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From national visions to **European interoperability**

YESTERDAY

International Agreements
(COTIF, AGC, AGTC,…)
+
International Rules
(UIC, RIV, RIC,…)
+
National Rules
(With or without mutual recognition)

TODAY

European Specifications
+
European Standards
+
National Rules

Technical specifications for interoperability (TSI)

- Directive 96/48: Interoperability of the trans-European (TEN) high-speed rail system
- Directive 2001/16: Interoperability of the trans-European (TEN) conventional rail system

- Interoperability Directive 2004/50 modifying 96/48 and 2001/16
- Safety Directive 2004/49/EC
- Regulation 881/2004 (European Railway Agency)

Directive 2008/57/EC on the interoperability of the rail system within the Community

(covering both HS and CR and extending the scope of the TSIs progressively to the whole rail system)

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

TSIs evolution*

- Decisions 2002 (HS)
- Decisions 2008 (HS)
- Decisions 2011 (CR)
- Decisions 2012 (HS)
- Regulations 2014 (TEN / off TEN)
- Regulation 2019
- New TSI package 2022

*e.g. INF/ ENE TSIs

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Subsystems

For the purposes of this Directive, the system constituting the Union rail system may be broken down into the subsystems beside.

Structural

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

Functional

- Operation and traffic management
- Maintenance
- Telematic applications for passengers and freight services

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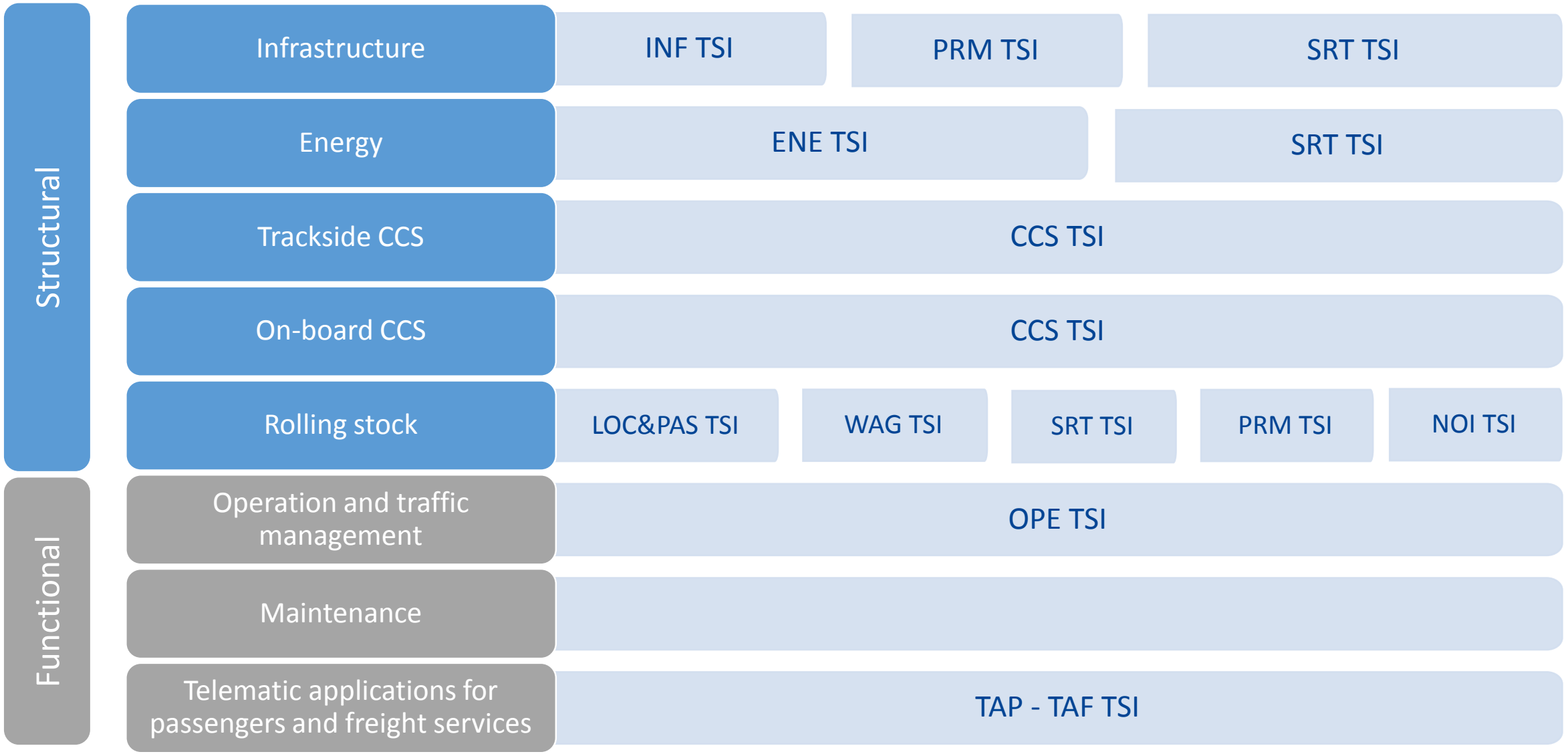
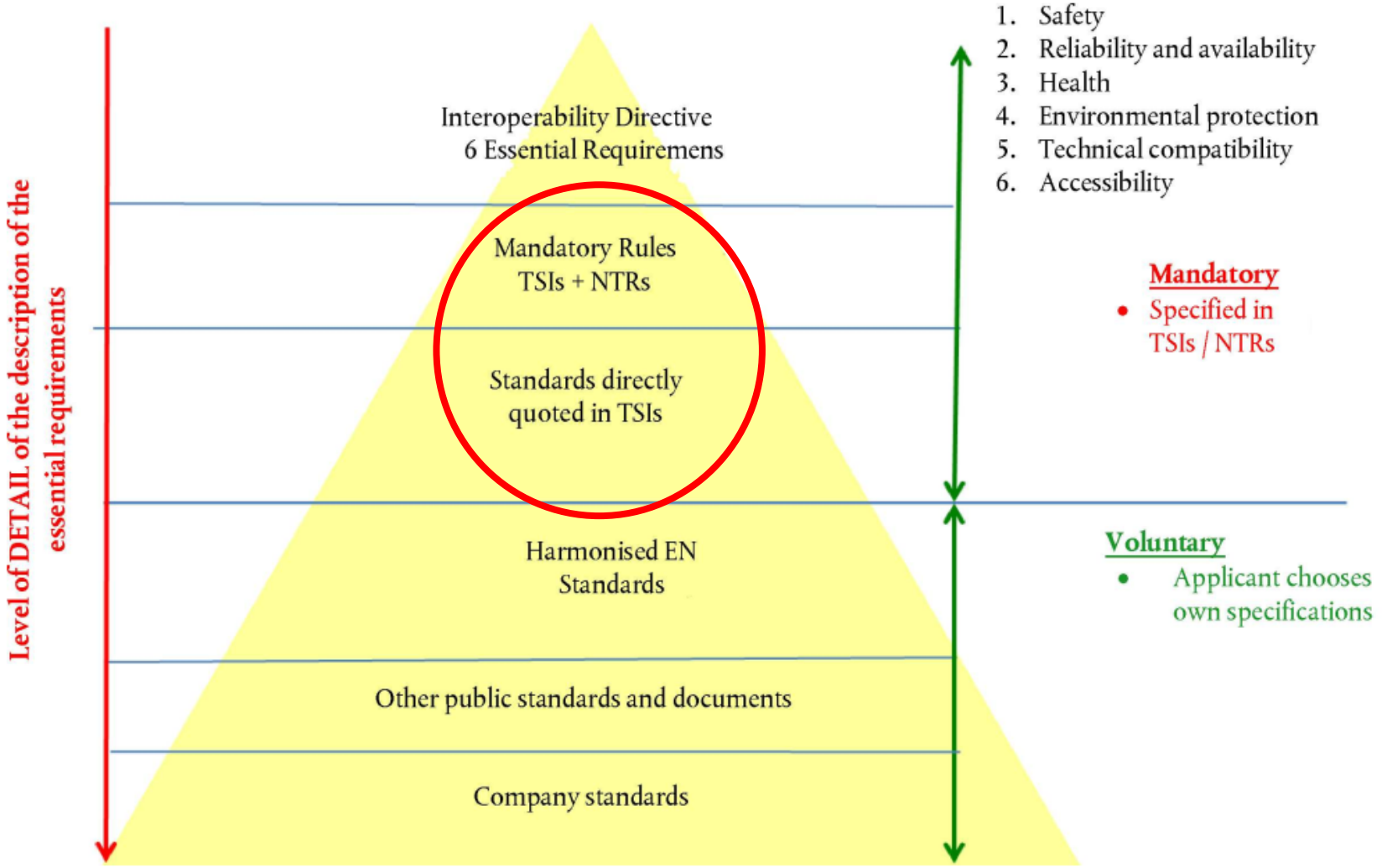
Subsystems and **Technical Specification for Interoperability**



TSIs chronology (Table 1 Structural TSIs, Table 2 Functional TSIs)

Implementation of Essential Requirements



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TSI Infrastructure

TSI Infrastructure

TSI Infrastructure - **Legal Act**

- **TSI infrastructure** is an **Annex** to the Commission Regulation (EU) No 1299/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union.

- The Regulation (EU) No 1299/2014 has been amended by Commission Implementing Regulation (EU) 2019/776 of 16 May 2019

- A consolidated version is available in the link

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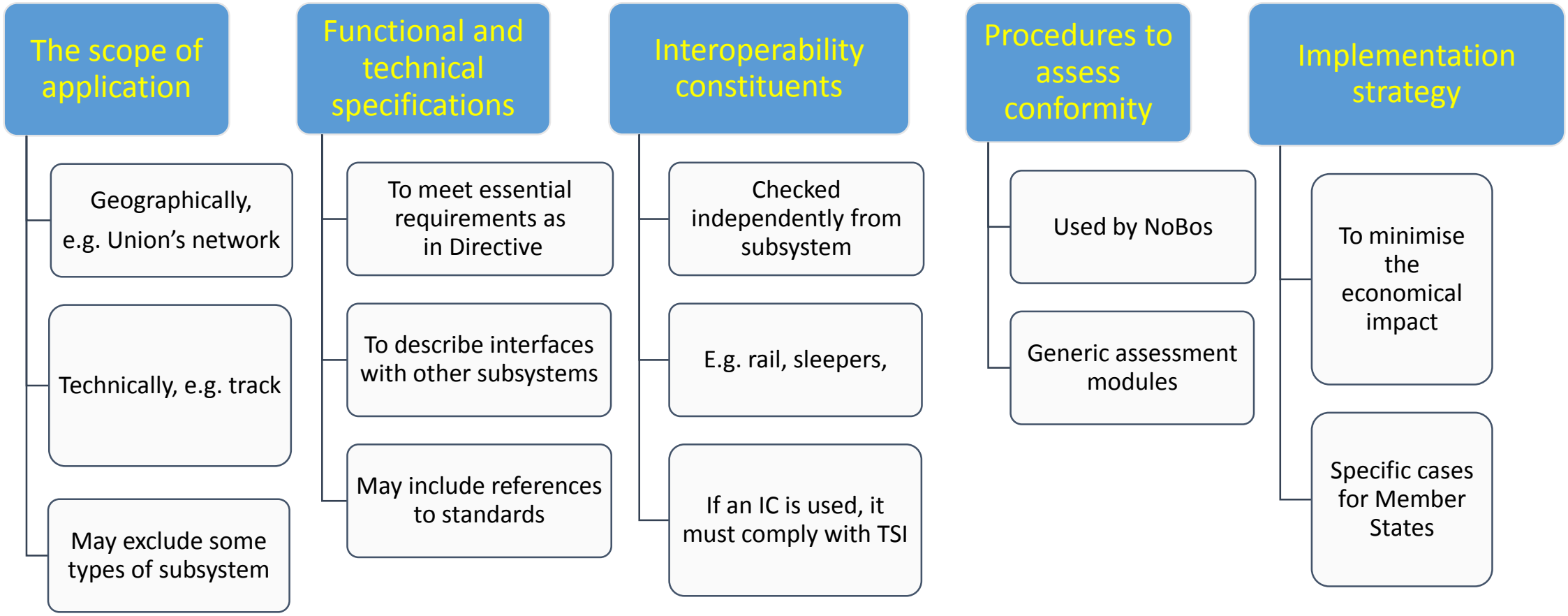
Structure of TSIs



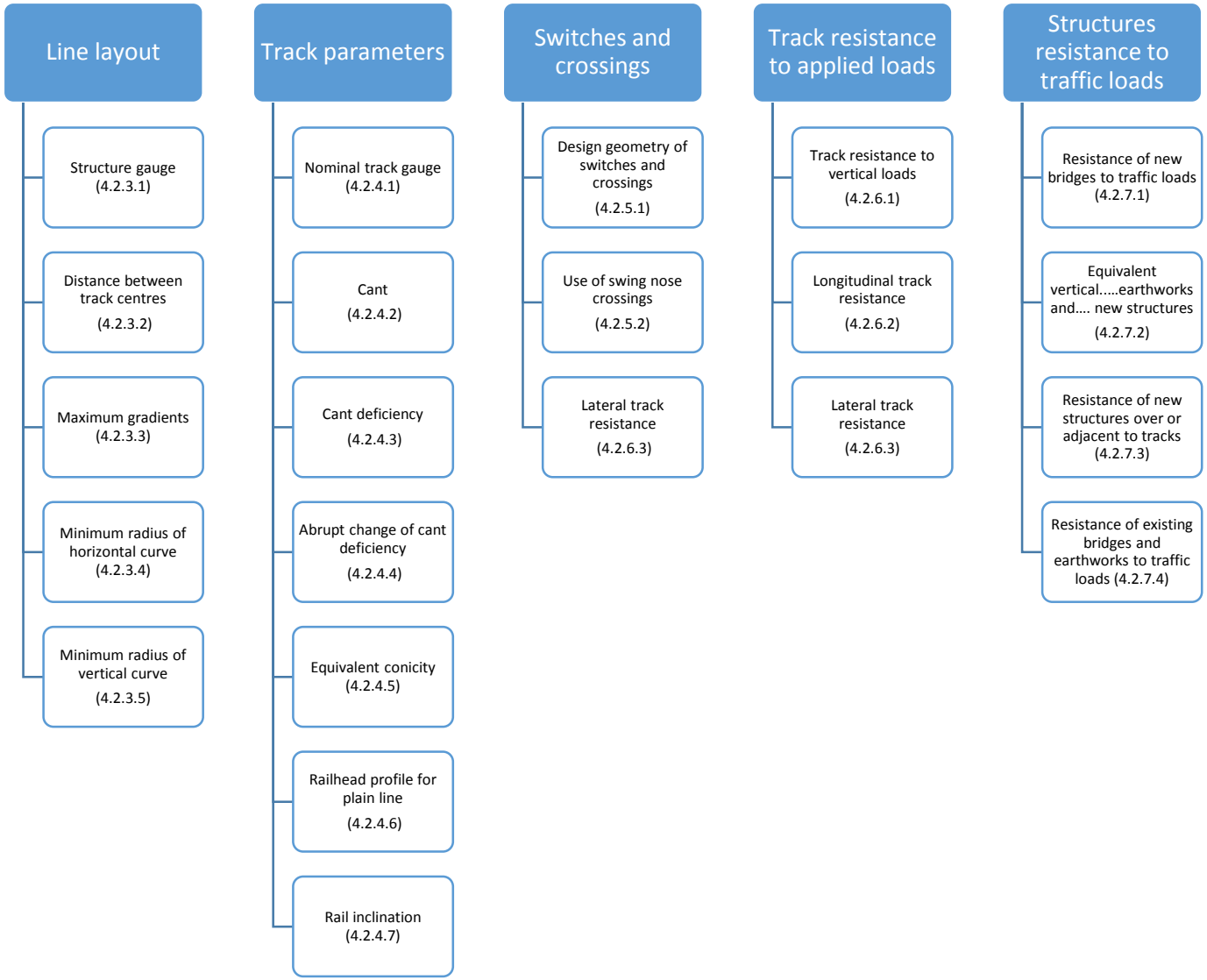
Both requirements & assessment procedures are mandatory

Chapter 4 - Functional and technical specifications **of subsystem**

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

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

Basic parameters 1/2



Basic Parameter 2/2

- **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)

Chapter 5 - **Interoperability constituents**

- Rail
- Rail fastening systems
- Track sleepers

(7) '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;

Modules (Decision 2010/713/EU) and **particular assessment procedures** are identified for:

- **Interoperability Constituents:**

Table 20

Modules for conformity assessment to be applied for interoperability constituents

Procedures	Rail	Rail fastening system	Track sleepers
Placed on the EU market before entry into force of relevant TSIs	CA or CH	CA or CH	
Placed on the EU market after entry into force of relevant TSIs	CB + CC or CB + CD or CB + CF or CH		

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Appendix A

Assessment of interoperability constituents

Table 36

Assessment of interoperability constituents for the EC declaration of conformity

Characteristics to be assessed	Assessment in the following phase			
	Design and development phase			Production phase Manufacturing process + product test
	Design review	Review of manufacturing process	Type test	Product quality (series)
5.3.1 The rail				
5.3.1.1 Railhead profile	X	n.a.	X	X
5.3.1.2 Rail steel	X	X	X	X
5.3.2 The rail fastening systems	n.a.	n.a.	X	X
5.3.3 Track sleepers	X	X	n.a.	X

- **Infrastructure subsystems:**

6.2.2. *Application of modules*

For the EC verification procedure of the infrastructure subsystem, the applicant may choose either:

(a) Module SG: EC verification based on unit verification, or

(b) Module SH1: EC verification based on full quality management system plus design examination.

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Appendix B

Assessment of the infrastructure subsystem

Table 37

Assessment of the infrastructure subsystem for the EC verification of conformity

Characteristics to be assessed	New line or upgrading/renewal project		Particular assessmen procedures
	Design review	Assembly before putting into service	
	1	2	3
Structure gauge (4.2.3.1)	X	X	6.2.4.1
Distance between track centres (4.2.3.2)	X	X	6.2.4.2

Chapter 7 – **Transposition** of the infrastructure TSI

- Application of TSI to **new railway lines** vs **existing railway lines**
- National Implementation plan (to be developed by MSs)
- Specific cases:
  - (a) ‘P’ cases: permanent cases;
  - (b) ‘T’ cases: temporary cases, where it is recommended that the target system is reached by 2020

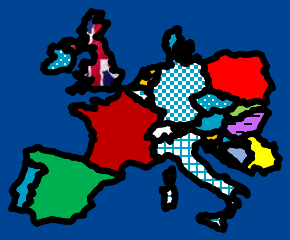
Conclusion

A **TSI** is a common (harmonized) technical standard specifying the elements of essential requirements* that need to be harmonized to achieve interoperability

- Safety, reliability and availability, health, environmental protection, technical compatibility, accessibility

TSIs relate to
+ structural subsystems (infrastructure, rolling stock, energy, CCS), or
+ functional subsystems (maintenance, traffic operation and management, telematics applications for passengers and freight services)

The TSI framework is supplemented by national rules (NRs)



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