Interoperability Overview 2023

July 2023

EUROPEAN
UNION
AGENCY
FOR RAILWAYS

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 2023. A larger analysis is performed by the Agency on a biennial basis with the statutory Report on Safety and Interoperability; the last biennial report was published in 2022 (and it is available on the Agency's website at this link), and the next edition will be published in 2024.

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-27 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 2022 statutory report for further guidance.

Additional statistics and insights (e.g. on rolling stock, infrastructure, etc.) from several sources in an accessible format per Member State are provided in the ERA Railway Factsheets on the Agency's website (at this link).

Annual overviews on Safety and Interoperability in SERA (2023): 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.

Possibly and partially linked to the above, although not exclusively, 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 (around 7 % and 13 % 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.

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.
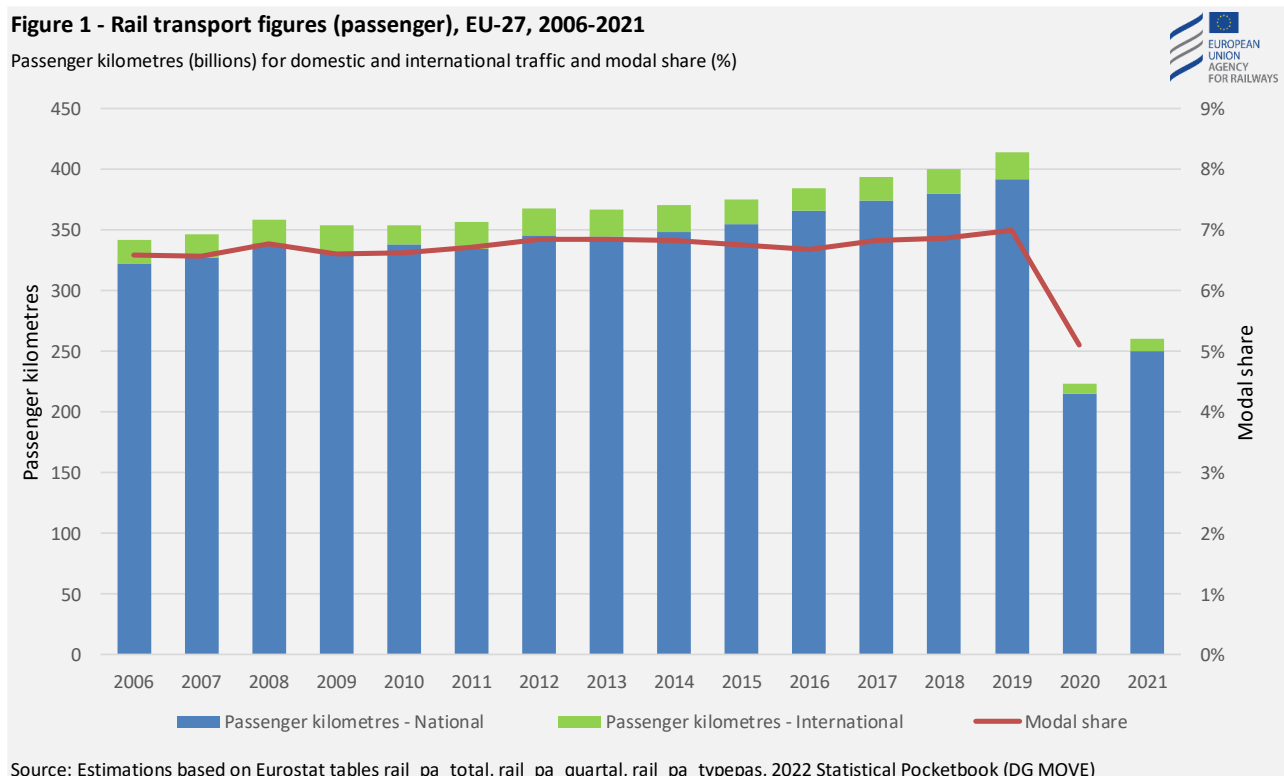
<u>Key findings:</u>

- *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.*
- *Existing national rules can still represent an obstacle to interoperability and effective cross border traffic.*
- *The number of vehicle authorisations and vehicles authorised by ERA show an increasing trend in recent years (either for area of use in one or more Members States). In 2022 around 72% of those authorisations (for almost 16 000 vehicles) concerned an area of use in multiple countries.*
- *Single safety certificates (SSCs) are now gradually replacing the old scheme (i.e. safety certificates part A and B). At the end of 2022, 12% of the total share of certificates were issued by ERA; the majority of the operations in the EU are domestic, while international operations are mostly related to freight.*

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

In this overview, the modal share[1] of rail transport and the percentage of rail international traffic across Europe are considered possible 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 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. on average around 7% and 13% 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.

Owing to the COVID-19 pandemic (and the related travel restrictions), in 2020 and 2021 the passenger-km in Europe (EU-27) recorded a significant decrease compared to 2019 (while clear signs of recovery are observable for the freight tonne-km in 2021).

Figure 1 - Rail transport figures (passenger), EU-27, 2006-2021

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

Source: Estimations based on Eurostat tables rail_pa_total, rail_pa_quartal, rail_pa_typepas, 2022 Statistical Pocketbook (DG MOVE)

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[1] as reported in the 2022 Statistical Pocketbook (DG MOVE)

Figure 2 - Rail transport figures (freight), EU-27, 2006-2021

Tonne kilometres (billions) for domestic and international traffic and modal share (%)
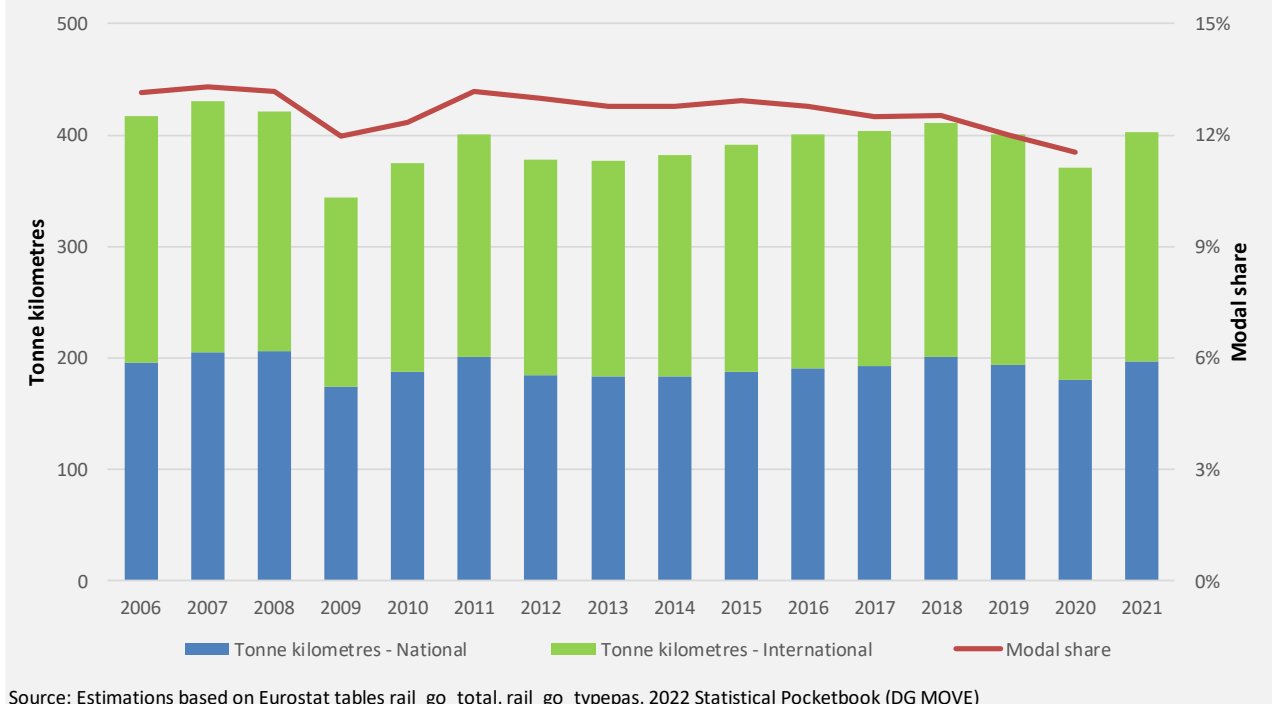
Source: Estimations based on Eurostat tables rail_go_total, rail_go_typepas, 2022 Statistical Pocketbook (DG MOVE)

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 identical across various reporting periods.

As reported in Figure 3 and 4, the degree of the implementation of TAF and TAP[2] functions by operators varies considerably among functions and it is progressing very slowly.

The average value for TAP functions was above 50 % by end 2021, with six functions still implemented in less than 50 % of the market; the highest degree of implementation was for timetable data provision (61 %).

Only two TAF functions (company codes and rolling stock reference database) have been fully implemented by more than 75 % of respondents (at end of 2022), while another two functions are above 60%; all other TAF functions are implemented in less than 50 % of the market.

Figure 3 - Degree of implementation of TAF functions

Status of implementation by end 2022
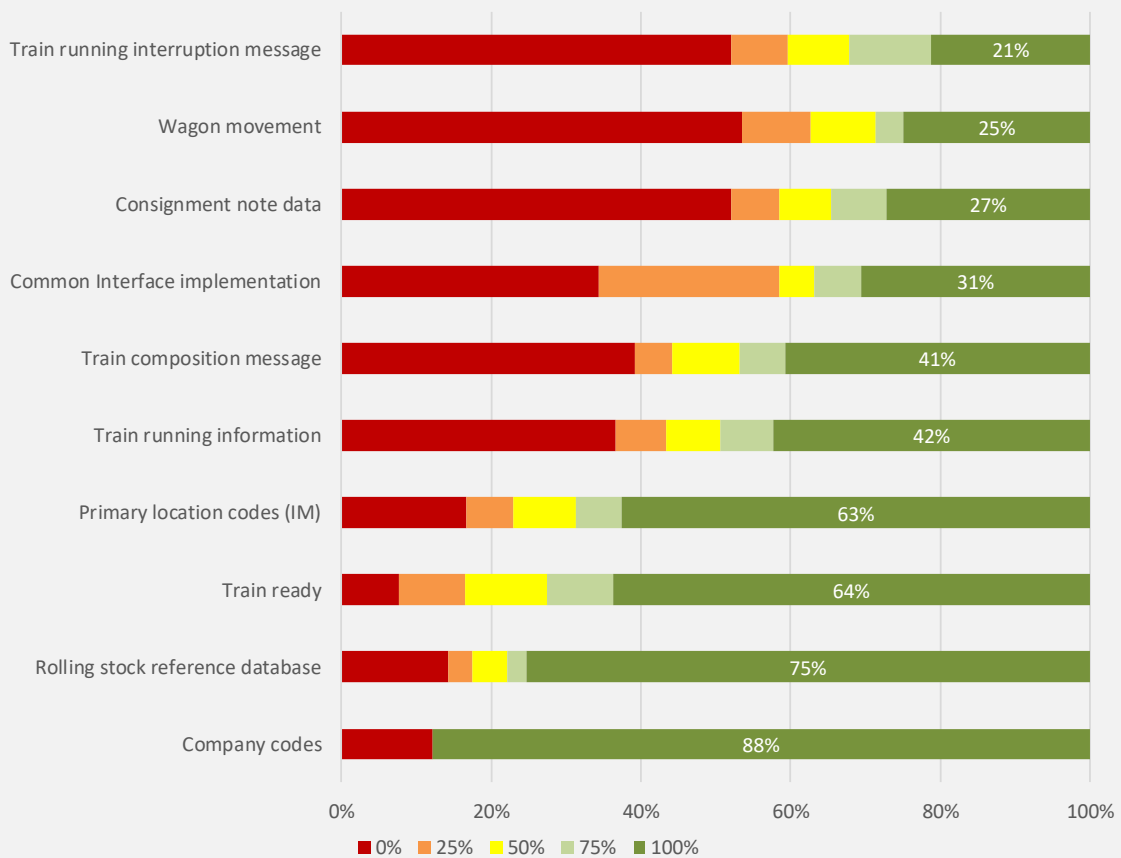
Source: TAF surveys to RUs, WKs and IMs by the Implementation reporting group by the TAF Joint Sector Group

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[2] Figure 4 reports the status of implementation for TAP at end 2021, while for TAF (Figure 3) data on implementation at end of 2022 are already available.

Figure 4 - Degree of implementation of TAP functions

Status of implementation by end 2021

Function	TAP TSI compliant standards	Other standard	Unknown
Setup of the Data quality tool	100%		0%
Setup of the TAP TSI registry	100%		0%
Setup of the Retail reference database	100%		0%
Setup of the TAP TSI governance body	100%		0%
Exchange of timetable data	61%	10%	
Exchange of special tariffs/fares	22%	1%	
Exchange of IRT tariffs/fares	40%	4%	
Exchange of NRT tariffs/fares	55%	3%	
Answering PRM assistance reservation requests via IT	59%	13%	
Sending PRM assistance reservation requests via IT	51%	0%	
Accepting home printed tickets for international and foreign sales	28%	21%	
Issuing home printed tickets for international and foreign sales	31%	5%	
Accepting value paper tickets for international and foreign sales*			
Issuing value paper tickets for international and foreign sales	55%	5%	
Answering reservation requests for car carriage	56%	7%	
Sending reservation requests for car carriage	27%	1%	
Answering reservation requests for bicycle carriage	56%	8%	
Sending reservation requests for bicycle carriage	39%	4%	
Sending reservation requests	58%	5%	
Answering reservation requests	56%	8%	

■ TAP TSI compliant standards   ■ Other standard   ■ Unknown

*The basic parameter was not included in the questionnaire and no implementation progress can be reported

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 ERTMS[3] is intended to replace legacy Train Protection Systems and is designed to replace the many incompatible safety systems currently used by European railways. It will allow an interoperable railway network in Europe, while providing additional benefits in terms of increased operational efficiency, capacity and safety. Although ideally all core/comprehensive networks[4] in the EU would be equipped with the system, emphasis has been put on nine CNCs, with a view to maximising the return on investment. The long-term
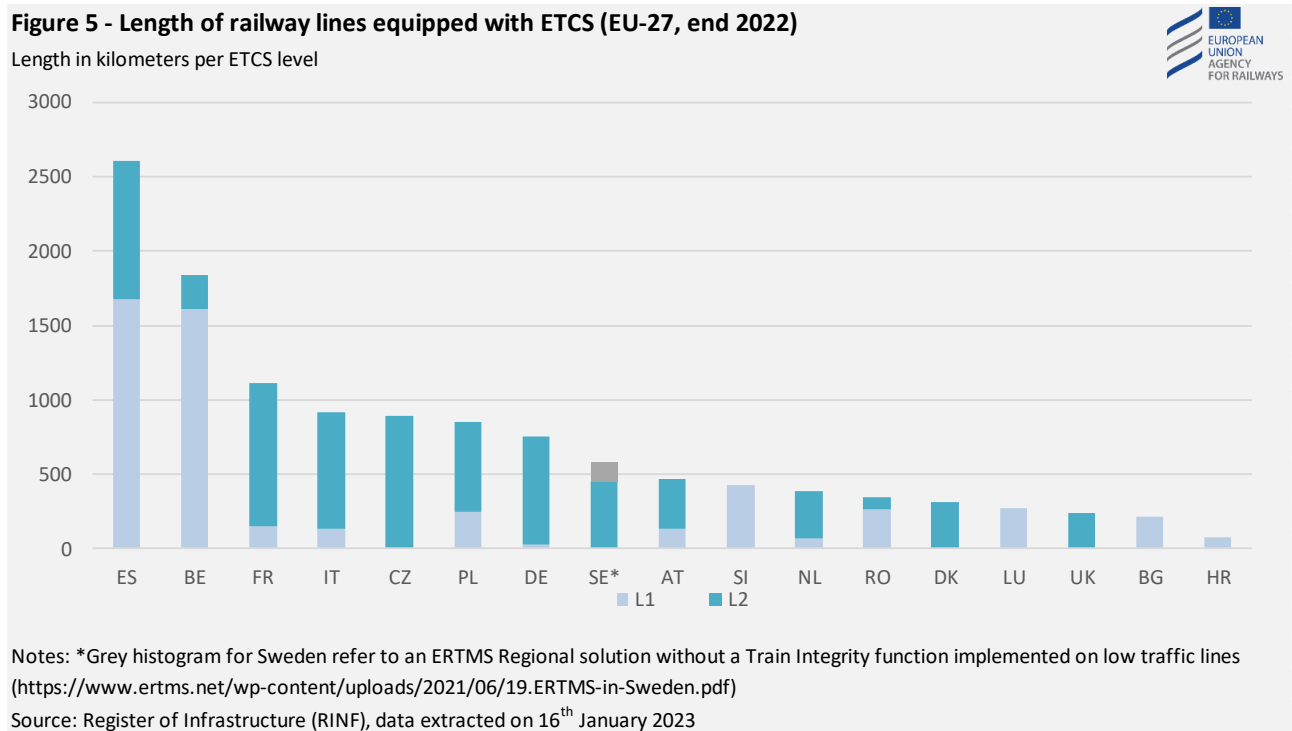
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[3] ERTMS comprises of the European Train Control System (ETCS), i.e. a cab-signalling system that incorporates automatic train protection, the Global System for Mobile communications for Railways (GSM-R) and operating rules

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

target adopted by the European Commission is to have the whole core trans-European transport network equipped with the ERTMS by 2030 and the whole comprehensive network equipped by 2050.

The deployment of the ETCS on the EU railway network has been slow so far. Figure 5 shows that the deployment of the European Train Control System (ETCS) has been limited 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 the entire railway network of SERA countries as available in RINF. Deployment varies considerably among the Member States, reflecting national rail transport policy and investment priorities. According to the records in the RINF, the leading implementers (in terms of kilometres of all lines equipped with the ETCS) are Spain, Belgium and France.
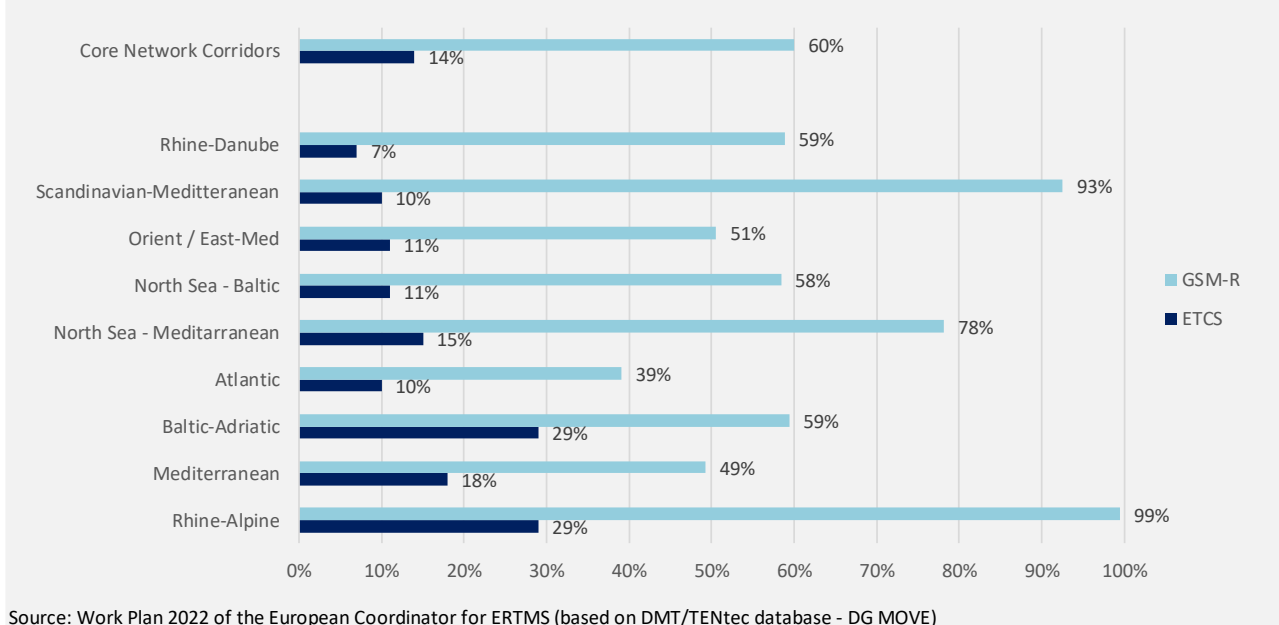
ERTMS deployment on the CNC network had reached 14 % (ETCS) and 60 % (GSM-R) at the end of June 2022[5]; a substantially greater effort is needed to meet the European deployment plan targets. Progress has been uneven among individual corridors; ETCS is operational on around 29 % of the Rhine–Alpine and the Baltic–Adriatic corridors, compared with 7–18 % on other corridors.

Figure 5 - Length of railway lines equipped with ETCS (EU-27, end 2022)

Length in kilometers per ETCS level

Notes: *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 January 2023

5 Second Work Plan (2022) of the European Coordinator for ERTMS

Figure 6 - Deployment of ERTMS on Core Network Corridors (end June 2022)
ETCS and GSM-R equipped lines among core network corridor lines

Core Network Corridors — ETCS 14%, GSM-R 60%
Rhine-Danube — ETCS 7%, GSM-R 59%
Scandinavian-Meditteranean — ETCS 10%, GSM-R 93%
Orient / East-Med — ETCS 11%, GSM-R 51%
North Sea - Baltic — ETCS 11%, GSM-R 58%
North Sea - Meditarranean — ETCS 15%, GSM-R 78%
Atlantic — ETCS 10%, GSM-R 39%
Baltic-Adriatic — ETCS 29%, GSM-R 59%
Mediterranean — ETCS 18%, GSM-R 49%
Rhine-Alpine — ETCS 29%, GSM-R 99%

Legend: GSM-R, ETCS

Source: Work Plan 2022 of the European Coordinator for ERTMS (based on DMT/TENtec database - DG MOVE)

Applicable national technical rules for vehicles authorisations[6]

Existing national rules can represent an obstacle to interoperability and effective cross border traffic. They can also be technical barriers to the vehicle authorisation process because vehicles have to be compliant with these rules. This is especially the case when the national rules are not notified and assessed against the harmonised TSIs and other applicable EU legal frameworks.

Member States have to notify the European Commission of the national rules and ERA has to assess the national rules. The existence and use of rules that are not notified leads to unnecessary uncertainty and costs, and can affect interoperability. The process of 'cleaning up' rules is ongoing. The remaining national technical rules should cover only open points in TSIs, aspects of vehicle compatibility with the network (e.g. class B signalling systems) and other limited cases as set out in Directive (EU) 2016/797.

The cleaning-up process ensures that only the relevant rules are published in the publicly accessible Reference Document Database and gradually transferred to the Single Rules Database.

At the level of the EU-27, Norway and Switzerland, the total number of national rules for vehicle authorisation (in addition to the latest TSIs in force) dropped from about 13 450 in January 2016 to 854 in May 2023, with some differences among the countries. Although there has been an impressive decrease in the number of published rules in the past 6 years, this trend has flattened since 2019, as potentially removable rules are becoming scarce. After cleaning up, a further reduction in the number of national rules is expected with the

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[6] *'national rules' means all binding rules adopted in a Member State, irrespective of the body issuing them, which contain railway safety or technical requirements, other than those laid down by Union or international rules which are applicable within that Member State to railway undertakings, infrastructure managers or third parties* (Article 2 (30) of the Interoperability Directive EU 2016/797). Other existing national rules relate to safety (and operations) or to fixed installations.

entry in force of the TSI revision package 2023; Member States must revise their existing national rules and repeal redundant/contradictory ones.

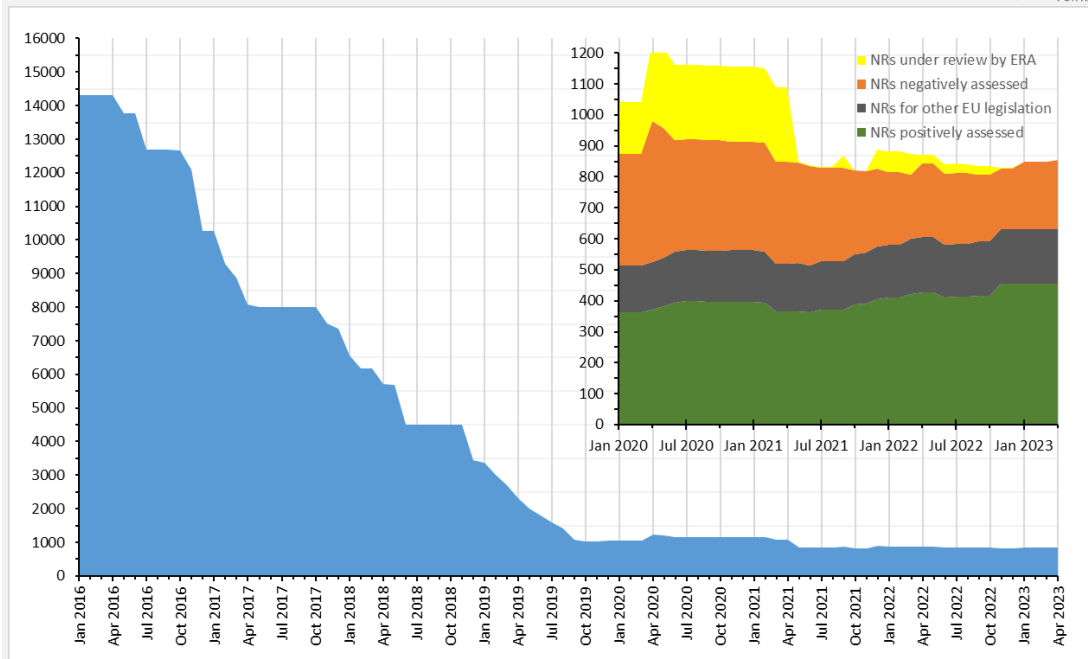**Figure 7 - National rules for vehicle authorisation in addition to latest TSIs**

Status May 2023, EU-27+CH+NO
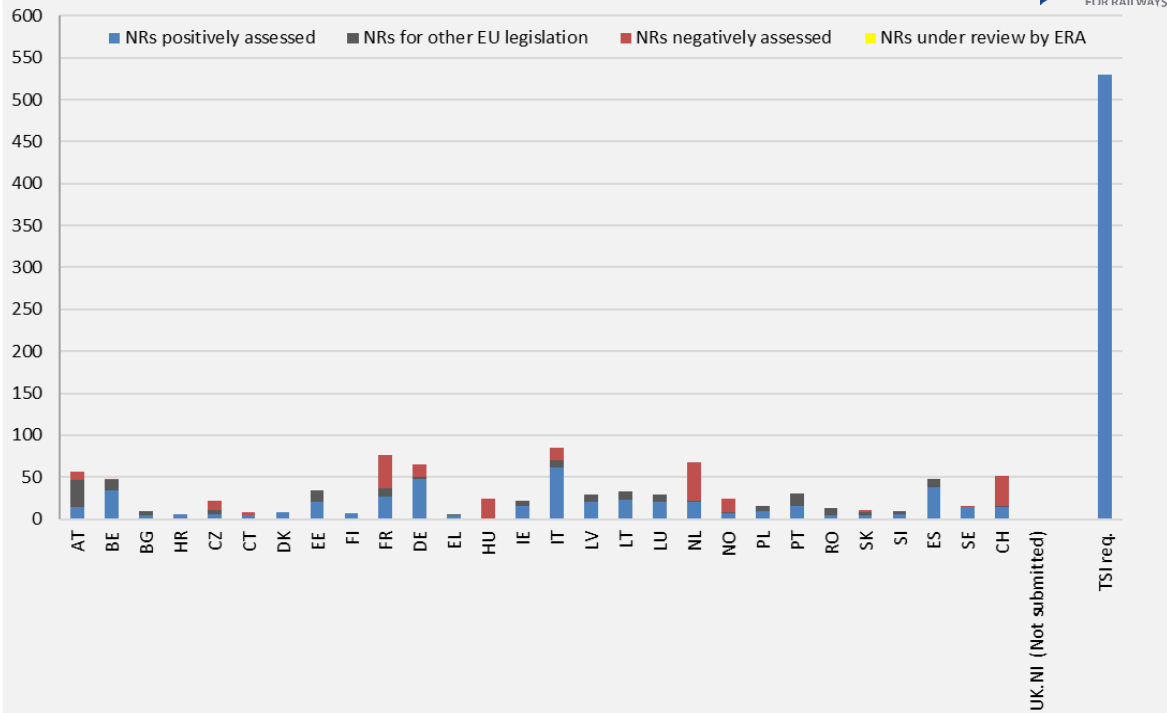
Source: Reference document database (RDD) maintained by the Agency

Figure 8 - National rules for vehicle authorisation

Rules notified, EU27+CH+NO+UK*, Jan 2016 - Apr 2023

Notes: *NRs from UK are considered until 2021

Source: Reference document database (RDD) maintained by the Agency

Vehicle authorisations

Before a new or modified railway vehicle is permitted to operate on the EU railway network, it must be authorised. A vehicle and/or vehicle type authorisation is valid for a defined area of use, that is a network or networks within one or more Member States where the vehicle may be used. Further authorisation is required if changes are made to the area of use (e.g. extension of the area of use). According to the interoperability directive, when the area of use is limited to a network or networks within one Member State, the applicant is able to choose whether it submits its application for vehicle authorisation to the NSA of that Member State or to ERA. However, in the case of vehicles intended for use in more than one Member State, the authorisation must be issued by ERA. The number of vehicle authorisations handled by the Agency with area of use in multiple countries may provide an indication of the vehicles authorised for international use across Europe.

Figures 9 and 10 provide the number of vehicle authorisations and vehicles authorised by ERA per area of use and type of vehicle. Around 1 800 vehicle authorisations were submitted and handled by ERA in 2022, with more than 18 000 vehicles authorised. The number of authorisations of all types (e.g. conformity to type, first authorisation, renewal and extension of area of use) shows an increasing trend in recent years (which can also be attributed to the progress in the transposition of the fourth railway package). The percentage of vehicle authorisations handled by ERA for area of use in one Member State increased from around 9% in 2019 to 28% in 2022. The majority of authorisations in 2022 were related to wagons, followed by locomotives and train sets, while around 72% of authorisations (for almost 16 000 vehicles) concerned an area of use in multiple countries (with almost all of the wagons authorised for the use in more than one Member State).

Figure 11, instead, reports the total number of type approvals recorded in ERATV in the last ten years (data for 2023 are only partial); since 2019 (i.e. with the fourth railway package) the number of type approvals recorded in ERATV registered a significant increase (from around 600 in 2018 to more than 3000).
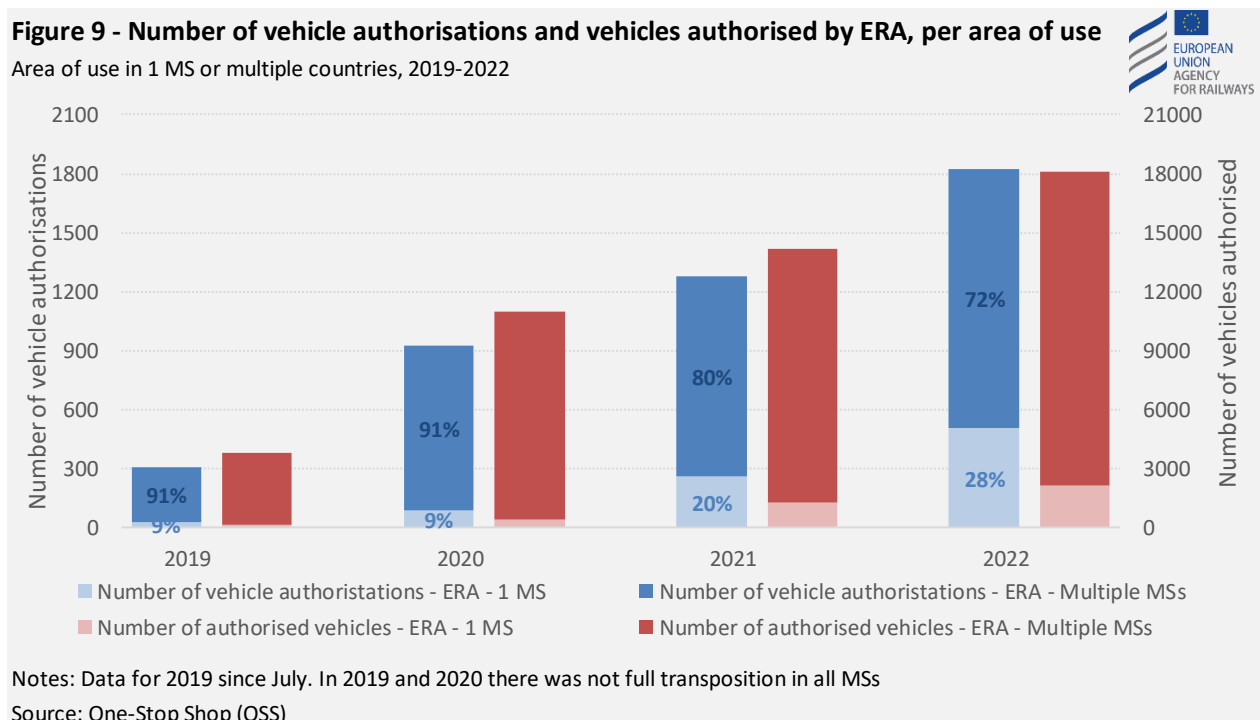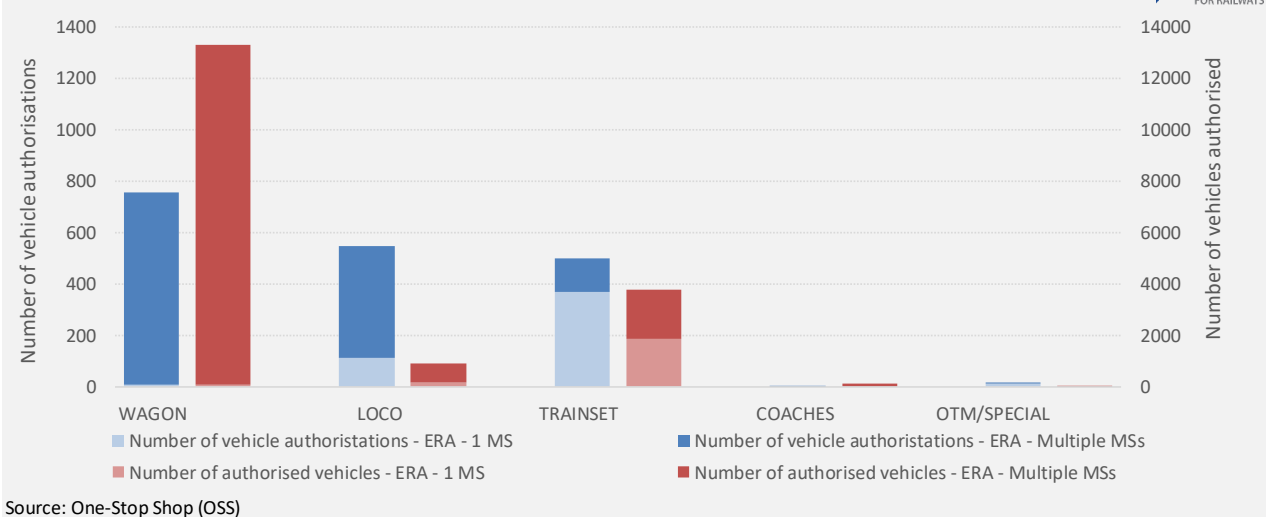

Figure 9 - Number of vehicle authorisations and vehicles authorised by ERA, per area of use
Area of use in 1 MS or multiple countries, 2019-2022

Legend:
- Number of vehicle authorisations - ERA - 1 MS
- Number of vehicle authorisations - ERA - Multiple MSs
- Number of authorised vehicles - ERA - 1 MS
- Number of authorised vehicles - ERA - Multiple MSs

Notes: Data for 2019 since July. In 2019 and 2020 there was not full transposition in all MSs
Source: One-Stop Shop (OSS)

Figure 10 - Number of vehicle authorisations and vehicles authorised by ERA, per area of use and type of vehicle

Area of use in 1 MS or multiple countries, 2022

Number of vehicle authorisations - ERA - 1 MS
Number of vehicle authorisations - ERA - Multiple MSs
Number of authorised vehicles - ERA - 1 MS
Number of authorised vehicles - ERA - Multiple MSs

Source: One-Stop Shop (OSS)

Figure 11 - Number of type authorisations recorded in ERATV

Total number of type authorisations recoreded (cumulative per year)
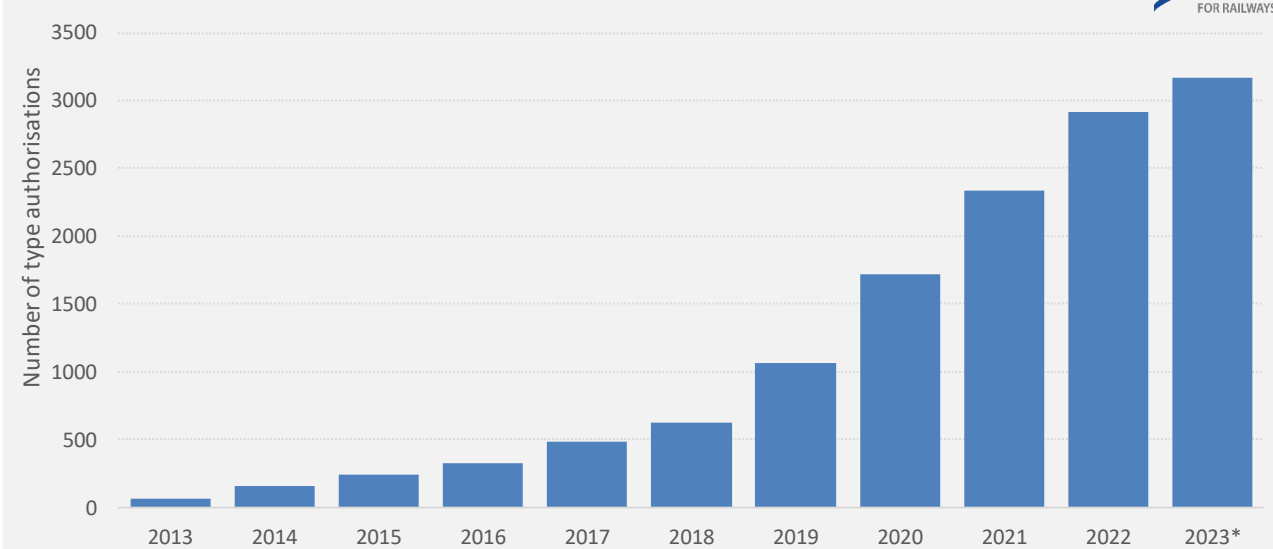
(*) data extracted in June 2023

Source: ERATV (ERA)

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.

The number of RUs holding valid part B safety certificates in more than one Member State and the number of SSCs with a multi-country area of operation may provide an indication of international rail services across Europe.

Figures 12 and 13 indicate the number of RUs per Member State (EU27+NO) holding a part B safety certificate or a SSC with area of operation only in that country or in more Member States (including that country), and valid at the end of 2021 and at the end of 2022. The figures show the general decrease (between the two considered years) of RUs holding part B SCs, gradually replaced by the SSCs (which increase in number).

Figure 14, instead, shows the number of SCs part B and SSCs issued by NSAs or ERA (valid at the end of 2022), per area of operation. SCs part B and part A for the same RU (operating in more MSs) are counted only once. 12% of the total share of certificates are managed by ERA which could rise up at least to 18% after the end of the transition period of the fourth railway package (i.e. when all part B SCs will be replaced by SSCs).

Domestic operations represent most of the operations in the EU (87% share) with safety certificates that are mostly issued by NSAs and for which half of companies have already migrated to a SSC (and so to the new regulatory framework). As evident also from Figure 15, (focusing only on the SSCs issued by ERA per type and area of operations), international operations are mostly freight operations.

It should be noted that, granting a (single) safety certificate for an area of operation composed of 1 MS does not mean that the railway undertaking exclusively operates at national level. Many sister companies with their own (single) safety certificates still exist and manage their operations through partnership agreements or contractual relationships with other railway undertakings either when crossing the State border or when operating to border stations. In addition, operations to border stations in neighbouring Member States are not counted as international operations.
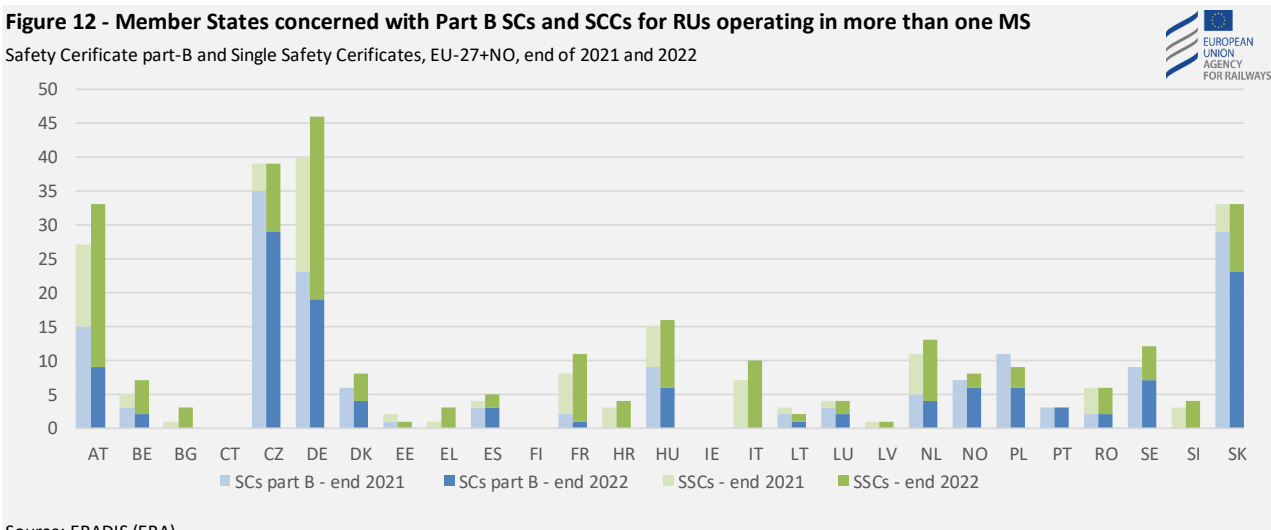

Figure 12 - Member States concerned with Part B SCs and SCCs for RUs operating in more than one MS
Safety Cerificate part-B and Single Safety Cerificates, EU-27+NO, end of 2021 and 2022

Source: ERADIS (ERA)

Figure 13 - Member States concerned with Part B SCs and SCCs for RUs operating in one MS
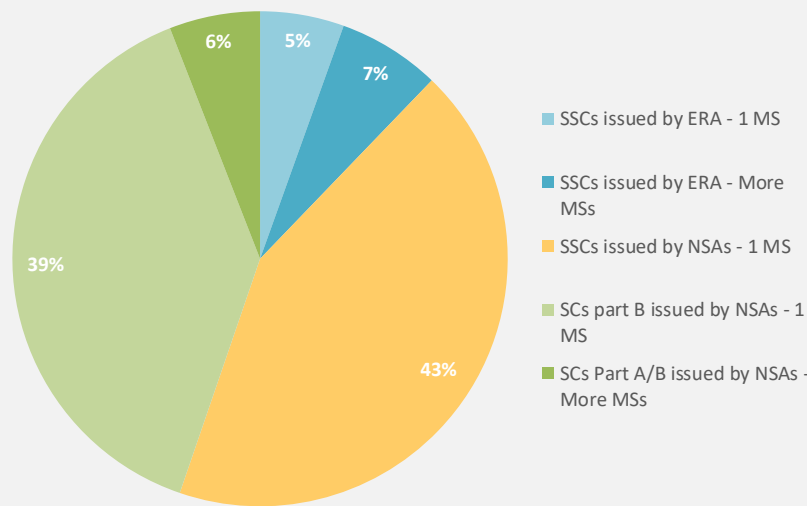
Safety Cerificate part-B and Single Safety Cerificates, EU-27+NO, end of 2021 and 2022
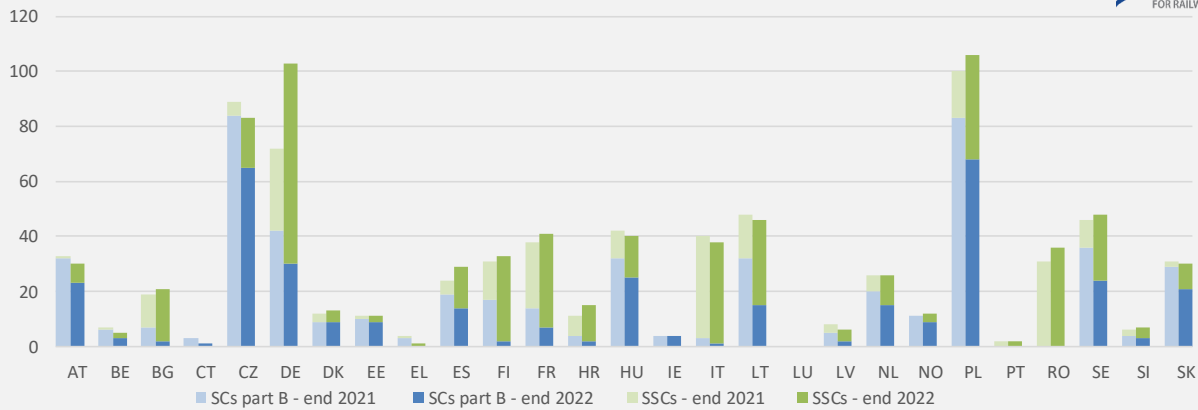
Source: ERADIS (ERA)

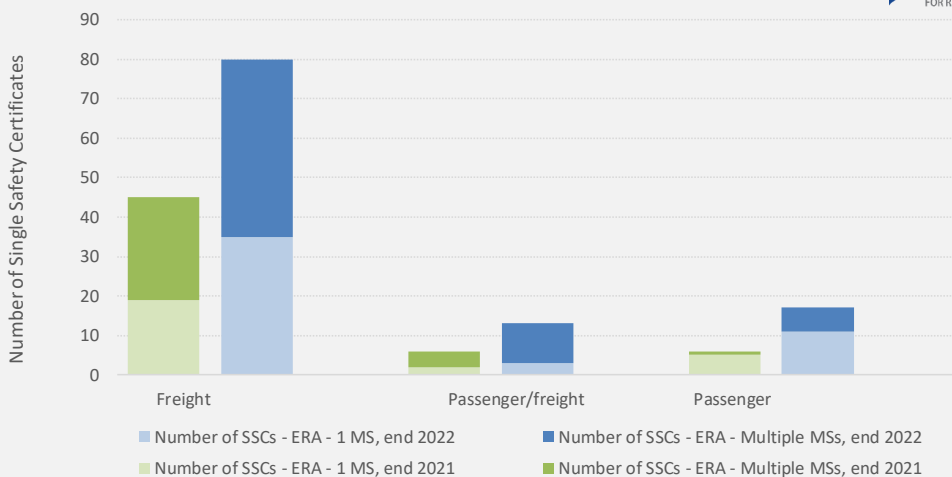**Figure 14 - SCs and SSCs issued by NSAs and ERA per area of operation**

Percentage of SCs and SSCs (on the total), valid at the end of 2022

Source: ERADIS and OSS (ERA)

Figure 15 - SSCs issued by ERA, per type and area of operation

SSCs valid at the end of 2021 and at the end of 2022, EU-27+NO

Source: One-Stop Shop (OSS)

Concluding remarks

The data collected for 2021 (and when possible for 2022) 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; possibly and partially linked to this, although not exclusively, the European rail modal share remains low (both for passenger and freight) and international rail passenger services quite limited.

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.

Existing national rules can represent an obstacle to interoperability and effective cross border traffic and should be limited to the minimum necessary. After the entry in force of the TSI revision package 2023, Member States should further revise their existing national rules and repeal redundant/contradictory ones.

Figures on vehicle authorisations and (single) safety certificates show clear progress in the transposition of the fourth railway package, also with the increasing role of ERA in issuing VAs and SSCs. Areas of use/operations, though, remain mainly domestic, with international operations mostly related to freight.

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.