epsf
établissement public de
sécurité ferroviaire

THE EPSF'S VISION
for railway safety and interoperability

A WORD FROM THE MANAGING DIRECTOR

Over the past twenty years, the EPSF has built firm convictions on several critical aspects of railway safety and interoperability, drawing on its experience as an authorising and supervisory authority. This document outlines these convictions and presents, for each one, our perspectives and proposals for action. In doing so, it sets out our vision for a safe and interoperable railway system, both in France and across Europe.

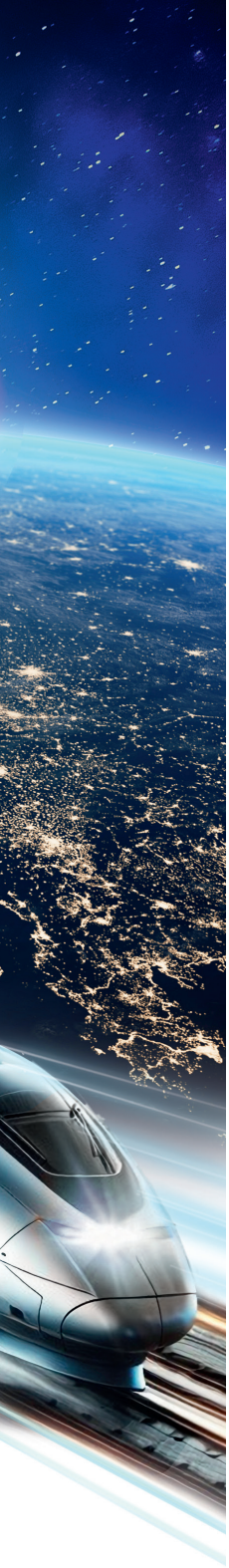
At the European level, our work takes place within the context of the implementation of the « Fourth Railway Package » and its impact on the market structure and its stakeholders, as well as on technical and operational harmonisation. In France, efforts to promote regional and local rail transport are prompting the development of a regulatory and operational framework that is more adaptable and less restrictive in terms of interoperability, yet still fully aligned with safety requirements.

Technological innovation, the succession of crises experienced in recent years and demographic changes are all elements that are reshaping the railway sector and introducing a need for adaptation in an uncertain environment. Uncertainty, however, is fundamentally at odds with safety.

The EPSF plays an active role in these developments, working closely with ministerial bodies and sector stakeholders at both the French and European levels. In addition to fulfilling our mandate as the authority responsible for issuing authorisations and supervising sector stakeholders, the EPSF actively supports the integration of the European regulatory framework by the sector. This includes providing guidance to new entrants, fostering cooperation with peer authorities and contributing to the development of a harmonised, pragmatic and safe European railway system. Together, these actions reinforce our strategic vision.

We hope this document provides valuable insights.

Laurent CÉBULSKI
EPSF Managing Director



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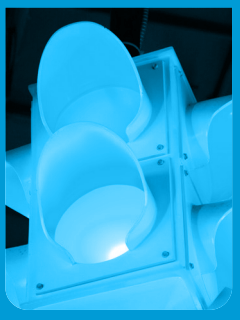
Safety



1 Safety

Regulatory approach

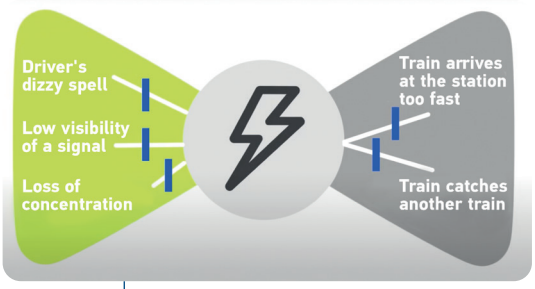
Understanding and managing risks beyond regulatory compliance

- Safety rules are proposed by experts to address the risks identified in railway operations. These rules are usually based on railway experience and/or studies.
- For an organisation, following a rule ensures an acceptable level of safety and meets the requirements of the authority that issued it, but does not necessarily mean there is a full understanding of the analysis behind it.

« Moreover, following rules does not systematically ensure absolute safety. »

In practice, situations will arise that are not covered or are only partially covered by the rule.

- Human factors can also play a role: attitudes toward rules, overconfidence, or the temptation to push the limits may reduce the level of safety that the rule was intended to ensure.



- Analyses carried out after incidents and accidents highlight the limits of applying a rule blindly. This often leads the authority to create new rules or tighten existing ones. In practice, operational reality constantly confronts operators and organisations with situations that fall outside the scope of the rules, or that leave room for individual or organisational interpretation of how the rule should apply in that specific case.

- Consequently, to avoid a purely literal and uncritical application of rules, and to contribute to the goal of continuously improving safety, organisations should focus primarily on two pillars:
  - Rather than applying rules without fully understanding their foundations, organisations must develop the ability to identify, understand and assess risks. Building on the foundations of regulatory and normative frameworks and enriched by their own analysis, this enables them to put standard rules into perspective, determine how they should be applied, and decide on the measures best suited to their operational context, taking into account both the letter and the spirit of the rule;
  - train and encourage its staff, particularly operational staff, to exercise judgement when applying a rule in response to an unfamiliar situation. The training of this staff must place strong emphasis on the understanding and evaluation of risks, as well as on the underlying rationale for each rule, including its scope and, where relevant, its limitations. This allows to adapt their behaviour and apply the rule in the most appropriate way.
- The various regulations require operators to carry out the type of analysis described above CSM SMS mention the word “risks” 75 times: 38 times in Annex 1 and 37 in Annex 2). As authorisation and supervision authorities, the European Union Agency for Railways (ERA) and the National Safety Authorities (NSAs), must as well assess the relevance and effectiveness of the SMS arrangements by sampling, during assessment and supervision activities.

Commission Delegated Regulation (EU) 2018/762 of 8 March 2018, establishing common safety methods on safety management system requirements (CSM SMS), sets out the minimum elements that railway undertakings and infrastructure managers must include in their SMS. These elements are divided into the following categories: organisational context, leadership, planning, support, operation, performance evaluation, improvement.

- The EPSF considers that operators should be encouraged to go beyond simple compliance, and that more attention should be paid to assessing the quality and substance of the evidence provided on risk management. For this approach to be effective, coordination is needed between the bodies that grant authorisations and those that supervise operators. To set benchmarks for the railway sector, evaluation of these qualitative elements should also form part of the broader assessment of SMS performance and operator maturity.

2 Safety

Safety Management System (SMS)

Managing safety on a daily basis and across all areas

Upon its creation in 2006, the EPSF carried out its authorisation and supervision activities for operators almost exclusively through checks for regulatory compliance. Over time, its experience, aligned with best practices in leading safety-critical industries, has shown that while compliance remains a prerequisite, it is far from sufficient. As highlighted in the previous chapter on the approach to rules, improving safety requires operators to go beyond rule compliance (regulated safety) and to anchor their actions in a genuine safety culture driven by organisational and human factors (managed safety). This is particularly important given the general shift in safety management regulations toward result-based objectives rather than prescriptive objectives.

An SMS must be implemented and actively spearheaded by senior management among operational teams, as these are the teams audited by the EPSF. Without a deep understanding of their role in the organisation's safety framework and of the importance of safeguards put in place to address identified risks, it is impossible to secure every employee's full commitment to safety. Safety cannot be perceived as a constraint; it must be recognised as an essential condition for the company's success.

The SMS, which is built around a set of structured processes, must clearly describe the organisation, methods and procedures the company uses to ensure the safe management of its operations. These elements support effective, risk-based decision-making in daily activities.

Each year, EPSF inspectors carry out around 300 inspections across the country. The ESPF's experience in supervision shows that when an SMS is not well adapted to a company's activities and organisation, it often fails to control risks effectively, leading to findings that can result in operational restrictions or even coercive measures. These measures may include a formal notice or the suspension, restriction or withdrawal of authorisation.

The EPSF firmly believes that the objectives set by the Safety Directive* can only be achieved if the SMS is a genuine management tool for the company, informing decision-making at all levels:

- *the assessment of its level of control is one of the management indicators at the highest level of the organisation;*
- *the operator's SMS is adapted to its scope and organisation;*
- *the SMS exhaustively and precisely identifies the risks specific to the company, taking into account its activities and organisation;*
- *the SMS must be grounded in the company's operational reality, clearly reflect work processes and be based on documents and company procedures;*
- *all of the operator's relevant staff should understand the general workings of the SMS and be familiar with the sections that apply to their role. it describes how staff or their representatives are involved in the development, modification and improvement of the SMS. Where necessary, the SMS can be adapted with agility;*
- *the level of control of the SMS is known from the highest levels of the company down to the operational front line.*

*Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety

3 Safety

Safety culture

Committing to a just culture and promoting feedback

- A company's safety culture reflects how much importance it places on safety in all its decisions and judgements. This is true at every hierarchical level and in all its activities, whether operational or support, central or local. The level of risk control within an organisation depends as much on the active implementation of its SMS through its safety culture as on the design of the system itself.

- Even a perfectly written SMS manual can still result in uncontrolled risks if it is not supported by a strong safety culture, e.g. one that consistently incorporates safety into decision-making. A well-developed safety culture can act as a safety net, as employees with a strong focus on safety respond effectively to unexpected situations (which relates back to the balance between "regulated safety" and "managed safety").

- Safety culture is therefore a powerful driver of performance, but it cannot be imposed. It results from long-term efforts and forms part of the broader development of the company's overall culture.

« Developing a strong safety culture depends on visible day-to-day commitment from senior and line management, as well as active participation from all employees. It cannot be simply imposed. »

For the EPSF, safety culture also highlights the central role of humans and their judgement in driving safety management systems, and the importance of maintaining control in an environment shaped by rapid technological change.

- A "just culture" that encourages the transparent reporting of safety events (particularly those that would not have been detected without voluntary reporting by staff or witnesses) is a key element of a safety culture. This principle is supported in law by the French Transport Code, Article L2221-12: "No disciplinary action may be taken against an individual who has reported a breach of obligations by the holder of an authorisation necessary for carrying out a railway activity (...)." «While simple in theory, applying this principle in practice requires careful definition and a clear explanation of its conditions. It should not, for example, be seen as increased tolerance for non-compliance with rules.

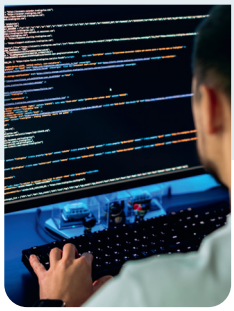
- When effectively implemented (though its level of integration within each company is hard to measure) just culture is a vital part of safety culture and supports continuous learning. It ensures that feedback isn't limited to events with the most severe consequences, which are impossible to ignore, but also captures early warning signs and precursors, helping to prevent the most serious accidents before they occur.

- This is particularly important because the EPSF considers feedback to be a fundamental element of the SMS for continuously improving risk control. For this reason, the EPSF has long maintained, alongside the learning processes each actor carries out individually, a national system for sharing feedback across all participants. The national safety event database, which is managed by the EPSF, serves as the cornerstone of this approach, supporting learning from feedback, just culture and safety culture.

« Each year, operators submit over 20,000 safety events to the EPSF via the Cyrus database. »

4 Safety

Data
Drawing on the potential of data to optimise risk management



- Risk identification and evaluation are based on analysing the factors that affect a situation and implementing a data processing system. Combined, these two approaches enable informed decision-making.
- Historically, the data and factors taken into account in these analyses were limited by the small volume of data collected and by the restricted capabilities of the tools available for analysis (initially human capacities, and later the use of computer tools).
- The exponential growth in data collection enabled by multiple sensors, the sharing of information through modern communication technologies and the development of powerful processing and analysis systems, now provides organisations with a wealth of new opportunities. In particular, new technologies allow to:
  - analyse data from diverse sources and formats, providing a more complete and precise view of a situation;
  - detect correlations and trends that were previously unknown or difficult to perceive;
  - react faster, enabling rapid detection of anomalies or deviations and the implementation of appropriate measures.
- With the advent of early artificial intelligence systems, the collection and analysis of large data volumes open opportunities to innovate in safety management, detect risks earlier, evaluate them faster and determine the most appropriate risk control measures, supporting early decision-making. Moreover, these new capabilities can also make it possible to reassess the relevance of certain rules or legacy solutions for which the original underlying data is no longer available, or where that data has significantly changed over time.
- In this context, an "open data" approach could be considered, particularly for the use of NSAs, sharing data collected across various registers managed by the ERA (OSS, ERADIS, ERATV, EVR, RINF, ISS).

- The overall effectiveness of systems that use large volumes of data depends on various factors, including:
  - *Data:*
    - volume and frequency of data collection,
    - relevance of the data for analysis,
    - data quality, including accuracy, completeness and correctness,
    - access to data: open data, possession by other entities, confidentiality, availability;
  - *Data processing:*
    - relevance and absence of bias in the tool/processing method,
    - maturity and level of confidence in the data post-processing tool (certification of tools and processes),
    - feedback from experience (comparing process results with reality),
    - adaptation, improvement (continuous improvement processes),
    - explainability: a comprehensive understanding of the processing workflow, from the input data and the predicted output to the decision,
    - "auditability",
    - effectiveness: the result addresses the problem at hand;
  - *The use of data in a safety demonstration and/or decision-support process involves:*
    - interpreting the results, including identifying the variables that contribute most to the decision (this is less critical if the tool is highly reliable);
    - implications for legal responsibility.

4 Safety

The EPSF strongly promotes and supports the efforts and initiatives of stakeholders in the field of data science, which holds significant potential for improving safety. EPSF itself has launched an ambitious, business-oriented approach, implemented through the development of use cases, aiming to optimise risk knowledge through data use.

To deliver the expected results, implementing such an approach within an organisation must be fully integrated into the organisation's core business processes, and in particular requires:

- *having the necessary skills and resources in the field of data science;*
- *demonstrating control over each of the system's input parameters (particularly those identified above) to ensure the effectiveness of the overall process;*
- *verifying the ongoing relevance of the process if it or its environment changes (non-regression), ensuring feedback and the continuous improvement of the system;*
- *demonstrating that the results of data processing enable the expert interpreting them to make informed decisions, with humans remaining in control of the overall process.*

5 Safety

New technologies
Anticipating and facilitating innovation

- The stakeholders in the railway system (railway undertakings [RU]/infrastructure managers [IM]/manufacturers) play a key role in the economy and society of a country like France: they enable large-scale, "green" mobility through the transport of people, goods and essential products; they strengthen territorial cohesion; and they have a significant impact on the national economy and job creation.

- The railway sector faces several megatrends:
  - climate challenges and the decarbonisation of transport;
  - demand for high-performance collective mobility;
  - market liberalisation and intermodal competition;
  - demographic and societal shifts;
  - the ongoing process of technical harmonisation within the rail system;
  - the rise of new technologies that change production processes, offer new possibilities and introduce new risks.

- These changes require strong adaptability, responsiveness and anticipation.

- Innovation is a key factor in addressing these many challenges, allowing:
  - The introduction of new railway mobility solutions, to meet new challenges:
    - in densely populated areas, with more efficient, reliable and safe systems (NExTEO, ETCS N3),
    - as an alternative to the "all-car" model to help combat climate change (e.g., innovative light train [ILT], very light rail [VLR]);
    - by minimising production constraints (e.g., autonomous trains);
  - The transition towards new modes of power supply and propulsion (e.g., batteries, hydrogen, biofuels).
  - The development of solutions to reduce risks or lower operating costs (e.g., level crossing safety systems, translation tools for train drivers);
  - The improvement of working conditions, such as reducing physical strain and enhancing safety (e.g., digital automatic coupling [DAC]);
  - The provision, use and optimisation of available data to increase efficiency and safety (AI, Internet of Things);
  - The optimisation of already significant investments in the maintenance and development of the network.

- In the railway sector, innovations are developed within a regulated framework, with a strong technical component, where safety plays a central role and which is subject to intense pressure from competing modes of transport.

- As part of its missions, the EPSF is called upon to provide opinions on innovation topics both as an authorisation/certification authority and as a stakeholder in the development of the regulatory framework, as well as a supervisory authority. The EPSF takes a positive and engaged interest in these developments, focusing its actions on:
  - *anticipation (contact with the sector and relevant bodies, e.g., Europe's Rail; participation in projects as an observer, and technological and regulatory monitoring);*
  - *paying close attention to the emergence of new risks (cybersecurity);*
  - *support (development of doctrines; upstream assistance for projects);*
  - *promoting a comprehensive approach to safety, (technology + organisational and human factors + safety culture);*
  - *adapting its own operations accordingly to better meet new challenges;*
  - *incorporating these elements into the development of the regulatory/standards framework.*

« The regulatory and standards framework must facilitate the upstream development of innovations and support the downstream integration of innovative products, ensuring that no new interoperability obstacles are introduced, while also maintaining the highest safety standards. »

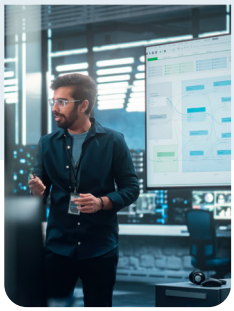
Within this context, careful consideration must be given to selecting the appropriate methods of intervention, whether through regulation or standardisation.

The EPSF actively monitors developments and promotes the enhancement of its staff's skills on topics related to new technologies and innovations, particularly when these may impact authorisation and supervision activities. Depending on their level of maturity, these efforts may result in the production of documents called "Doctrines", which provide an analysis and initial position of the EPSF on a given topic. These documents aim to inform innovators, project sponsors and operators, while contributing to the broader discussion in the field. The EPSF's doctrines can be accessed at the following link:
https: //www.securite-ferroviaire.fr/realementation/rechercher-un -document?tvpe=7&theme=&kevword=&date debut=&date fin=

6 Safety

Roles and responsibilities

Managing the growing complexity and number of interfaces



More than ever, the French railway landscape is changing. The fourth railway package has completed the opening of the railway market, extending it to domestic passenger transport services and making competitive tendering mandatory for new public service contracts managed by the Regions (see Section 3.2 of the EPSF 2024 activity report).

The expected consequences of these changes are already starting to appear:

- entry into the French market of railway companies historically based in other countries;
- creation of new railway companies in France, sometimes by economic actors encountering the railway system for the first time;
- restructuring of the historic French operator to meet the new market conditions.

At the same time, the rail system is becoming increasingly complex with the integration of both rail and non-rail stakeholders in specific roles. This is especially true for infrastructure works companies and organisations involved in the maintenance cycle. These companies are connected to rail operators through contractual arrangements that can be highly complex and include critical information on the roles and responsibilities of the parties, such as:

- licensor/concessionaire;
- contracting authority/subcontractor;
- manufacturer/owner/operator/entity in charge of vehicle maintenance.

Moreover, the introduction of new technologies and innovative rolling stock solutions (e.g. very light rail [VLR]), which could reshape the traditional allocation of responsibilities among stakeholders, requires particular attention.

« In today's increasingly complex landscape, where the number of interfaces is rising significantly, it is essential to prevent any safety breaches. »

Achieving this goal requires ensuring that safety is considered both vertically, in relationships between a company and its subcontractors and within the company hierarchy itself, and horizontally, with respect to other stakeholders and economic sectors whose services and applications are used in the railway field.

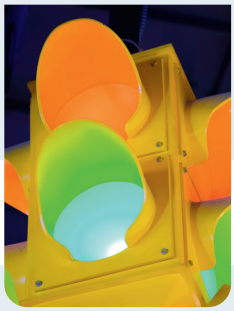
The EPSF has identified several areas of focus to prevent any deterioration in risk control within the sector:

- promote the principle that each stakeholder is fully independent in its decisions and responsible for safety within their defined scope of activity, along with effective collaboration across all parties involved to contribute to the overall safety of the system;
- pay attention to potential excesses or abuses in the use of subcontracting (nature of subcontracted activities, number of acceptable cascading levels);
- require that delegations of responsibility are clearly established;
- given an increasing number of stakeholders, consider the concept of a "critical size" for an entity authorised by the EPSF to perform a railway activity, based on its traffic forecasts and requested operational domain;
- be vigilant against misuse of safety certificates for financial, social, legal or contractual reasons when such misuse impacts railway safety;
- ensure that each stakeholder identifies and properly considers all interfaces in its risk analyses;
- Develop safety culture as an essential component of railway culture;
- invest in the continuous development of skills for all stakeholders, including the EPSF, as the certification and oversight authority. This is crucial to keep humans at the heart of safety management systems, even in situations where automation might seem to exclude them;
- manage interfaces with other competent authorities [ANSSI].

7 Safety

Safety at level crossings

Supporting France's national strategy through European cooperation



- A significant number of fatalities on the French network occur at level crossings. This situation is mirrored across Europe.

  Level crossing fatalities accounted for 31% of total European railway deaths from 2019 to 2023. This represents over 200 deaths per year for this category of accident*.

- Accidents at level crossings also generate substantial material costs, in addition to the impact on train operations, including delays and other negative consequences.

- Although these types of accidents are only rarely caused by the railway system, they still harm the sector's reputation. Strong safety performance is, and must remain, a key strength, especially compared with other modes of land transport.

- According to the specific circumstances in which they take place, in some cases, accidents are particularly tragic, leaving a lasting mark not only on those directly involved but also on society as a whole. Such events demand swift, concrete action and often fuel calls for tougher safety measures. Yet, stricter requirements increasingly clash with local efforts to reopen and develop railway lines, which then have to overcome a highly restrictive and costly regulatory framework.

- Finding solutions is complex. This is mainly due to the fact that safety at level crossings represents a critical interface between the railway system and road networks. This creates challenges in allocating responsibilities and costs, particularly given the longstanding focus, since the launch of the 2008 National Safety Programme (PSN), on removing level crossings and the need for cooperation between the rail and road sectors. While level crossing fatalities make up only a small portion of overall road deaths, they account for a large share of rail-related deaths and thus remain a significant concern for the railway sector.

- Societal and behavioural factors further complicate the issue, especially in cases of non-compliance with rules governing railway crossings, whether intentional or accidental.

- In France, the PSN (2019, following the 2008 and 2014 plans) identified priority areas for action. The EPSF both supports and participates in implementing this national safety plan and, based on its experience and observations, promotes a European approach to level crossing safety. In fact, the ongoing occurrence of level crossing accidents calls into question whether a purely national approach is enough.

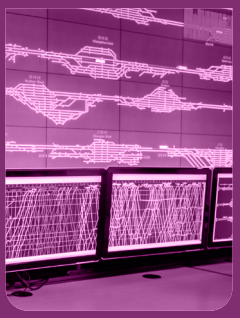
  A structured and regular discussion at the European level would be useful, which aims to give the issue the attention it deserves and to work towards coordinated actions. This approach may also involve identifying regulatory requirements while taking into account the interoperability of safety measures. The greater performance of certain EU Member States in addressing this issue strengthens the belief that improvement strategies could be identified and shared.

- The risk model for level crossings must be regularly reviewed using up-to-date information (recent assessments, more detailed consideration of the surrounding environment, increased throughput on an existing line, etc.).

- Other areas for development include:
  - Improving understanding of the problem, especially regarding user behaviour and attitudes towards rules and prohibitions;
  - Highlighting existing projects and fostering collaboration among stakeholders;
  - Leveraging new technologies to enhance safety.

*Source : ERA Annual Safety Overview - 2025 https://www.era.europa.eu/content/annual-safety-overview-2025

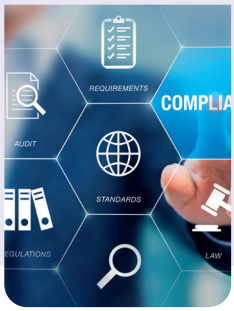
Interoperability



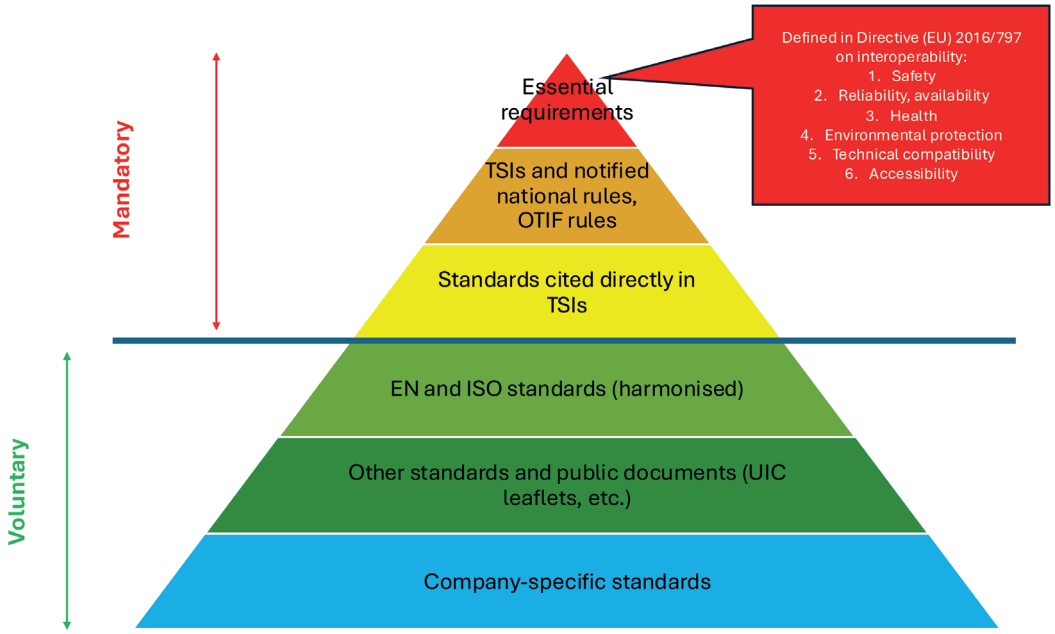
8 Interoperability

Harmonising and simplifying the regulatory framework

Striking an appropriate balance between the technical standards framework and the overarching rules established by directives and regulations



Regulation sets the essential safety and interoperability requirements that must be met by the entities to which it applies. Regulation is established by French or European public authorities.



Hierarchy of railway interoperability standards. Source: EU Agency for Railways (ERA)

Standardisation is a process that brings together experts representing stakeholders in a technical field to develop, by consensus, reference documents that offer solutions to a specific issue or respond to a mandate. In innovative fields, developing standards is a crucial step toward industrialisation and large-scale commercialisation, with regulation covering the innovation being developed subsequently.

Both European regulation and standardisation promote similar objectives (i.e., safety, interoperability, performance, innovation), and in all cases aim for harmonisation, with standardisation pursuing these goals at the global level. In this context, it is important to distinguish interoperability from standardisation: the EPSF considers that only the standardisation necessary for interoperability should be subject to regulation, while in other cases, market dynamics, potentially supported by standardisation, are sufficient.

At the European level, Regulation (EU) 1025/2012 on European standardisation governs cooperation between European and national standardisation bodies, Member States and the Commission. It establishes the framework for developing standards, with the Commission defining requirements and deadlines through its mandates. As such, like regulation, standardisation contributes to achieving the EU's political objectives.

In practice, the body of rules increasingly refers to numerous standards or technical documents, which may be assigned one of three possible statuses depending on the requirement in question:

- reference for informational purposes only, without mandatory effect: the cited standard is voluntary and does not confer a presumption of regulatory compliance.
- conferring a presumption of compliance: the cited standard is voluntary, and alternative solutions may be proposed; however, applying the provisions of the document is presumed to meet the regulatory requirement. This is the case, for example, with acceptable French and European means of compliance (MAC, AMOC).
- making a standard, or part of a standard, mandatory: this status legally establishes the obligation to comply with the provisions of the standard and excludes alternative solutions.

8 Interoperability

The use of standards in regulation is not without drawbacks, particularly when it comes to aligning developments across the two types of reference frameworks. This complexity requires the establishment of a process to ensure that references to standards are consistent with regulatory objectives. The process should also take into account the impacts on project sponsors in the industrial sector.

« The EPSF maintains that regulations should define only the essential requirements. This pragmatic approach ensures that the desired objectives are met. »

Whenever possible, the technical solutions used to meet these requirements should draw on domain expertise, as reflected in a standard or technical document. Such documents can, for example, address aspects of authorisation or safety demonstration, and applying them provides a presumption of compliance with the requirement. This practical approach not only ensures that the objectives are met but also gives the railway sector the flexibility to adopt technical solutions from research and development, which is particularly valuable during this period of rapid change and digitalisation. This approach is integrated into the organization's standardisation strategy, in line with its 2023–2025 objectives and performance contract, which sets the goal of actively participating in the development of three standards in innovative areas.

9 Interoperability

ERTMS

Supporting deployment to promote interoperability through a stable version

The ERTMS (European Rail Traffic Management System) is a major project led by the European Union and the European railway industry, aimed at developing a single system for signalling, speed control, telecommunications and rail traffic management across Europe, as well as an intermediate level of train automation (Grade of Automation [GoA] 2).

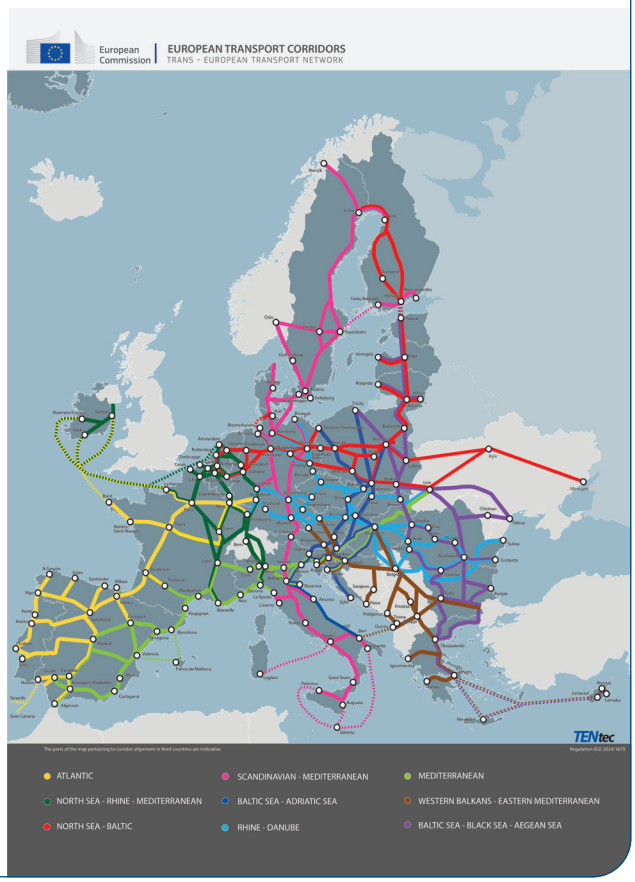
The deployment of the ERTMS originally meets the following objectives:

- reduce investment and maintenance costs for fixed installations;
- enable seamless traffic management across the EU without signalling system interruptions, through a single, harmonised system;
- maximize the capacity of the railway infrastructure;
- improve operational performance (e.g., increasing capacity and reducing travel times);
- enhance railway safety, depending on existing national systems.

This same system, which was designed, developed and safely integrated into both trains and trackside infrastructure in multiple countries, ultimately prevents the need to have multiple national train protection systems installed on board vehicles. It thus enhances the interoperability of rail operations across Europe and, in turn, improves access for railway companies to national markets that are opening to competition. As a standardised system, it also opens the market to manufacturers, which should help reduce equipment costs compared with equivalent national solutions.

The deployment of the GSM-R (Global System for Mobile Communications - Railway) component of the ERTMS in France was completed several years ago. However, its replacement is planned starting in the 2030s due to the obsolescence of certain GSM-R equipment and the performance gains offered by FRMCS (Future Railway Mobile Communication System), which relies on 5G-type radio technology.

European regulations (the [TEN-T] Trans-European Transport Network Regulation and the CCS [Control-Command and Signalling] TSI) provide for the gradual deployment of the ETCS (European Train Control System). The ETCS is intended to eventually replace national signalling systems (Class B systems) on the main lines of the interoperable European rail network. Once incorporated into European regulations, these deployment objectives become the responsibility of the Member States, which must ensure the development and implementation of deployment plans in collaboration with IMs.



Map provided by: European Commission

9 Interoperability

- However, the development, deployment and integration of the ETCS into the rail transport system involve onsiderable complexity and are progressing slowly for several reasons:
  - Frequent changes in the regulatory framework and specifications;
  - Costs for the trackside (for infrastructure managers [IM]s) and onboard (for railway undertakings [RUs] and vehicle owners) systems, particularly given the need to maintain Class B systems. For the trackside component, the balance between these significant costs and the benefits in terms of interoperability and increased capacity varies depending on whether the main network or regional/local lines are considered. It is therefore important to continue European-level work to develop solutions adapted to local requirements and less costly. This includes research and innovation activities by the Europe's Rail Joint Undertaking and the deployment of adapted ETCS versions on regional lines in certain countries;
  - In France, Class B systems (although decades old and relatively inflexible) still provide a good level of safety. However, most of these systems support lower capacity compared with the ERTMS.
  - The duality of the ETCS system, where only the synchronised deployment of ETCS subsystems (trackside, onboard and radio) enables the expected operational performance gains. Added to this is the complexity introduced by possible exemptions from regulatory requirements, which also tend to further delay the full and uniform deployment of the ERTMS.

« Given the elements above, it is vital to quickly stabilise a version of the ERTMS and ensure its efficient deployment by fully mobilising all available resources. »

Achieving a uniform deployment of the ETCS will first require ERA to assess technical differences. This assessment aims to minimise variations in regulatory implementation and equipment incompatibilities, which currently must be resolved through compatibility verification procedures.

- The deployment of ETCS Level 2, particularly versions incorporating radio-based train detection and train integrity monitoring, represents a significant technological advancement. It supports increased network capacity, enhances traffic safety and contributes to the reduction of infrastructure operation and maintenance costs.
- Since the Fourth Railway Package, the assignment of the system authority role for the ERTMS to the ERA (and its related responsibilities, including vehicle and infrastructure authorisations) supports the objective of achieving uniformity and coherence.
- Active during the development of regulatory requirement, EPSF then intervenes during their application as the authorising body for infrastructure and vehicles. The EPSF is responsible for verifying compliance with regulatory requirements throughout the approval process, as well as overseeing the application of flexibilities allowed under the European framework (e.g., the non-application of TSIs or the partial fulfilment of requirements).
- In response to difficulties expressed by new entrants regarding access to and integration of Class B systems, the creation of a "national authority as a single point of contact" to facilitate access to these systems was proposed in a study conducted by the French regulator (Autorité de régulation des transports [ART]) on onboard safety systems. As part of these works, assigning this role to the EPSF was also recommended by the ART. While the EPSF is open to the idea, this type of assignment would require a substantial evolution of its resources and competencies. However, to date, this possibility has not been implemented.

10 Interoperability

Local and regional railway lines
Balancing local needs with connection to the interoperable network

- Over more than 20 years, the development of harmonised technical rules to support interoperability, has been a major milestone in building a European rail network. These efforts also place a strong emphasis on greening transport in the context of climate change and the digitalisation of the sector.

- These developments facilitate international traffic, market access and therefore the increase of freight and passenger transport on the priority lines and corridors of the European rail network. Such progress is vital, and efforts to harmonise must continue as long as financial and human resources permit. These efforts should complement European regulations while gradually replacing the corresponding French rules. The use of exemptions from these European rules should be approached with caution and reserved for truly exceptional cases, as they can slow down progress toward harmonisation goals.

- Alongside or beyond these European-level initiatives, local transport and mobility needs also pose significant challenges that required customised solutions. In other words, to secure the future of the rail sector, the European-scale network, built to high interoperability standards, must be complemented by local lines that provide safe and attractive railway services for passengers and freight compared with other modes of transport, while also allowing a proportional adjustment of requirements and therefore costs for operators, their customers and organising authorities.

- In France, steps have already been taken to develop this approach in freight transport, including the introduction in 2017 of a tailored safety regime for local rail lines dedicated exclusively to freight operations. This applies not only to secondary lines but also to the rail networks serving major river ports and seaports, which are crucial links in multimodal transport chains. More generally, the 2021 French strategy for the development of rail freight included measures specifically adapted to these lines.

- For passenger transport, this complementary network must not only connect to stations on the main lines but also—to meet daily mobility needs—integrate with other modes of transport (buses, bicycles, tram-trains, and autonomous shuttles), some of which fall under the responsibility of the STRMTG. Therefore, the interconnection of local and regional railway lines (in French, *lignes de desserte fine du territoire*, or LDFT)». should not be considered only within the context of the rail system. Technical solutions can be hybrid, combining elements from the LDFT, the main network and urban transport networks to ensure both interoperability and intermodality.

- The 2020 assessment of the LDFTs, conducted by Prefect François Philizot** at the French government's request, identified, among other things, that standardised rules were not suited either to the characteristics of these lines and the intensity of their use, or to local realities. In order to address this finding, the EPSF has been actively supporting the DGITM and coordinating with the STRMTG (responsible for urban guided transport) to develop a dedicated safety regime for these LDFTs, tailored to their specific needs. In this process, which is designed to integrate competitiveness and interoperability objectives, railway stakeholders are extensively involved in expressing their expectations and proposals. This is achieved by:

  - broadly encouraging innovation and frugal solutions;
  - promoting risk-based approaches;
  - setting performance-based objectives that allow applicants to choose the solutions to meet them;
  - maintaining uncompromising safety levels (ensuring that a train protection system is in place without prescribing the exact technical solution).

- At the European level, it should be noted that the work program of the joint undertaking Europe's Rail includes a component focused on secondary and regional lines. In complement to initiatives at the French level, this European approach could enable pooling of efforts, knowledge and resulting industrial solutions.

*Decree No. 2017-439 – Decree of 30 March 2017 relating to the safety of rail operations on certain local lines carrying freight. ** Philizot report. "Devenir des lignes de desserte fine des territoires" (The future local and regional lines). February 2020

11 Interoperability

Cross-border traffic

Simplifying procedures and adapting requirements

- Within the commonly used term "cross-border traffic", two distinct types of operations coexist and should be clearly distinguished. First, there are cross-border journeys of varying lengths that cross multiple Member States (international and interoperable traffic). Second, there are operations largely confined to a single Member State, with only limited extension into a neighbouring country, typically referred to as a "border section".

- The Fourth Railway Package has achieved tangible progress in reducing obstacles to long-distance cross-border traffic, particularly by simplifying the authorisation process. This is reflected in the introduction of a single safety certificate issued by the ERA for companies operating in multiple Member States. The same principle applies to vehicles used in these operations, which are now subject to a single market authorisation issued by the ERA. Considerable strides have been made in the harmonisation of technical rules aiming to eliminate obstacles to interoperability. These efforts must continue with determination, while ensuring that safety is never compromised.

- For operations limited to the border section of a neighbouring Member State, the Fourth Railway Package has simplified the authorisation process. Under this framework, the NSA of the second Member State is involved only to provide an opinion to its counterpart, rather than taking full responsibility for the authorisation. These simplifications apply to infrastructures and operating modes that are considered "similar"—a concept that remains broadly open to interpretation. Clearly defining this notion at the European level would help ensure that the regulatory improvements can be fully realised.

- The concept of a border section allowing simplified authorisation processes already existed in France before the Fourth Railway Package. These simplified procedures have long been implemented by the EPSF in cooperation with its neighbouring NSA counterparts. Building on this momentum, and supported by cooperation in the field of supervision, the EPSF took the initiative to negotiate "border section" cooperation agreements with its counterparts, relying on the expertise of infrastructure managers to interpret the concept of similarity in a practical, pragmatic way.

« As subsystems and rules are gradually harmonised, the processes in these cooperation agreements should be further simplified, based on the equivalence of remaining national rules. »

- One area not covered by NSA cooperation agreements is language requirements, which can also impact interoperability on border sections. European regulations specifically aim to ensure that train drivers and the infrastructure manager's traffic management staff have a sufficient level of mutual understanding to maintain safety. The regulations require train drivers to have a B1 level in one of the languages specified by the infrastructure manager, based on the Common European Framework of Reference. While this requirement is not new, practical challenges can still create new interoperability barriers. For example, if an infrastructure manager decides to remove one of the two permitted languages on a border section, railway undertakings using drivers who do not speak the remaining language may face difficulties operating safely.

- A specific exemption for border sections allows the infrastructure manager to waive the B1 language requirement for train drivers, based on a risk analysis conducted by the railway company. While this flexibility is useful, it has two main limitations that hinder its implementation. First, it shifts some responsibility onto the infrastructure manager. Second, if the infrastructure manager rejects the exemption , they are under no obligation to provide a justification for their decision.

« European regulations allow the use of automatic translation tools to ease language requirements. With the rise of AI, this could be a particularly promising option. »

- It's important to treat border sections as a distinct case, separate from the language requirements for long-distance cross-border traffic. One approach could be to require infrastructure managers to support both official languages of the relevant Member States. Based on a risk analysis that considers the technical and operational characteristics of the border section, the use of predefined message lists to lower the required level of language proficiency should also be considered, without the need for an exemption from the infrastructure manager.

Summary of the EPSF's positions

1 Safety

Regulatory approach

Understanding and managing risks beyond regulatory compliance

- Following rules does not systematically ensure absolute safety.
- Operators and organisations are often faced with situations that fall outside the direct scope of regulations and must be prepared to address them appropriately.
- Rather than applying rules without fully understanding their foundations, organisations must develop the ability to identify, understand and assess risks.
- The training of an operator's personnel must place strong emphasis on the understanding and evaluation of risks, as well as on the underlying rationale for each rule, including its scope and, where relevant, its limitations.
- Throughout the authorisation process and in the course of its supervisory activities, the authority must assess the level of maturity demonstrated by operators in these areas, in particular by verifying their implementation through sampling methods. Effective coordination between authorisation and supervision activities is essential.
- The results of assessments related to these qualitative aspects must inform the overall evaluation of a company's performance.

2 Safety

Safety Management System (SMS)

Managing safety on a daily basis and across all areas

- The SMS must function as a practical management tool that supports decision-making at all levels. It should be led by top management.
- The SMS must be adapted to the company that designs and operates it. It must be grounded in the company's operational reality, clearly reflect work processes and be based on documents and company procedures.
- All of the operator's personnel should understand the general workings of the SMS and be familiar with the sections that apply to their role. The document should also explain how personnel and their representatives are involved, including how they can suggest improvements or changes to the SMS.
- When developing an SMS, companies must go beyond basic regulatory compliance and actively promote a culture of safety that takes human and organisational factors into account.

3 Safety

Safety culture

Committing to a just culture and promoting feedback

- A company's safety culture reflects how much importance it places on safety in all its decisions and judgements.
- Safety culture highlights the central role of humans and their judgement in safety management systems, and the importance of maintaining control in an environment shaped by rapid technological change.
- Developing a strong safety culture depends on visible day-to-day commitment from senior and line management, as well as active participation from all employees. It cannot be simply imposed.
- Establishing a just culture is an essential component of the safety culture and, when properly implemented, it enhances feedback by encouraging the reporting of weak signals and early warning signs.

4 Safety

Data

Drawing on the potential of data to optimise risk management

- The EPSF strongly promotes and supports the efforts and initiatives of stakeholders in the field of data science, which holds significant potential for improving safety.
- The overall effectiveness of systems that use large volumes of data depends on various factors, including data availability and quality, its processing and the absence of bias in the tools and processing methods used for safety demonstrations or decision-making support. Feedback on data results must also be considered.
- At the organisational level, data use must be integrated into operational processes, which first requires developing (new) necessary skills.
- Regardless of the tool or data processing system used by the organisation, it must allow experts to make well-informed decisions based on the processed data. The overall process must be controlled by humans.
- At the European level, it would be beneficial to test an open data approach, with a particular focus on optimising the use of existing European registers. This would enhance the ability of National Safety Authorities (NSAs) to access and use the shared data collected across the system.

5 Safety

New technologies

Anticipating and facilitating innovation

- Innovation is a key factor in addressing the many challenges faced by the railway system, including the improvement of safety.
- The EPSF's approach to fostering innovation is built around several key priorities, including:
  - Anticipating the emergence of new technologies and assessing their impact on the railway system;
  - Paying close attention to the emergence of new risks;
  - Supporting operators and stakeholders involved in the development of new technological solutions;
  - Promoting a comprehensive approach to safety;
  - Adapting its own operations accordingly;
  - Incorporating these elements into the development of the regulatory and standards framework.
- The regulatory and standards framework must facilitate the upstream development of innovations and support the downstream integration of innovative products, ensuring that no new interoperability obstacles are introduced, while also maintaining the highest safety standards. Within this context, careful consideration must be given to selecting the appropriate methods of intervention, whether through regulation or standardisation.

6 Safety

Roles and responsibilities

Managing the growing complexity and number of interfaces

- In today's increasingly complex railway landscape, where the number of interfaces is rising significantly, it is essential to prevent any safety breaches.
- Safety must be managed both vertically, within a company's hierarchy and its interactions with subcontractors, and horizontally, by engaging all other stakeholders and economic sectors involved in the railway industry.
- To guarantee that the sector maintains an effective level of risk control, the following areas must be strengthened or further developed:
  - Clear assignment of safety responsibilities to each stakeholder, within their defined scope of activity, along with effective collaboration across all parties involved to contribute to the overall safety of the system;
  - Management of subcontracting;
  - Clear definition and delegation of responsibilities;
  - Recognition of the concept of "critical size" necessary to perform railway activities;
  - Prevention of the misuse of safety certificates for financial, social, legal or contractual purposes;
  - Inclusion of interface considerations in risk analyses;
  - Safety culture as an essential component of railway culture;
  - Investment in the continuous development of skills by all stakeholders.

7 Safety

Safety at level crossings

Supporting France's national strategy through European cooperation

- A significant number of fatalities on French and European rail networks occur at level crossings.
- Safety at level crossings represents a critical interface between the railway system and road networks. This complexity makes it more difficult to allocate responsibilities for implementing safety measures and covering associated costs, and it can hinder effective cooperation between the railway and road systems. Moreover, societal and behavioural factors further complicate the issue.
- In France, the EPSF supports and contributes to the implementation of the national level crossing safety plan.
- The risk model for level crossings must be regularly reviewed using up-to-date information (recent assessments, more detailed consideration of the surrounding environment, increased traffic on existing lines, etc.).
- The EPSF promotes a European approach to level crossing safety, which aims to give the issue the attention it deserves and to work towards coordinated actions. This approach may also involve identifying regulatory requirements while considering the interoperability of safety measures.
- In seeking solutions, several key areas should be developed, such as:
  - Improving understanding of the problem, particularly user behaviour and attitudes towards rules and prohibitions;
  - Highlighting existing projects and fostering collaboration among stakeholders;
  - Leveraging new technologies to enhance safety.

8 Interoperability

Harmonising and simplifying the regulatory framework

Striking an appropriate balance between the technical standards framework and the overarching rules established by directives and regulations

- While regulations define essential requirements and ensure interoperability (especially through Technical Specifications for Interoperability, or TSIs), standardisation offers a more flexible and efficient way to address certain aspects related to authorisations and safety demonstrations.
- This pragmatic approach achieves the desired objectives for interoperability and safety. Given the significant changes that are taking place in the railway sector, including technological advances and digitalisation, this approach helps reduce the time between research and development and the implementation of technical solutions by the industry.
- As such, the EPSF has decided to develop a strategy focused on standardisation, with special emphasis placed on addressing challenges related to new technologies.

9 Interoperability

ERTMS

Supporting deployment to promote interoperability through a stable version

- The deployment and integration of the ERTMS, as required by European regulations to ensure interoperability, can provide significant benefits in terms of safety and increased line capacity, depending on the characteristics of existing national systems. However, these efforts are complex and slow to develop for several reasons, including:
  - Frequent changes in the regulatory framework;
  - High costs;
  - The need to coordinate with the phased decommissioning of existing Class B systems;
  - The dual nature of the ETCS system, which involves both trackside and onboard components.
- To address these challenges and fulfil the commitments made, as well as to realise the anticipated benefits, it is vital to quickly stabilise a version of the ERTMS and ensure its efficient deployment by fully mobilising all available resources.
- The deployment of ETCS Level 2, particularly versions incorporating radio-based train detection and train integrity monitoring, represents a significant technological advancement. It supports increased network capacity, enhances traffic safety and contributes to the reduction of infrastructure operation and maintenance costs.
- The EPSF is responsible for verifying compliance with regulatory requirements throughout the approval process, as well as overseeing the application of flexibilities allowed under the European framework (e.g. the non-application of TSIs or the partial fulfilment of requirements).

10 Interoperability

Local and regional railway lines

Balancing local needs with connection to the interoperable network

- Developing interoperability is crucial for achieving a Single European Railway Area.
- Derogations from European regulations should be approached with caution and reserved for truly exceptional cases, as they can slow down progress toward harmonisation goals.
- Alongside European interoperability initiatives, local transport and mobility needs also pose significant challenges that require customised solutions.
- The EPSF supports France's Directorate-General for Infrastructure, Transport and Mobility (DGITM), in collaboration with the Technical Service for Guided Transport (STRMTG), in establishing a safety framework specifically adapted to local and regional lines. This framework focuses on integrating competitiveness and interoperability goals. These local lines provide safe and attractive rail services while allowing operators, customers and transport authorities to adjust requirements and costs accordingly.
- A European-level approach to the solutions for regional and local lines (refer to the work carried out by the Europe's Rail Joint Undertaking), could enable pooling of efforts, knowledge and resulting industrial solutions.

11 Interoperability

Cross-border traffic

Simplifying procedures and adapting requirements

- Cross-border rail traffic confined to border regions should be managed through a distinct approach that clearly differentiates it from long-distance cross-border traffic, especially in terms of procedural simplification and language requirements.
- For border-area traffic, the concept of « similar » operating modes, which is open to broad interpretation, should be clarified at the European level to fully benefit from the regulatory progress. As technical and operational harmonisation moves forward, the processes in cooperation agreements between NSAs should be further simplified. This can be done by mutually recognising the remaining national rules.
- When it comes to language requirements for communication between railway companies and infrastructure managers, possible solutions might include allowing infrastructure managers to use both official languages of the Member States involved. Another option is to use, based on risk analysis, predefined message lists to lower language requirements without needing a special exemption from the infrastructure manager. With the rise of artificial intelligence (AI), machine translation tools also present a promising opportunity.

Acronyms

AI	Artificial Intelligence
AMOC	European Acceptable Means of Compliance
ANSSI	Agence nationale de la sécurité des systèmes d'information (National agency for the security of information systems)
ART	Autorité de régulation des transports (Rail Regulatory Body)
CCS	Control-Command and Signalling
CSM	Common Safety Methods
DAC	Digital Automatic Coupling
DGITM	Direction générale des infrastructures des transports et des mobilités (Department of the Ministry of Transport in charge of railway transport)
DGT	Direction générale du travail (Department of the Ministry of Labour)
ECM	Entities in Charge of Maintenance
EPSF	Établissement public de sécurité ferroviaire (France's National Safety Authority)
ERA	Agence de l'Union européenne pour les chemins de fer, également dénommée « Agence »
ERADIS	European Railway Agency Database of Interoperability and Safety
ERATV	European Register of Authorised Types of Vehicles
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
ETCS N3	ETCS level 3
EU	European Union
EVR	European Vehicle Register
FRMCS	Future Railway Mobile Communication System
GoA	Grade of Automation
GSM-R	Global System for Mobile Communications for Railway
HOF	Human and Organisational Factors
ILT	Innovative light train
IM	Infrastructure Manager
ISS	Information Sharing System
LC	Level Crossing
LDFT	Lignes de dessertes fines du territoire (Local and regional lines)
MAC	Moyen acceptable de conformité (Acceptable means of compliance)
NSA	National Safety Authority
NExTEO	Nouveau système d'exploitation des trains Est-Ouest
OSS	One Stop Shop (« Guichet unique » géré par l'Agence de l'Union européenne pour les chemins de fer)
PSN	Programme de sécurisation national (National programme for securing level crossings)
REx	Return on experience
RINF	Register of Infrastructure
RU	Railway undertaking
SGM	Safety Management System
STRMTG	Service technique des remontées mécaniques et des transports guidés (Service of the Ministry of Transport in charge of guided transport)
TEN-T	Trans-European Transport Network
TSI	Technical Specifications for Interoperability
VLR	Very light train

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sécurité ferroviaire

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