Interoperability Overview 2021

September 2021

EUROPEAN
UNION
AGENCY
FOR RAILWAYS

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Foreword

This overview is one of the visible results of the Agency's activities in monitoring the progress of safety and interoperability. It is also part of the Agency's effort to provide to its stakeholders a more regular overview of the development of railway interoperability and safety in the Single European Railway Area (SERA). This annual overview focuses on some aspects of the progress in interoperability, whereas a first overview for covering the progress in safety was published at the end of March 2021. A larger analysis is performed by the Agency on a biennial basis with the statutory Report on Safety and Interoperability.

This overview draws on data available in the databases and registers hosted by the Agency, complemented by an annual data survey among National Safety Authorities and by official data available from the European Commission. The EU-28 countries, Norway and Switzerland are considered as members of the SERA for the purpose of this report.

The interpretation of the figures is the sole responsibility of the reader, who may wish to refer to the 2020 statutory report for further guidance.

Annual overviews on Safety and Interoperability in SERA (2021): Interoperability

This annual overview confirms that, although interoperability of the Union railway system is improving, the progress has been slow so far and it appears to be unequal/uneven when looking at different areas.

As a consequence, railways have not increased their modal share in the past decade, despite being currently the most sustainable mode of transport. The modal share of rail transport in Europe is stagnating around quite low levels (7 % and 12 % for passenger and freight respectively), with the international rail traffic being significant only for freight (over 50% of the total traffic) and very limited for passenger services. This picture is far away from the EU climate policy ambitions and from the targets set in the 2011 Transport White Paper.

Greater use of rail is critical to satisfy the demand for more sustainable transport and would have substantial positive effects on pollution and energy consumption. In order to achieve the full potential of the Single European Railway Area, crossing internal EU borders should become a smoother process, enabling the increase of rail's modal share and international traffic; for this goal, the removal of interoperability barriers, the deployment of the ERTMS and the availability of appropriate rolling stock are key elements.

- *Rail modal share in Europe is still low (for both passengers and freight) and has increased very little in the last decade; while international rail traffic accounts for slightly more than 50% of total tonne kilometres by rail across Europe, international rail passenger traffic still represents a small percentage of the rail passenger kilometres in Europe.*
- *The degree of the implementation of single functions under TAP/TAF TSI by operators varies considerably among functions and it is progressing slowly.*
- *The deployment of ERTMS remains still quite low and patchy across Europe and needs to be enhanced/accelerated in order to comply with the European Deployment Plan and increase interoperability of the EU rail network.*
- *More than half of all vehicle authorisations across Europe are represented by first authorisations, with the majority (72 %) concerning wagons, followed by locomotives (11%). More than 30% of authorisations granted after upgrade or renewal reflects the preference of many rolling stock owners for updating existing rolling stock over their replacement.*
- *Records in ERADIS[1] indicate over 1600 safety certificates, 92 single safety certificates (of which 18 issued by the Agency) and more than 1100 licences valid on 31 December 2020 in SERA countries, with the majority related to freight services.*

Rail transport figures (passenger kilometres and tonne kilometres by rail and relative modal share)

In this overview, the modal share[2] of rail transport and the percentage of rail international traffic across Europe, are considered indirect measures of the impact of railway interoperability on actual transport performance. The modal split is calculated on the basis of transport performance (measured in passenger

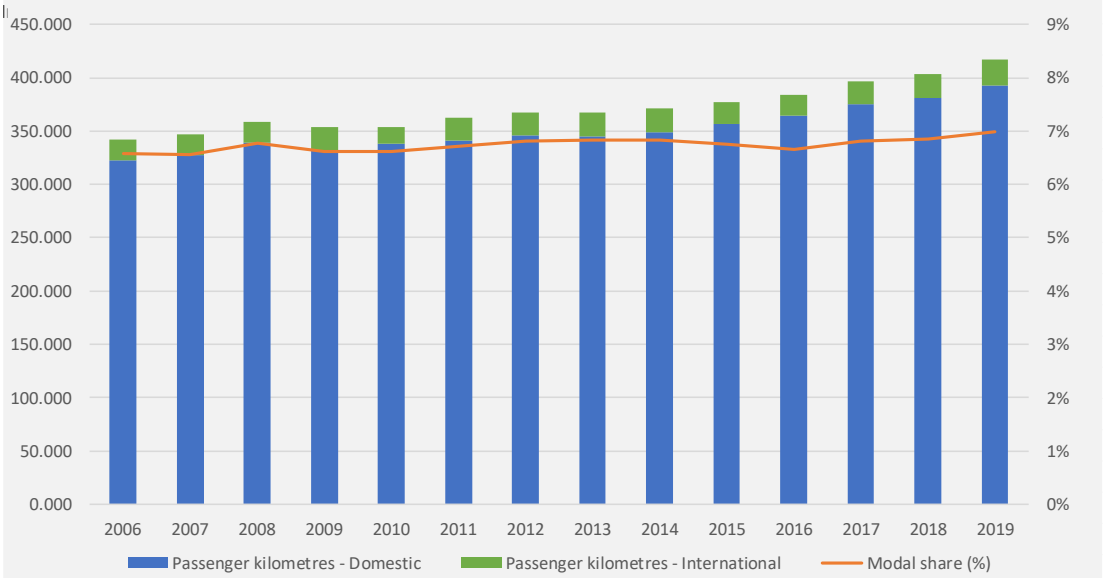
[1] European Railway Agency Database of Interoperability and Safety
[2] as reported in the 2021 Statistical Pocketbook (DG MOVE),

kilometres and tonne kilometres) of five transport modes: road, rail, inland waterways, air and maritime, and it is presented alongside absolute rail transport volumes (both domestic and international).

Figures 1 and 2 indicate that the European rail traffic has increased very little in the last decade; rail passenger volumes have slightly but constantly increased in the last years while freight volumes remained stable. The relative share of people and goods transported by railways, as compared to other modes, appears stagnant at rather low levels (i.e. around 7% and 12% respectively for passenger and freight). International rail traffic is significant only for freight (over 50% of the total traffic) while it appears to be quite limited for passenger services.

Figure 1 - Rail transport figures (passenger)

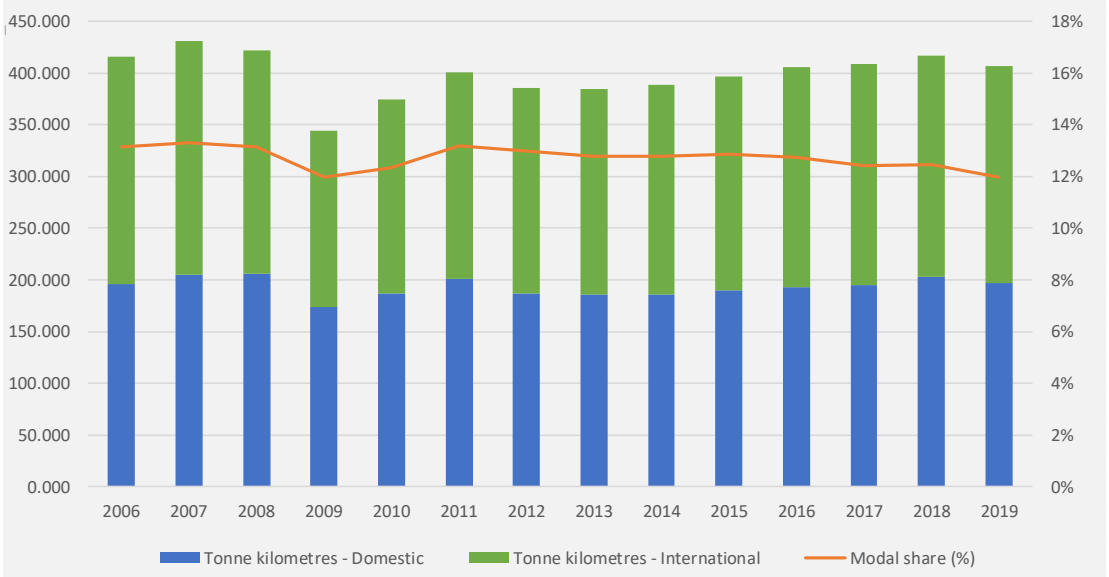
Passenger kilometres (billions) for domestic and international traffic and modal share (%) - EU-27



Source: Estimations based on Eurostat tables rail_pa_total, rail_pa_quartal, rail_pa_typepas, 2021 Statistical Pocketbook (DG MOVE)

Figure 2 - Rail transport figures (freight)

Tonne kilometres (billions) for domestic and international traffic and and modal share (%) - EU-27



Source: Estimations based on Eurostat tables rail_go_total, rail_go_typepas, 2021 Statistical Pocketbook (DG MOVE)

TAF - TAP TSI implementation

The Technical Specifications for Interoperability relating to Telematics applications for freight services (TAF TSI) set the functional and technical standards for exchanging harmonised information between infrastructure managers, railway undertakings and other wagon keepers.

The Technical Specifications for Interoperability relating to Telematics applications for passenger services (TAP TSI) were introduced to allow for the harmonisation/standardisation of procedures, data and messages to be exchanged between the computer systems of different railway companies and of the tickets vendors in order to provide reliable information and services to passengers and also to issue tickets for journeys across the European Union railway network. Furthermore, the data exchange between the railway undertakings and infrastructure managers is standardised.

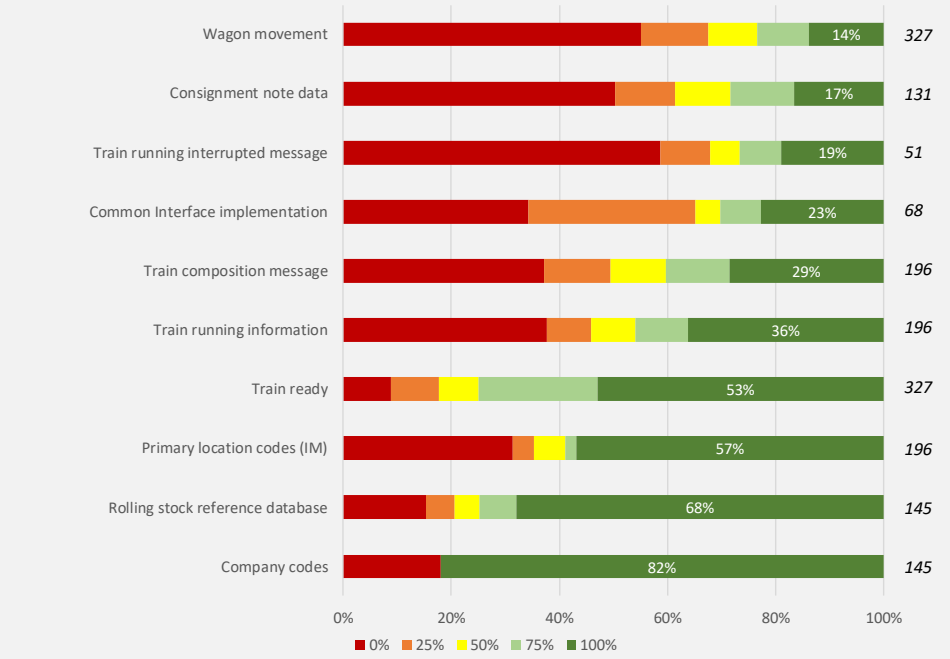
Following years of design and development, the implementation by the RUs and IMs is now underway. The railway operators have been gradually integrating TAF and TAP standards into their IT practices.

The indicator used to monitor the progress on the implementation of TAF – TAP TSI specific functions by the railway sector is the share of operators that have implemented a certain TAP/TAF function in their IT systems, weighted by the train kilometres performed on European scale. The target value for the indicator is to have 100% of the individual functions implemented as communicated in the Master Plan of the railway operators. A specific Joint Sector Group led by the Agency and involving the sector and the National Contact Points was set up for the purpose of collecting data on the TAF-TAP TSI implementation. The Implementation Cooperation Group deploys a dedicated tool which allows the RUs and IMs to report twice a year on the degree of implementation of specific TAF-TAP TSI functions. Data provided by the RUs and IMs have a good degree of reliability. While analysing the trends in the deployment of the functions, attention should be paid to the fact that the population of respondents may not be the identical across various reporting periods.

As reported in Figure 3 and 4, the degree of the implementation of TAP and TAF functions by operators varies considerably among functions and it is progressing very slowly; the average value for TAP functions is now above 50 %, while only two TAF functions (company codes and rolling stock reference database) have been fully implemented by more than 65 % of respondents.

Figure 3 - Degree of implementation of TAF functions

Status of implementation by end 2020



Source: TAF surveys to RUs, WKs and IMs by the Implementation reporting group by the TAF Joint Sector Group

Figure 4 - Degree of implementation of TAP functions

Status of implementation by end 2020

NRT= Non-Reservation-Integrated Tickets; IRT= Integrated Reservation Tickets; PRM=Persons of Reduced Mobility

Source: TAP surveys to RUs and IMs carried out by the Agency

Tracks equipped with train protection systems and lines with ETCS deployed

The installation of Train protection systems (TPSs) is the most effective railway safety measures to reduce the risk of collisions between trains. The deployment of these systems on the national railway networks and their use is monitored under the Common Safety Indicators (CSIs). Given the wide range of types and versions of train protection systems in the EU, a classification focusing on three levels of assistance provided to the train driver is considered a solid basis for reporting comparable statistical data. As noted in Fig. 6, a relevant share of tracks across the Member States is still not protected with TPSs.

While TPSs are non-interoperable legacy system with a variety of functions, reliability and accuracy depending on the time when they were installed, ERTMS[3] is the most advanced system and it is mandated to be installed across the entire Core/Comprehensive Networks[4] of the EU. ERTMS stands for 'European Railway Traffic Management System' and it is the European standard system for Automatic Train Protection (ATP) which ensures high levels of safety, interoperability, reliability and performance. Some Member States have decided to deploy ERTMS on their entire rail network thus going beyond the EU legal requirements. In fact, several TPS face obsolescence, low reliability, lower safety levels and low performance.

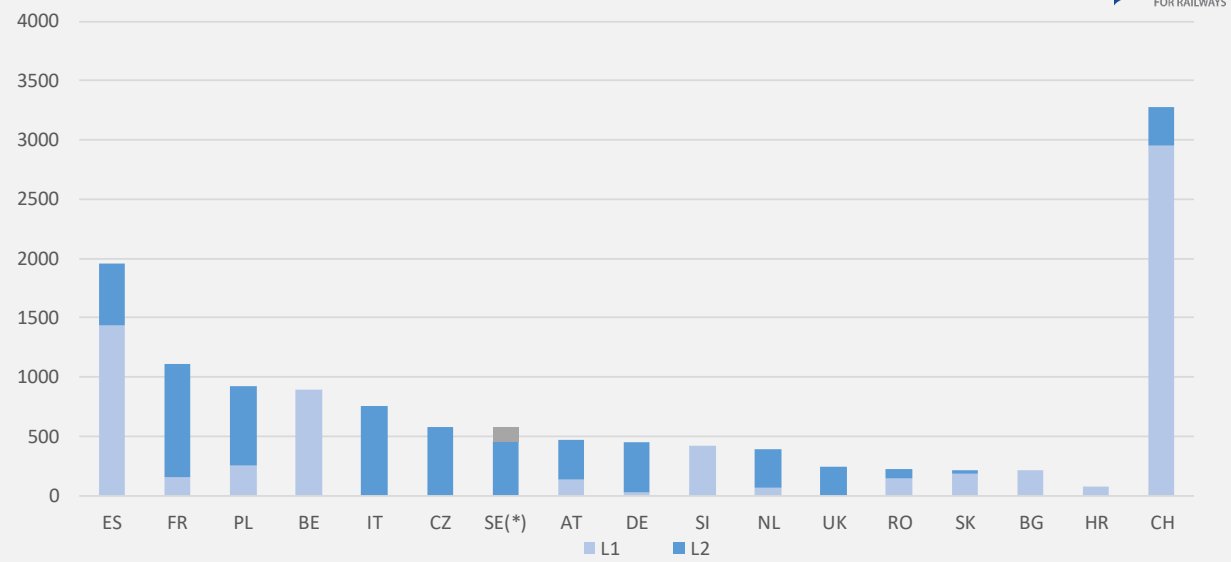
The effort in deploying ERTMS appears still not sufficient and needs to be increased to improve interoperability and safety of the EU network. Figure 5 and 6 show that the deployment of the European Train Control System (ETCS) has been limited so far whereas only a few SERA countries have deployed the system on a significant length of lines and/or a significant share of their network. The data refer to entire railway network of SERA countries as available in RINF and not only to Core Network lines and nodes. Regarding the TPS, instead, many countries did not report the share of tracks equipped with TPS (or reported a null value), whereas in some of them, advanced TPS, such as ETCS are in place. Among countries providing TPS data, the majority reported more than 50% of the main tracks with TPS that provide at least warning and automatic stop.

[3] ERTMS comprises of the European Train Control System (ETCS), i.e. a cab-signalling system that incorporates automatic train protection, the Global System for Mobile communications for Railways (GSM-R) and operating rules

[4] See Regulation (EU) n. 1315/2013 (as amended)

Figure 5 - Length of railway lines equipped with ETCS

Length in kilometres, mid September 2021

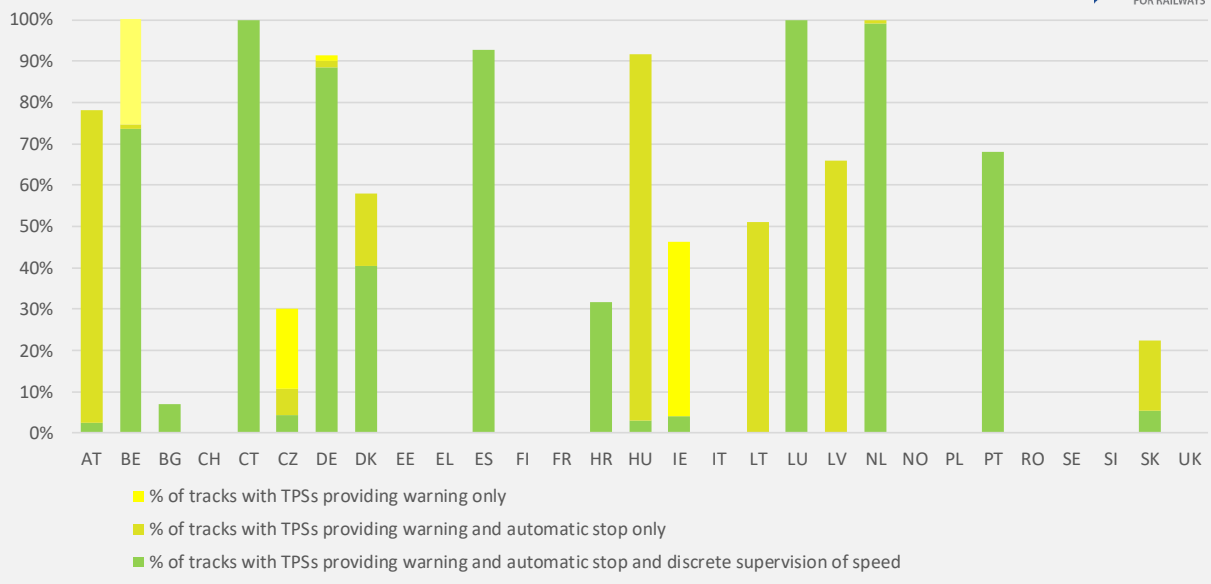


(*) Grey histogram for Sweden refer to an ERTMS Regional solution without a Train Integrity function implemented on low traffic lines: https://www.ertms.net/wp-content/uploads/2021/06/19.ERTMS-in-Sweden.pdf

Source: Register of Infrastructure (RINF), data extracted on 16th September 2021

Figure 6 - Tracks equipped with train protection systems (TPS)

Share of main tracks equipped (SERA countries, 2019)



Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the Agency, published in ERAIL

Vehicle authorisations

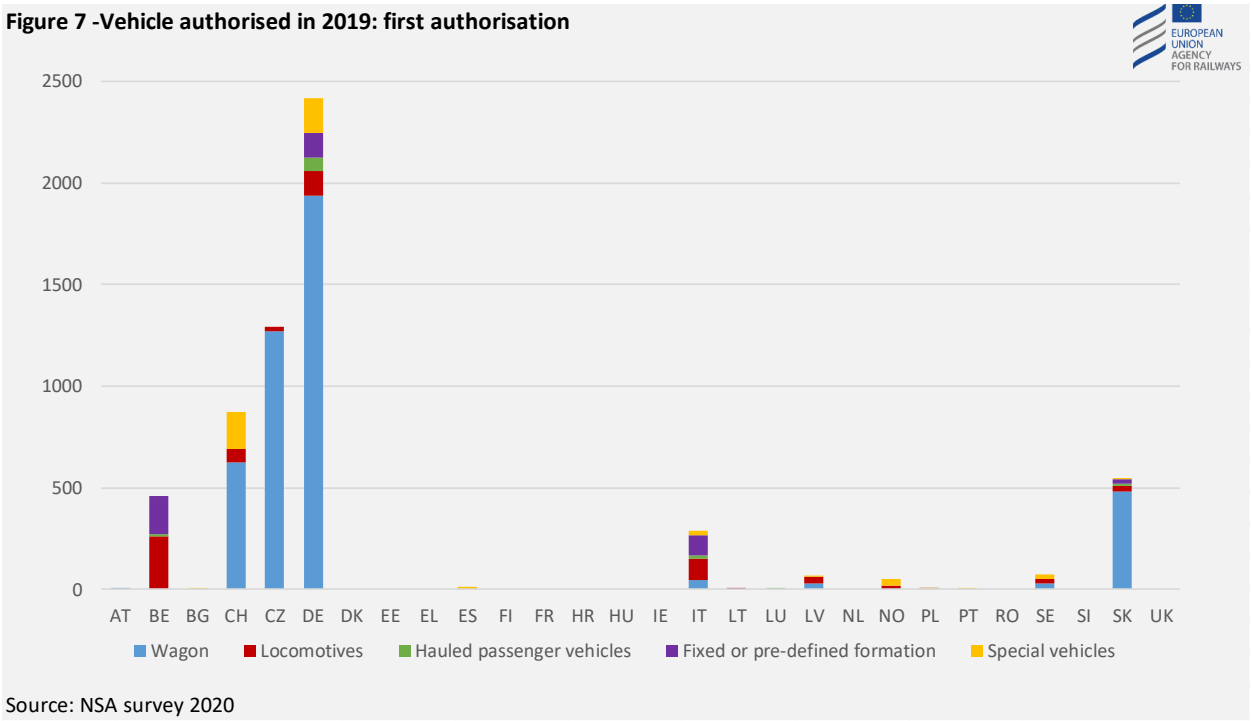
Before a new or modified railway vehicle is permitted to operate on the EU railway network it must be authorised. An authorisation is granted for a vehicle and/or vehicle type (vehicle type authorisation), or for individual vehicles that conform to an already authorised vehicle type (conformity to type). A vehicle and/or vehicle type authorisation is valid for a defined area of use, i.e. a network or networks within one or more Member States where the vehicle may be used. A further authorisation is required if changes are made to

the area of use (extension of the area of use) and may also be required if certain changes are made to an authorised vehicle and/or vehicle type (new authorisation). Authorisations are granted by NSAs and since mid-June 2019 also by the Agency. According to the Fourth Railway Package, the Agency is the sole issuer of vehicle authorisations for cross-border rolling stock while applicants can ask NSAs or the Agency for vehicle authorisations of rolling stock for domestic use.

The data used to produce Figure 7 and 8 comes from a survey among NSAs. This 2020 NSA Survey indicates that more than 6000 first authorisations were granted in 2019 by NSA in SERA countries. The majority (72 %) concerned wagons, followed by locomotives (11%); hauled passenger vehicles represented less than 2% of the total. First authorisations represent more than half of all authorisations. A relatively high number of authorisations granted after upgrade or renewal (over 2400 in 2019) reflects preferences of many RUs for continuous use of existing rolling stock over their replacement. Type authorisations and additional authorisations accounted respectively for 9% and 15% of total authorisations. Figure 7 shows also a quite great variability in the number of vehicle authorisations issued by NSAs across SERA countries which is not necessarily related to the size of the relevant national rail markets.

Regarding ERA, in 2020 the Agency issued more than 900 authorisations for more than 11000 vehicles. The large majority were conformity to type authorisations (more than 800); similarly to NSAs, the majority of authorisations were related to wagons (more than 600), followed by locomotives (around 250).

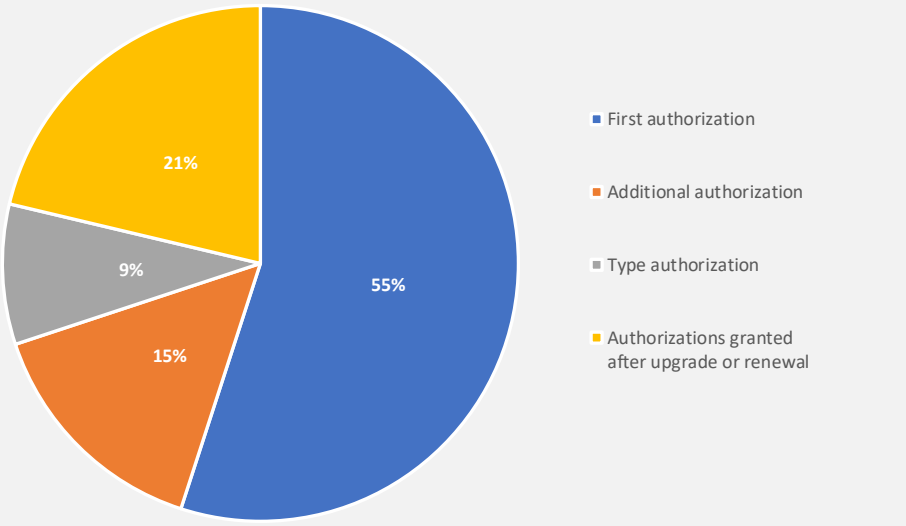
Figure 7 -Vehicle authorised in 2019: first authorisation



Source: NSA survey 2020

Figure 8 - Share of issued vehicle authorisation types

SERA countries, 2019



Source: NSA survey, 2020

Licences and Safety Certificates

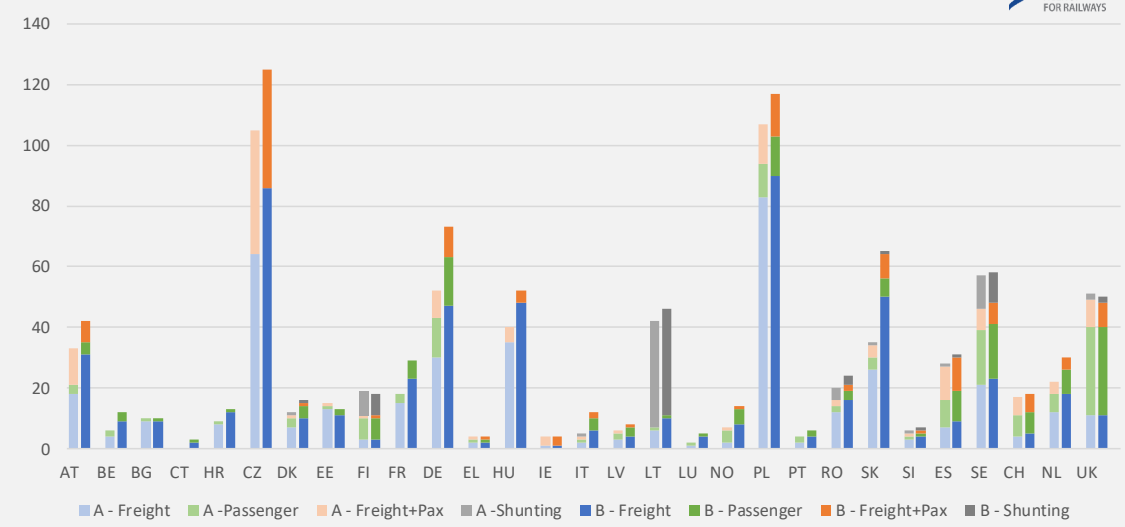
The Railway Safety Directive requires the railway undertakings (RUs) to hold a safety certificate to access the railway infrastructure. Historically, until the entry into force of the Fourth Railway Package, the safety certificate comprised a valid Part A safety certificate (certification confirming acceptance of the railway's undertaking safety management system) and at least one Part B safety certificate (certification confirming acceptance of the provisions adopted by the railway undertaking to meet specific requirements necessary for the safe supply of its services on a relevant network). A single safety certificate (SSC) is now gradually replacing the old scheme. Information on safety certificates and SSC are recorded in ERADIS; the same database contains also data on the licences for the performance of rail transport services within the Union and the European Economic Area according to Directive 2012/34/EU and the relevant national legislation.

As described in Figures 9, 10 and 11 over 1600 (more than 700 part A and around 900 part B) safety certificates valid on 31 December 2020 are recorded in the ERADIS database for SERA countries. Similarly, the database indicates 92 single safety certificates (of which 18 issued by the Agency) and more than 1100 licence documents[5] (for freight, passenger and freight/passenger services) valid on 31 December 2020 in the Single European Area. The majority of certificates and licenses are related to freight services, and the charts show a significant difference in the number of safety certificates and licenses across the SERA countries.

[5] Note: a railway undertaking even having a licence may not be operational

Figure 9 - Number of safety certificates valid at the end of 2020 by issuing country/agency

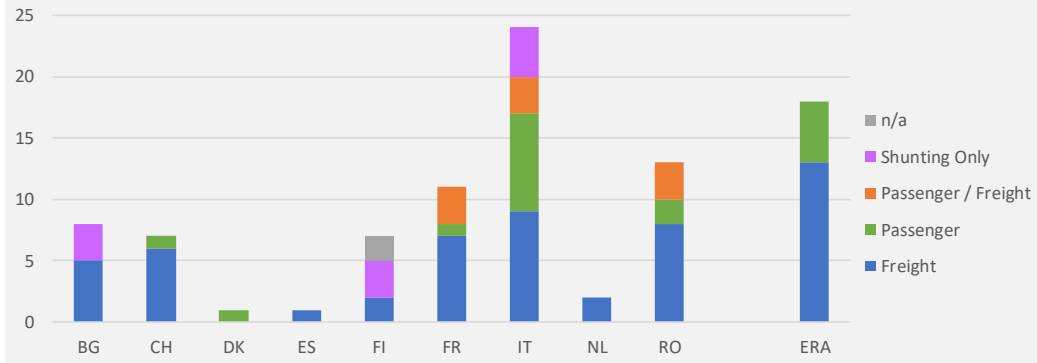
Part-A and part-B safety certificates valid on 31 December 2020, SERA countries



Source: ERADIS (data extracted in June 2021)

Figure 10 - Number of single safety safety certificates, valid at the end of 2020

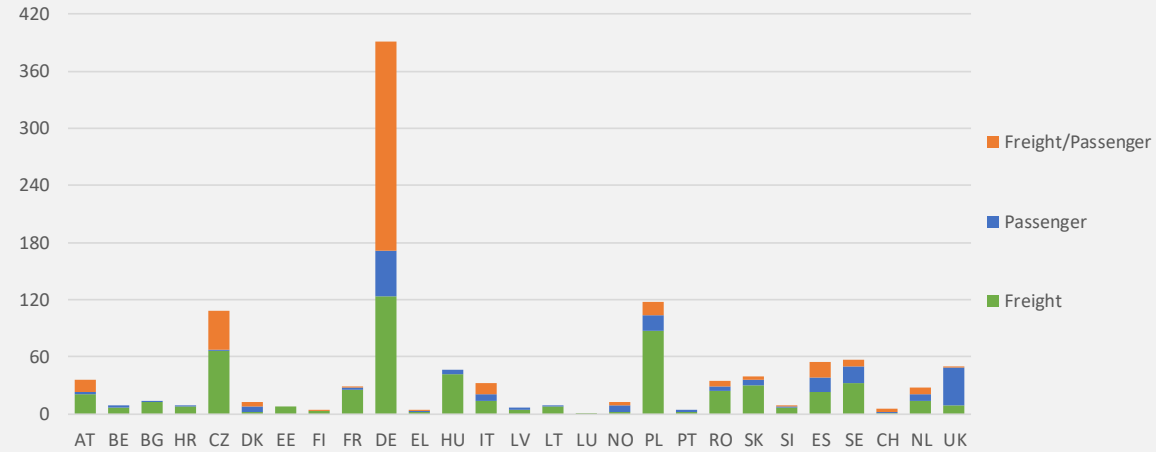
SERA countries, 2020



Source: ERADIS (data extracted in June 2021)

Figure 11 - Number of valid licence documents(*), active at the end of 2020 by country

SERA countries, documents valid on 31 December 2019, for passenger, freight and freigh/passenger services



(*) Note: a rail undertaking even having a licence may not operate

Source: ERADIS (data extracted in June 2021)

Concluding remarks

The data collected for 2019 and reported in the figures above confirm a slow progress for railway interoperability of the Union railway system. Despite some positive developments, rail in Europe is not yet achieving its full potential.

The deployment of the ETCS on the European rail network has been limited and uneven so far; similarly, the degree of the implementation of single functions under TAP/TAF TSI by rail operators varies considerably among functions and it is progressing slowly.

First authorisations represent more than half of all vehicle authorisations granted in the SERA, with the majority (72%) concerning wagons, followed by locomotives (11%). The relatively high number of authorisations granted after upgrade or renewal reflects the preference of many RUs rolling stock owners for updating existing rolling stock over their replacement.

Over 1600 safety certificates, 92 single safety certificates (of which 18 issued by the Agency) and more than 1100 licences valid on 31 December 2020 in SERA countries are recorded in ERADIS, with the majority related to freight services.

As a consequence of all the above, the European rail modal share remains low (both for passenger and freight) and international rail passenger services quite limited. These facts urge the Agency and the entire rail sector to continue to work relentlessly and tirelessly to improve railway interoperability in the Single European Railway Area and make the railways fit for future growth and competition with other transport modes.