Economic Steering Group

Task Force on Data Quality

Final report

EUROPEAN
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FOR RAILWAYS

ESG Task Force on Data quality

Final report

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1. Executive summary

Railway data frequently suffers from quality issues on multiple dimensions, including accuracy, consistency, completeness, and timeliness. The consequences can be significant, such as misguided decision making and adverse impacts on railway operations and safety. Improving data quality will therefore contribute to the greater performance and competitiveness of rail.

Within its Economic Steering Group, the European Union Agency for Railways (ERA) launched a Task Force on Data Quality, focusing through four subgroups on

1) Common Safety Indicators (CSI)
2) Register of Infrastructure (RINF)
3) The ERA Database of Interoperability and Safety (ERADIS)
4) Railway statistics

Over 60 experts across 32 organisations were involved in the Task Force's activities which identified data quality issues and proposed improvements, as summarised below.

Subgroup	Overall observations	Summary of key recommendations
1. CSI	CSI contact points occasionally ask ERA for guidance to determine the most applicable category of accident to which to assign a specific occurrence. The content and conclusion of such exchanges, though, are not structurally shared with all other NSAs. Moreover, the last update of the CSIs Implementation Guide happened in 2015 and several amendments (both in terms of legal references and further clarifications) would be beneficial. In addition, ERA regularly validates and compares data with other sources, particularly when specific figures are analysed at a European level (e.g. tonne-km). In December 2021 a comparative analysis showed that data provided for the CSIs (i.e. reference indicators) in various countries differed substantially from Eurostat figures.	The recommendations are to update the CSIs Implementation Guide, based on the proposed and agreed amendments. ERA will continue supporting NSAs when encountering issues in reporting CSIs (e.g. through emails exchanges). The Agency shall also organise an annual meeting with the CSI contact points (and Eurostat) to share and discuss on identified issues and ways forward. The subgroup also recommends NSAs to revise (or define, if missing) some governance processes to improve data quality of the collected and reported CSIs. Regular plausibility analyses on data, and validation exercises with the IMs and RUs, would be beneficial to improve data quality. The adoption and implementation of the CSM ASLP will further improve occurrences reporting and the involvement of each operator.
2. RINF	A comparative assessment of four sources on railway networks showed large inconsistencies on the Member State level. Within RINF itself, issues were observed with disconnected, sinking, and unreachable points. Additionally, the completeness of values for certain parameters was deemed to be suboptimal. These issues were found to have several administrative, operational and statistical impacts.	Several actions have been put in place to improve the completeness of the network, notably by the continuation of a comparative assessment on multiple network sources by Eurostat. A full reconciliation of statistical sources could be promoted when RINF includes an indicator on whether a SoL falls under the IOD/SD or not. The Agency also undertook actions to reduce the number of disconnected, sinking, and unreachable operational points. Finally, it is recommended to continue with a range of other initiatives to test and improve RINF, including the alignment with TAF TAP primary location codes and populating TEN-T with RINF data.

Subgroup	Overall observations	Summary of key recommendations
3. ERADIS	Considering that the ERADIS documents have a well-defined, legally embedded, structure and contents, and based on the feedback received, it was concluded that data quality is not the main issue of ERADIS. In part because of substantial efforts to check the uploaded documents. The most frequent errors preventing the publication of documents in ERADIS are human errors. They are also the main reason that put ERADIS' data quality at risk and for which quality assurance process have been put in place. The negative feedback we have received was mainly focused at the functionality of ERADIS. The unfriendly user interface, the outdated, unclear or by times unintuitive design of the ERADIS user interface may be a source of errors and may impact the final data quality offered by this application.	Keeping users' manuals, validation guides up to date to limit number of main human errors. Creation of the ERADIS users' forum / improvements in communication and collecting feedback from external users to identify and address most urgent users' needs to be resolved. Analysing reported ERADIS different functionality issues by ERADIS internal team and prioritising NoBo and EC Declaration related requests as most urgent for implementation / correction.
4. Statistics	Many different institutional and industry organisations collect statistics from the rail sector on several indicators that are identical or similar. Stakeholders are often faced with uncoordinated and overlapping data collection requests with unclear definitions of relevant indicators and unclear scope of reporting. The latter is a primary concern as the misunderstanding of the scope of reporting of the rail networks in scope, often due to an unclear EU legal basis, generates data quality issues. Statistics on identical or similar indicators published by different organisations are hardly comparable and it is difficult to establish if diverging results for a given indicator/country are due to reporting mistakes or misunderstanding by data providers of the scope of reporting.	Data collectors need to be clear in their requests on the applicable scope and definitions of the indicators they want to feed with data. Guidance documents need to be regularly updated and the use of examples can help data providers to understand the aim and the scope of reporting of different statistics. The use of registers also for statistical purposes can reduce the data collection burden through surveys on the rail sector and increase data quality.

In addition to the subgroup specific findings, the Task Force elaborated the following cross-cutting recommendations.

Category	Observations – shortened	Recommendations – shortened
1. Scope	Reporting scopes are defined by different legal acts (see Table 5), but unclear how Member States apply the scope.	Member States should be encouraged to explicitly specify the network(s) or lines(s) that fall outside the scope of application of the Interoperability and Safety Directives. Data providers should receive clear guidance on scope differences for indicators that are collected by multiple organisations.
2. Definitions	Data quality is negatively affected by unharmonized and complex definitions.	Promote collaboration between data collectors to harmonise and simplify definitions. This will facilitate data sharing and reduce burdens.
3. Administrative burden – data access and provision	ERA registers were not set up for statistical purposes but have statistical value in absence of alternative sources. Also, some data provision processes increase administrative costs	The use of ERA registers for statistical purposes could reduce administrative costs and improve the accuracy of providing and collecting statistics. Such use case should be considered when defining access and utilisation rights. For IM safety authorisations a new ERADIS module is recommended.
4. Administrative burden –	Technical functionalities (e.g. user interfaces) impedes data entry and analysis, negatively	Register users are encouraged to propose change requests to improve the efficient usage of the

Category	Observations – shortened	Recommendations – shortened
Usability of ERA registers	affecting data quality. In other cases, access rights complicate analysis.	systems. The most pressing changes should be prioritised to lower administrative burdens and improve accessibility.
5. Governance – Coordination	Insufficient coordination between data collectors and providers was observed. Coordination is necessary to implement the recommendations as formulated by this task force.	Existing groups can be leveraged in the fields of RINF and CSI. For ERADIS and transport statistics, new channels should be set up to ensure communication and alignment on data quality issues.
6. Governance – Quality assurance	Structural data quality issues at country level need to be addressed by collectively involving national data providers.	Eurostat is encouraged to organise country reviews on railway data quality.
7. Data quality processes and resources	Data providers are often assigned the responsibility for data quality. Data collectors are however well positioned to cross-check data quality.	The data quality assurance role of data collectors should be acknowledged and adequate resources assigned to this role.
8. Railway organisation identifiers	The 2018 EVR decision introduced a unique alphanumerical identifier code for all railway organisations. This code is only partially applied to railway data databases.	The organisation code should be promoted in all databases where railway organisation data is gathered.

ERA's Analysis Team shall promote the uptake of these recommendations within the Agency and beyond. It is also noted that the Agency's Linked Data activities contribute to the implementation of several recommendations. The Economic Steering Group shall be informed on the progress. The Task Force recommends that data quality is proactively addressed beyond the topics that were covered by this Task Force.

ERA wants to warmly thank all participants to the Task Force for their involvement and strong contributions. A special thanks goes out to Eurostat for working as one team with ERA and for dedicating a considerably amount of time to make this Task Force a success.

2. List of definitions and abbreviations

2.1. Definitions

Term	*Definition*
Agency/ERA	The European Union Agency for Railways
Agency regulation	Regulation (EU) 2016/796 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Railways and repealing Regulation (EC) No 881/2004
Data quality	An umbrella concept covering multiple dimensions including the accuracy, consistency, completeness, and timeliness of data.
Data collectors	Organisations that request and bundle railway data on a higher level of aggregation (e.g. Eurostat, UIC, PRIME, NSAs, ERA, …).
Data providers	Organisations that measure and submit primary data on railways (e.g. railway undertakings and infrastructure managers)
Eurostat Regulation	Regulation (EU) 2018/643 of the European Parliament and of the Council of 18 April 2018 on rail transport statistics (recast)
Interoperability Directive	Directive (EU) 2016/797 of the European Parliament and of the Council on the interoperability of the rail system within the European Union
RMMS Regulation	Commission Implementing Regulation (EU) 2015/1100 on the reporting obligations of the Member States in the framework of rail market monitoring
Safety Directive	Directive (EU) 2016/798 of the European Parliament and of the Council on railway safety
Train drivers Directive	Directive 2007/59/EC of the European Parliament and of the Council on the certification of train drivers operating locomotives and trains on the railway system in the Community

2.2. Abbreviations

Abbreviation	*Meaning*
CER	Community of European Railway and Infrastructure Companies
CQ	Common Questionnaire
CSIs	Common Safety Indicators
CSM ASLP	Common Safety Methods for Assessing the Safety Level and the Safety Performance of railway operators at national and Union level
DG MOVE	European Commission's Directorate-General for Mobility & Transport
DMU	Diesel Multiple Unit train
EBA	Eisenbahn-Bundesamt (German Federal Railway Authority – NSA DE)
EC	European Commission
EIM	European Rail Infrastructure Managers
EMU	Electric Multiple Unit train
ERA	EU Agency for Railways
ERADIS	European Railway Agency Database of Interoperability and Safety
ERATV	European Register of Authorised Types of Vehicles
ERTMS	European Rail Traffic Management System
ESG	Economic Steering Group
EU	European Union
EVR	European Vehicle Register
EUROSTAT/ESTAT	European Commission's Directorate-General Statistical Office of the European Union
FTE	Full Time Equivalent

Abbreviation	*Meaning*
GoA	Group of Analysists of the CSM ASLP
IM	Infrastructure Manager
IOP	Interoperability Directive (EU 2016/797)
IRG	Independent Regulators' Group - Rail
ITF	International Transport Forum
M&A	Mergers and Acquisitions
MS	Member State
NSA	National Safety Authority
OCR	Organisation Code Register
OECD	Organisation for Economic Co-operation and Development
PSO	Public Service Obligation
RCC	Route Compatibility Check
PRIME	Platform of Rail Infrastructure Managers in Europe
RATP	Régie autonome des transports parisiens
RCC	Route Compatibility Check
RER	Réseau Express Régional
RINF	Register of Infrastructure
RMMS	Rail Market Monitoring Scheme
RSD	Railway Safety Directive (EU 2016/798)
RSYS	Railway System Unit
RU	Railway Undertaking
S-Bahn	Stadtschnellbahn
SNCF	Société nationale des chemins de fer français
SoL	Section of Line
SSC	Single Safety Certificate
SG	Subgroup
SGA	Subgroup A of the CSM ASLP
TDG	Transport of Dangerous Goods
TEN-T	Trans-European Transport Network
TENTec	European Commission's Information System to coordinate and support the Trans-European Transport Network Policy (TEN-T)
TF	Task Force
TPS / ATP	Train Protection Systems / Automatic Train Protection
UIC	International Union of Railways
UNECE	The United Nations Economic Commission for Europe
WP	Working party

3. List of tables

4. Introduction

Railway data is provided, assessed and disseminated by numerous organisations, ranging from railway operators to national and European statistical bodies. This data is used to assess and improve the functioning of the railway system. To do so, a high level of data quality is of critical importance.

Data quality covers multiple dimensions including the accuracy, consistency, completeness, and timeliness of data[1]. Unfortunately, railway data is regularly found to score low on these dimensions.

The consequences can be significant. Data quality issues lead to misguided decision making and can have adverse impacts on railway operations and safety. Improving data quality will therefore contribute to the greater performance and competitiveness of rail.

The Agency is increasingly responsible for collecting data and maintaining databases. In this role it frequently observes data quality issues. Notwithstanding the principle that data providers are primarily responsible for the quality of their data, the Agency observed a need to bring this topic to the foreground. As such it set up a Economic Steering Group (ESG) Task Force to identify existing data quality issues and promote structural improvements.

Within the Task Force, four subgroups were established to targeted specific areas in which data quality issues were observed, namely:

1) Common Safety Indicators (CSI)
2) Register of Infrastructure (RINF)
3) The ERA Database of Interoperability and Safety (ERADIS)
4) Railway statistics

Over 60 experts, representing 32 organisations, participated in the Task Force with some experts participating in more than one subgroup. Each subgroup organised 3 meetings between October 2022 and March 2023.

Key findings and recommendations for each subgroup are captured by this report. In addition, this report provides cross-cutting recommendations that carry relevance for multiple areas.

[1] DAMA International. (2017). DAMA-DMBOK: Data Management Body of Knowledge (2nd ed.). Technics Publications, LLC.

5. Subgroup 1: Common safety indicators

5.1. Background and process

The Agency regularly interacts with NSAs for the collection of the Common Safety Indicators (CSIs) and for the reporting of accidents. CSIs contact points occasionally ask ERA for guidance to determine the most applicable category of accident to which to assign a specific occurrence. The content and conclusion of such exchanges, though, are not structurally shared with all other NSAs. Moreover, the last update of the CSIs Implementation Guide dates from 2015. Considering this, several amendments to the guide, both in terms of legal references and also in terms of further clarifications, were deemed to be beneficial.

In addition, ERA regularly validates and compares data with other sources, particularly when specific figures at European level are analysed (e.g. on tonne-km, train-km, passenger-km, line-km etc.). In December 2021 a comparative analysis showed that data provided for the CSIs in various countries differed substantially from Eurostat figures. In particular, in some MSs the values of tonne-km, train-km and line-km provided within the CSIs were higher than the values provided to Eurostat. This should logically not be possible because Eurostat should, in many cases, have a wider rail network in scope.

The elements above increased the need to have an exchange with the CSIs contact points to share clarifications on interpretations, to discuss new issues identified and to agree on possible ways forward, including the update of the CSIs guidelines.

Practically, the main objectives of the subgroup on CSIs were the following:

- Sharing and mapping of issues related to data quality and/or to definitions for CSIs;
- Discussing on and streamlining/harmonising data collection processes, reporting criteria and definitions;
- Defining governance processes on how data quality can be improved (possible ways forward);
- Update of CSIs guidelines.

In order to avoid any duplication of efforts and to guarantee coordination with the activities going on for the CSM for the assessment of safety levels and safety performance (CSM ASLP), close alignment was sought with the CSM ASLP's Subgroup A (SGA), which is responsible for the development of the CSM's taxonomy. The findings of this CSI subgroup were discussed with the SGA participants.

In the call for interest 12 CSIs contact points and Eurostat volunteered to participate. Three meetings were held with the subgroup participants.

During the first meeting (on 20/10/2022) an overview of the clarifications already provided to specific CSIs contact points were shared, together with the data quality issues identified by the Agency. Following that introductory discussion, a survey was prepared and distributed amongst the participants (on 3/11/2022) to collect their insights into the identified issues and possible ways forward. The survey also aimed at collecting additional difficulties/doubts encountered when collecting and reporting CSIs data.

The second meeting (held on 6/12/2022) was used to present the results of the survey and to further discuss identified problems, as well as preliminary proposals for improvement.

Finally, the third and last meeting (on 28/02/2023) focused on the agreement and finalisation of the findings from the subgroup, identifying the recommendations provided below. The CSM ASLP SGA was kept regularly updated on the progress of this subgroup. The main findings of interest for the SGA were presented in a meeting on 22/2/2023.

5.2. Data quality issues

As mentioned above, the subgroup on CSIs focused on three different aspects related to data quality:

- Clarifications on specific occurrence reporting (to be shared with all NSAs) and possible discussion on further issues encountered when reporting CSIs data.
- Specific data quality issues identified by analysing the CSIs historical data.
- Need for updating the CSI guidelines.

More in detail, some clarifications on definitions and/or reporting criteria (already provided to a single contact point) were shared and discussed to develop a common understanding on the reporting of such events; the discussion concerned:

1. Electrocutions involving rolling stock in motion (when trains are not moving);
2. Persons jumping out of a running train without suicidal intention;
3. Fatalities at level crossings (when persons are hit by a vehicle in motion);
4. Accidents to persons involving rolling stock in motion (with focus on passengers travelling on board);
5. Collision of a train with an obstacle (i.e. the catenary damaged by a truck, in the specific case presented);
6. Speed restriction panels wrongly or not placed (e.g. after maintenance works);
7. Suicides resulting in involuntary victims;
8. Fires in rolling stock (caused by the electrocution of persons while the trains are stopped at a station);
9. Fires in road-rail vehicles (used on tracks);
10. Events related to track circuits not operating due to leaf mulch/contamination;
11. Definition of the precursor “track buckle and other track misalignment”.

Regarding data quality issues identified by analysing historical CSI data, the Agency presented the results of a request for support sent to many NSAs in December 2021, due to some inconsistencies found between reference indicators in the CSIs and other sources (e.g. tonne-km, passenger-km, train-km, line-km). The previously received feedbacks, together with the replies from the subgroup to the survey, indicated that:

- Data from different organisations do not match always. Despite the possible narrower scope of the network falling under the RSD compared to the scope of the network for Eurostat, sometimes the line-km or the tonne-km reported to Eurostat are lower than the values indicated in the CSIs. Within this context, also a discussion on the network falling under the Safety and Interoperability Directives was held (focusing on the possible exclusions under art. 2.2 and 2.3 of the RSD); despite the inconsistencies above, the subgroup participants confirmed that CSIs are reported according to the RSD scope in each MS, and that IMs/RUs are aware and aligned on this.
- More communication/interaction with the IMs and RUs, and especially consistency/plausibility analyses (even through clear/standardised procedure) would be beneficial to provide more reliable data.
- Train-km (for passenger, freight or other services) provided within the CSIs and from other sources are sometimes calculated differently (e.g. inclusion/exclusion of empty runs). In addition, it could be beneficial to have a clear/common definition of the weight to be considered for the (freight) tonne-km (proposed within the discussion).

In addition, some concerns related to the possible non-harmonised reporting of some indicators were discussed (e.g. accident involving TDG, costs, or infrastructure data), focusing particularly on any issue encountered when reporting CSIs data or on any improvement needed in the definitions and/or in the collection methodology. Based on the points above various amendments to the CSIs guidelines were agreed upon. A new version will be released by the end of Q2 2023.

The table below provides an overview of the discussed issues and on the agreed measures.

Table 1 : CSI - Overview of issues and measures agreed

N.	Specific doubts/issues (or topics for discussion)	Clarifications/measures agreed
1	Inclusion or exclusion (from the CSIs) of cases of electrocution when trains are not moving (e.g. person climbing on the roof and electrocuted in a workshop/warehouse/ depot/sidings or when a train is stopped at station).	For electrocution involving rolling stock in motion, it was agreed that the CSIs guidelines are already clear and that no further clarification is needed. Within the CSIs, only cases of electrocution with rolling stock in motion are to be reported, while the CSM ASLP will help in covering also the cases of electric shock when rolling stock is stationary.
2	Persons jumping out of the running train without suicidal intention.	For persons jumping out of the running passenger train without suicidal intention, it was agreed that they fall under the category of passenger (unless intentionally riding or climbing on the outside of the train and thus included within the category trespassers, as train surfers). For this reason, it was agreed to delete in the CSIs guidelines the case of a '*person jumping out of the running train without suicidal intention*' from the cases included under '*other person not at a platform*' (the definition of which clearly excludes passengers).
3	Fatality occurred at level crossing, with persons hit by a vehicle in motion.	For fatalities occurred at level crossing, with persons hit by a rail vehicle in motion, although it is quite clear that they should be included under level crossing accidents, it was proposed and agreed to clearly mention in the CSIs guidelines that '*accidents to person involving rolling stock in motion*' exclude events at level crossings when related to the use of the crossing. Regarding the suggestion by the Italian NSA to distinguish between pedestrians and vehicles involved in level crossing accidents, this suggestion has been already discussed and introduced in the CSM ASLP taxonomy.
4	Accidents to persons involving rolling stock in motion, with focus on persons travelling on board.	It was agreed to clarify in the CSIs guidelines under '*accidents to person involving rolling stock in motion*' that: • injuries/death due to natural causes (e.g. heart attack) are excluded (and should not be reported even if happening while travelling on trains), • the current reference to persons travelling on trains that are seriously injured or killed *'not in connection with train movement*' should be clarified/modified (i.e. better referring instead to '*rolling stock not in motion*').
5	Reported case of a truck hitting and damaging (with its boom raised) the overhead line at level crossing, causing the collision of a train (travelling nearby the level crossing) with the damaged infrastructure.	It was agreed that the first event alone did not represent a significant accident (i.e. it did not involve a train in motion) and thus the accident is to be reported within the CSIs under 'collision with an obstacle' in case the second event had significant consequences (in terms of fatalities/injuries, damages or traffic disruption). No modifications/clarifications in the CSIs guidelines were deemed necessary.
6	Speed restriction signals/panels wrongly removed and not replaced after maintenance works.	It was agreed to indicate in the CSIs guidelines that this case falls under '*wrong side signalling failure*' (i.e. within the 'technical' failure of a signalling system) when resulting in signalling information less restrictive than demanded.
7	Suicides resulting in involuntary victims.	It was clarified/confirmed (as indicated in the CSIs guidelines) that when a suicide resulted in involuntary victims, those should be reported under persons killed or seriously injured in accidents, classifying them as collisions, derailments, level crossing accidents, accidents caused by rolling stock in motion, fires or others (depending on the specific cases). For the specific example discussed regarding a person committing suicide by throwing himself in front of a train in movement in a station and projected back on the platform, hurting 3 persons, it was agreed that those involuntary injuries, if serious, should

N.	Specific doubts/issues (or topics for discussion)	Clarifications/measures agreed
		be reported as seriously injured persons under '*other*' accidents (beside reporting the suicide).
8	Fire in rolling stock (with significant damages) caused by the electrocution of a person while the freight train was stopped at a station (intermediate stop).	It was agreed that, similarly to the case above of the truck hitting and damaging the overhead line at level crossing, also in this case the first event does not represent a significant accident (i.e. electrocution when the train is stopped at the station), but the second event is to be reported within the CSIs (as fire in rolling stock) in case it had significant consequences. It was also noted/agreed that the CSM ASLP will definitely help in better reporting and classifying occurrences.
9	Fire in a vehicle driving on tracks (Toyota Hilux) as its staff were conducting track works (welding of switch etc.). The vehicle and welding apparatus caught fire and burned completely (causing significant damages).	The Toyota Hilux falls under the category of road-rail vehicle, a self-propelled machine able to move on rails and on the ground. Road-rail vehicles in the scope of EN15746 can be considered as special vehicles; they are excluded from the scope of TSI LOC&PAS but may be included in the scope of interoperability directive (except when provisions of article 1 of IOD exclude them). Special vehicles, are categorised in Appendix 6 part 11 of the EVR Decision (EU) 2018/1614. If the Toyota Hilux is not considered as a special vehicle as described in the legal framework, and therefore does not have a European Vehicle Number (i.e. not recorded in NVR/EVR), the accident should not be reported within the CSIs.
10	Events related to track circuits not operating due to leaf mulch/contamination.	Within '*wrong side signalling failures*', the current CSIs guidelines clearly exclude events related to track circuits not operating (e.g. due to leaf mulch/contamination); anyway, it was noticed by one CSIs contact point that leaf contamination has been known to be causal for significant accidents. Since in the taxonomy of the CSM ASLP those events due to leaf mulch/contamination will be covered by the category '*Train detection equipment failure*', it was proposed and agreed to leave the CSIs guidelines as they are.
11	Definition of the precursor "track buckle and other track misalignment".	Although outside the possibility and scope of this task force, some CSIs contact points indicated that it would be useful to define in a more quantitative way the precursor "track buckle and other track misalignment". They reported that the current definition (referring to '*any fault related to the continuum and the geometry of track, requiring track to be placed out of service or immediate restriction of permitted speed*') is linked to national criteria which are not harmonized/uniform at EU level. The issue was discussed also within the CSM ASLP SGA. It was concluded that in future (once more data will be available in the CSM ASLP), if it is considered necessary, it will be possible to open a change request, and the GoA will analyse the need/usefulness of a such quantitative definition, setting a task force (with adequate expertise) to analyse/define the issue. In any case, to be pragmatic and to try to analyse the issue and set limits, more data/inputs would be needed.
12	Railway network under the scope of the RSD in each MS.	Regarding the rail network under the scope of the RSD in each MS, from the survey and the discussions with the participants, it appeared that possible exclusions (as per art. 2.2 and 2.3 of the RSD) are applied in various MSs (with different network scope compared to Eurostat). NSAs also confirmed that CSIs are reported according to the RSD scope as transposed in each MS, and that IMs/RUs are aware and aligned on this. Beside Switzerland and Italy, no other NSA indicated to collect separately CSIs data out of the RSD scope (e.g. on functionally separated lines). It was also noticed that in some countries (e.g. Switzerland, but also Germany) the network/lines excluded may represent a part not always negligible of the full network.

N.	Specific doubts/issues (or topics for discussion)	Clarifications/measures agreed
13	Interaction with national and international authorities (responsible for transport statistics).	Regarding the questions in the survey on the interaction with national and international authorities (responsible for transport statistics), all 7 NSAs replying to the survey indicated to regularly interact with IMs, RUs and other national organisations (e.g. ministries or national statistical offices) for railway statistics, despite the issues encountered. Analysis on the consistency of the data (and on their plausibility with other sources) seems to be less common, like also the interactions with international organisations. It seems clear, instead, that data should be collected on actual transport (and not on planned services). Anyway, the issues found and/or reported seem to indicate a less positive picture, with some inconsistencies among CSIs, RINF and Eurostat data (as reported also below for railway statistics). In general, it was concluded that more communication/interaction with the IMs and RUs, and consistency/plausibility analyses (even through clear/standardised procedures) would be beneficial to provide more reliable data.
14	Missing definition of tonne-km.	Regarding a possible definition to be added in the CSIs guidelines for tonne-km, it was agreed to use the following definition (in line with Eurostat): "*Unit of measurement of railway goods transport which represents the transport by rail of one tonne of goods over a distance of one kilometre. It refers to the total weight of goods carried, including packaging and also the tare weight of the carried transport unit (e.g. containers, swap bodies and pallets for containing goods as well as road goods vehicles carrying goods)*".
15	Accidents involving the transport of dangerous goods.	Despite the respondents to the survey indicated to have not experienced issues in reporting accidents involving TDG, some inconsistencies with the CSIs guidelines were evident from the replies. It was reminded (and generally agreed) that Annex I point 2 of the RSD clarifies that '*indicators relating to dangerous goods*' refer to the total and relative (to train-km) number of accidents involving the transport of dangerous goods by rail. In addition, at point 2.1 of the Appendix, it is indicated that '*accident involving the transport of dangerous goods, means any accident or incident that is subject to reporting in accordance with RID/ADR section 1.8.5*' It follows (as reported in the CSIs guidelines) that: • Accidents involving TDG (in accordance with RID section 1.8.5) should be reported even if they do not meet the definition/criteria of a significant accident. • A significant accident involving also dangerous goods (e.g. a derailment with external damage over 150,000€ and release of DG) should be reported twice: as a significant accident (e.g. derailment) and as an accident involving dangerous goods.
16	Cost estimation of casualties.	ERA clarified that national values for preventing casualties are not mandatory to be reported in the CSIs reporting forms/templates, but they are voluntary in case the MS would have more recent, updated and specific values. Every year, based on the most updated European studies/data (e.g. the handbook of external cost, CE Delft, version 2019) ERA updates (in the CSIs forms) the fall back values of preventing a casualty per each MS according also to the (real) gross domestic product (GPD) per capita. The section on the estimation of the economic impact of accidents in the CSIs guidelines (and related tables) will be updated with the most recent information.

N.	Specific doubts/issues (or topics for discussion)	Clarifications/measures agreed
17	Percentages of tracks with train protection systems.	Despite no particular issues were indicated in reporting the percentages of tracks with Train Protection Systems (TPSs), it was noticed that for some MSs the sum of the percentages indicated for tracks equipped with the various TPSs (including ATP) in the CSIs exceed 100%. It was thus clarified (and agreed) that if tracks are equipped with TPSs providing a higher level of assistance to the train driver, they should not be reported also within the percentages of tracks equipped with TPSs providing lower levels of assistance.

5.3. Impact of data quality issues

The data quality issues described above may possibly cause unharmonized approaches for data collection and reporting criteria; discussing on and clarifying/sharing those doubts/inconsistencies allows guaranteeing a better/common understanding for the reporting of such events.

Monitoring the trends of safety and interoperability across Europe, for example, the Agency detected that for some indicators (i.e. precursors, accidents involving TDG, etc.) no clear/reliable trends can be deducted from the figures, possibly/partially also due to differences in data collection and reporting.

This limits authorities in drawing correct conclusions on the state of railway safety, impeding possible safety improvement measures.

Non-harmonised collection and reporting of CSIs data does also impact the results of the annual assessment of achievement of safety targets. For instance, when the train kilometre reference values are not correct, occurrences are not properly normalised, which can lead to a result moving from positive towards a 'possible deterioration' or vice versa.

In the worst scenario, possible lessons learnt or measures to be put in place may be weakened/flawed (or not detected) due to data quality issues/inconsistencies in the CSIs data.

5.4. Recommendations

The main contributions of the subgroup relate to the discussions/sharing of data quality issues (including clarifications on specific occurrence reporting) and to the revision of the CSIs guidelines by adopting the proposed and agreed updates for the definitions (reported in the table above together with all the other conclusions/clarifications discussed). Additional amendments of the guidelines will also regard the legal references, the costs data/information and any other general part that would need an updated.

More communication/interaction with the IMs and RUs, and especially consistency/plausibility analyses (even through simple but clear/standardised procedures) would be beneficial to provide more reliable data. The subgroup also recommends to NSAs to revise (or define, if missing) some governance processes to improve data quality of the collected and reported CSIs. These could include an alignment of data sharing rules with IMs/RUs (and whether possible with national statistical institutes) and consistency analyses (even through clear/standardised procedures) for data validation.

The continuous interaction with the Agency for supporting NSAs when encountering issues in reporting CSIs will continue (e.g. through emails exchanges). It was generally agreed and recommended that the Agency shall also organise, in the scope of the CSIs and in coordination with the CSM ASLP SGA, an annual meeting with the CSIs contact points (and the participation of Eurostat) to share and discuss on identified issues and possible related ways forward (e.g. interpretations/clarifications), including lessons learnt from consistency and plausibility analyses, in order to improve and align the reporting processes.

Within this context, it was also generally acknowledged/agreed that the adoption and implementation of the CSM ASLP will further improve occurrences reporting and the involvement of each operator.

5.5. Next steps

The main outputs of this subgroup are represented by this final report and by the upcoming updated CSIs guidelines (to be finalised by end Q2 2023); both documents will be published on the Agency website. They will be useful to share (also with the NSAs not participating in this task force) the results/clarifications proposed and to support in the reporting of the CSIs data.

The continuous support of the Agency to NSAs encountering issues in reporting CSIs data will continue through emails exchanges. In addition, an annual (possibly physical) meeting with the CSIs contact points (and Eurostat) will be set up (in coordination with the CSM ASLP SGA) to discuss/share further issues/doubts that could be raised by contact points or identified by the Agency in the coming months. The date could be coordinated/aligned with the NSA network meeting to increase participation.

6. Subgroup 2: RINF

6.1. Background and process

The Subgroup on the Register of Infrastructure (RINF) has been set up under the scope of the Task Force. For the RINF subgroup, the RINF Joint Workgroup (data providers) and RINF users were the main parties to involve. Following a call for nominations, experts from the organisations listed below were appointed and Eurostat has been co-chairing this Subgroup:

- CER (SNCF & RFI representatives)
- European Commission (EUROSTAT, DG MOVE A3, DG REGIO)
- IMs (Infrabel, JSC "LTG Infra", SNCF Reseau)
- NSAs (BE, CH, DE, ES, IT, LU, PL, RO)
- UITP

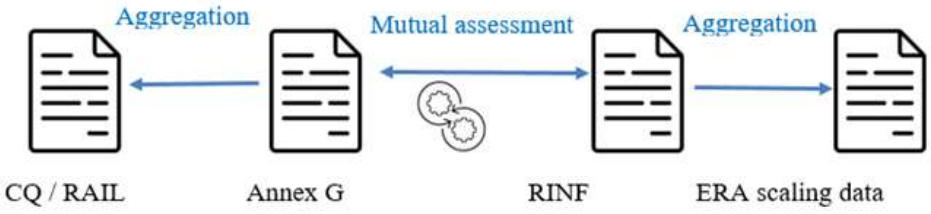
The RINF Subgroup held a total of 3 meetings, on 19 October 2022, on 15 January 2023 and on 24 March 2023. Practically, the main objectives of the subgroup on RINF were the following:

- Mapping of data quality issues [including completeness, accuracy (mismatch with reality) and overlaps] and assess which issues can be resolved at reasonable costs
- Make proposals for harmonisation and optimisation
- Defining governance processes on how data quality can be improved (possible ways forward)
- Create an open forum for direct exchange between the data consumers and data providers so as to define data fixes or other quick gains.

RINF data is used as reference data, providing information on the characteristics of the Members States networks. RINF data is already used by EC (DG REGIO, DG MOVE, EUROSTAT) and for statistical purposes internally in ERA. Therefore, although RINF is built for supporting interoperability, in practice its data serves statistical needs.

6.2. Data quality issues

Under the scope of the Subgroup, Eurostat conducted a comparative assessment of official lengths of railway networks per Member State (published by various international organisations), in terms of line-km or track-km. The comparison indicated that these statistics are rarely consistent, even within the datasets collected by the same organisation (for instance between RINF and CSIs for ERA, or between the Common Questionnaire and EU regulation 643/2018 Annex V ex-G for Eurostat).



A comparison between the four sources of some aggregates, such as total electrified line-km or gauge profile, was addressed to each EU or EFTA country. Some substantial discrepancies could be readily identified. For instance, the narrow-gauge network of Switzerland is included in RINF but not within the interoperability scope. In most cases a deeper comparison and assessment was needed.

A full assessment of Annex V ex-G versus RINF at network segment level was done for five countries, namely Luxembourg, Belgium, the Netherlands, Romania, and Lithuania. For those countries it was impossible to

achieve a full reconciliation of results. Given that this comparison exercise takes a considerable amount of time, it was not possible so far to test more MS during the work of the Task Force. Still, the results are informative and are thought to apply to other MS as well.

The assessment of Annex V ex-G vs. RINF has encountered three kinds of quality issues:

- The first one is the different scopes (a network segment exists in Annex V ex-G without corresponding section(s) of line in RINF, or the opposite). Nevertheless, the countries have rarely acknowledged an error in scope (for instance a metro or light rail network segment had been included in Annex V ex-G, or in RINF) or that a well-known difference of scope between ERA and "statistical scope" was documented
- The second one is the discrepancies of network lengths in terms of line-km, even when the network segments correspond to one or few sections of lines
- The third one, not specific to this exercise, is when information in RINF does not exist (e.g. network of Ireland) or great part of it is missing. Conversely, Annex V ex-G can be limited to reporting on the TEN-T network or very poor in terms of indicators

If most detailed quality issues have remained unsolved, it is because the ultimate data providers (of RINF or of Annex V ex-G) have not been reached or have not provided detailed answers. In some cases the RINF data provider has only commented that RINF was not made for extracting statistics. In one national case (Belgium), it has appeared that within the same national infrastructure manager (Infrabel) at least two concepts of line-km were coexisting, leading to well-known discrepancies in their on-line disseminated data.

In addition to the comparison exercise to uncover gaps in the different sources, ERA assessed and identified four major categories of issues within the data hosted in RINF as provided by the NREs of the MS and so far by two IMs[2]:

- Disconnected operational points, which seem disconnected from the network and prevent any route calculations towards or from them. An example is that of Brussels Central, due to different interpretation of definition of OP. The issue was resolved thanks to the collaboration with the Belgian NRE and IM.
- Sinking and unreachable operational points. A "sink" operational point is one where all the connected tracks allow arriving at it but not leaving it. In contrast, an unreachable operational point is one where all the connected tracks allow departing from it but not reaching it.
- Missing infrastructure, including sections of lines (SoL) and possibly operational points. Examples of SoLs fully missing and gaps in shares of the network based on specific parameters/values, e.g. high speed lines. An example is the Irish network, which is currently fully missing from RINF.
- Completeness of parameters/values per MS, closely related to "Not yet available (NYA)" feature in RINF (percentage of completeness per: overall view, core parameters, RCC parameters).

The participants in the RINF Subgroup identified several additional issues relating to:

- national rules and local restrictions and how to upload this information in RINF in a harmonised way, i.e. language, type of the documents
- transmission of information between IMs/RUs for the route compatibility check (RCC) and the production of route books
- technical issues as a source of data quality issues, i.e. domestic border points preventing the merging of two different networks

[2] i.e. French and Italian. IM direct data provision expected to increase as it is an obligation set in art. 4 (3) of Implementing Regulation 2019/777

- different coordinates in national border points
- level of data granularity (level of detail in a data structure).

In summation, a wide range of data quality issues has been mapped.

6.3. Impact of data quality issues

Differences in scope and unclear definitions can lead to different unharmonized approaches of filling in the various RINF parameters by different data providers. Data hosted in RINF are not only used as reference data for various purposes by organisations, as mentioned above, but also for business purposes by the sector (i.e. invoicing, business planning). As such, data quality issues may have effects in various fields.

Completeness of data is the most critical issue regarding the Route Compatibility Check and becomes even more critical under the forthcoming new developments that will be based on RINF data [Route Book (TSI OPE Appendix D2), as well as TSI OPE Appendix D3].

The discrepancies can also have an important direct statistical impact: the precision of any time series is compromised by the existence of other time series with identical content at first glance, but with different figures. Sometimes the change in time of a given series is not even certain, as a concept has been substituted to another concept at some point. One impact is that the use of line-km or track-km as scaling data for several CSIs and the calculation of the achievement of common safety targets remains imprecise, as long as the discrepancies have not been resolved.

Moreover, the various parallel efforts to map railway networks put a substantial administrative burden on national and European organisations. A greater level of harmonisation would reduce such burdens substantially.

6.4. Recommendations

Based on the analysis of data quality issues and building on ongoing ERA initiatives, the following recommendations are advanced:

6.4.1. Missing infrastructure

ERA has produced a guideline document in order to facilitate the procedure of direct uploading by the IM without NRE participation. The guideline has been distributed via the RINF Workgroup representatives. ERA can offer further guidance, if necessary, since it is a new procedure that almost all IMs are unfamiliar with. It is emphasized that there is an obligation for IMs to provide data in accordance with art. 4 (3) of Implementing Regulation 2019/777.

Regarding networks that are missing in RINF because of the scope set by the MS under the safety and interoperability directives, it is noted that the directives do not impose on the MS a requirement to notify the Commission which SoLs are excluded from the scope.

Based on the mutual assessment by Eurostat it is recommended that in case that RINF includes networks which do not fall under safety/interoperability directives scope, this information should be recorded at section of line level in RINF. In other words, the detailed description of a national railway network in RINF, with geographical coordinates, could be the keystone (together with Annex V ex-G) for a full reconciliation between all these sources.

In case two notions of line-km exist at national (data provider) level, a unique definition, assessed on international guidance, should be encouraged.

Ultimate data providers (of RINF and Annex V ex-G) should collaborate within the same national organisation in order to provide coherent data or appoint a unique data provider for both data collections.

6.4.2. Disconnected, sinking, and unreachable operational points

Comparing the results of the two queries on operational points (initial and follow-up) run by ERA, the results of the second query present an improved situation. The improvement is because of the developments of the RCC model itself in combination with new and probably more accurate datasets of the MSs identified in the results. For the cases that remain problematic according to the second follow-up query, further bilateral collaboration is required with the MSs/data providers concerned. Moreover, ERA welcomes and encourages good practices of collaboration such as the case of Belgium, as previously mentioned, in order to resolve such issues spotted.

6.4.3. Completeness of parameters/values per MS

In RINF the "NYA" value will be replaced by "Not Provided" for those parameters for which the legal deadline has elapsed. The NYA value will be available only for the new parameters that will be inserted in RINF by the new Regulation and for a specific period defined by the new Regulation. This will facilitate the data completeness assessment and follow-ups.

6.4.4. Other initiatives

In parallel of the work of the Task Force, ERA emphasized that data quality is being monitored and improved by the following steps:

- With help of the RINF Workgroup, 110 routes tested with the RCC application. The conclusion is that some areas of compatibility need further advice from domain experts (i.e., gauge cross-reference).
- By allowing the improved (more accurate) geometry description and routing (micro level description and improved RCC tool)
- In the proposal of alignment with TAF TAP Primary location codes (PLCs - OPs)
- Current testing by EC to populate TEN-T from RINF
- By publishing the ERA Vocabulary with the identified reference data (SKOS Concepts)

6.5. Next steps

Th exercise to compare networks using different sources will be continued by Eurostat for its own purposes of Common Questionnaire and EU regulation 643/2018 Annex V ex-G. The progress will be regularly reported to ERA and can be used to improve inquiries into missing data, if any.

7. Subgroup 3: ERADIS

7.1. Background and process

The scope of the ERADIS Subgroup covered safety & interoperability data and statistics. The main works were focused on the following activities:

- Mapping of data and its quality by document type (e.g. EC Declarations, SSC, etc.)
- Identify overlaps and data quality issues
- Harmonisation of definitions and templates
- Assess which issues can be resolved at reasonable costs
- Update of document validation guidelines
- Set up governance processes to address future data quality issues, including the interface optimisation with the One Stop Shop.

The Agency announced a call for interest for ERA's Economic Steering Group Task Force on Data quality. The kick-off meeting took part on 26/10/2021. During this meeting the background, problems and goals to be achieved were presented and accepted. Two other meetings were organised in following months on: 15/12/2021 and 02/03/2023.

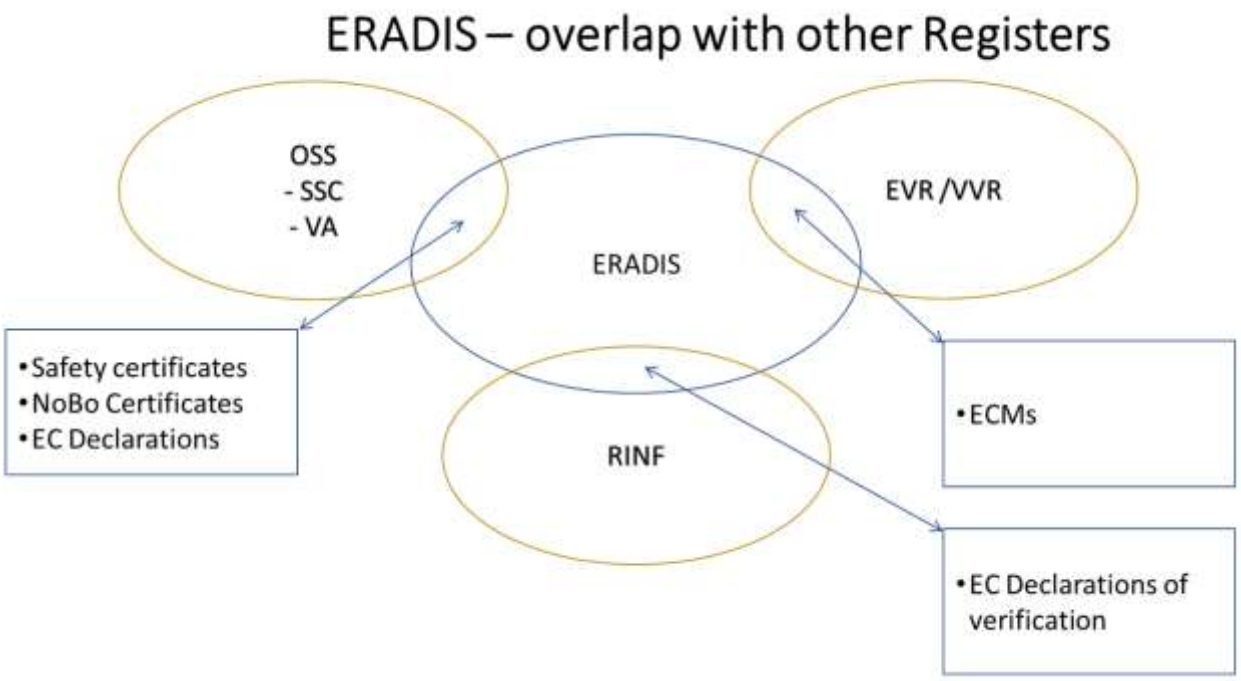
7.1.1. ERADIS – subject of investigation

Operating since 2006, ERADIS is the Agency's first database. Since its creation, new modules have been developed and implemented to provide new features for ERADIS users and to ensure compliance with changing legislation. The legal basis for ERADIS is defined in the following documents: Directive (EU) 2016/798, Directive (EU) 2016/797, Regulation (EU) 2016/796, Regulation (EU) 2021/782.

The subgroup focused on the following data collected in ERADIS:

- Safety Certificates
- Licences
- ECMs
- Safety indicators and Investigation Reports
- NSA & NIB Reports
- EC declarations of verification of subsystems
- EC declaration of conformity of interoperability constituents
- EC declaration of suitability for use of interoperability constituents
- NoBo EC Certificates
- Railway undertakings service quality reports

ERADIS contains a large amount of reference data available to other Agency registers. The set of data shared and used in different processes is presented in the figure below.



Some of this data is consumed by OSS and EVR/VVR via services allowing machine-to-machine communication. In case of RINF there are links to the respective EC Declarations related to railway infrastructure.

It is worth mentioning that since mid-2019, the amount of data in ERADIS increased dramatically. The table below shows the number of documents provided by various stakeholders and processed by the Agency in the different timeframes.

Table 2 : ERADIS - Overview of processed documents

Processed data	Till 2018	Since 2019	% Change
Users	354	+ 1322	373%
Organisations	633	+ 2370	374%
EC Declarations submitted	499	+ 15762	3159%
Licences	2236	+1226	55%
Safety Certificates	6026	+1796 (+ SSC 634)	/
NoBo EC Certificates	-	>24000	/
ECM Certificates	958	842	88%
SQR	640	+278	43%
Total	**11364**	**>48 230**	**424%**

7.2. Data quality issues

To evaluate data quality issues with ERADIS and possible improvements, a survey has been prepared with the aim of circulating it not only among the members of the group, but with as many users of the database as possible.

In total 49 respondents took part in the survey. What makes the survey results valuable is that they were reported by different types of ERADIS users using different ERADIS modules and for varying reasons.

In general, ERADIS is recognised as a relatively good system, providing reliable data and serving users with the information they look for and which is needed in their daily business activities. Nevertheless, some responses to the survey indicated that in certain areas improvements are required.

To focus at the most challenging ERADIS problems and to define properly the areas for improvement an additional questionnaire was produced and distributed among ERADIS users.

Respondents were asked to provide ideas and actions to improve existing shortages in ERADIS data quality / functionality. This time, five additional replies were provided. For more details, please refer to the Subgroup Report as available on the Task Force's Extranet space.

7.3. Impact of data quality issues

The ERADIS database aims to ensure that information relevant to the safety and interoperability of the railways in the Member States is accessible and transparent to all interested parties and stakeholders in the railway, in accordance with Directive (EU) 2016/798, Directive (EU) 2016/797 and Regulation (EU) 2016/796.

When created, ERADIS was, by design, intended to be an exclusively informational, not operational database. Today, however, it is more and more often used in different railway processes as an operational system. This is why data quality is of key importance for its future.

Taking into account the number of registered ERADIS users (i.e. ~1500) and the number of responses to the survey (i.e. 49), our conclusions may not reflect in full the opinions of the entire ERADIS "community".

It is also worth noting that nearly 40% of respondents feed ERADIS with data, the rest are advanced users who use ERADIS data in their daily business activities.

Nevertheless, based on the survey results and the supplementary feedback provided, the below conclusions can be formulated.

7.3.1. Mapping of data and its quality by document type

Considering that each of these documents have a well-defined - by the corresponding legislation - structure and contents, we can conclude that data quality is not the main issue of ERADIS.

Most answers show high and very high acceptance of the ERADIS data quality, following legal deadlines when providing data. Data accuracy and data consistency as well as its compliance with submission rules and purpose are also appreciated by ERADIS users. To conclude, the overall assessment of ERADIS is scored by 67% of users as good or very good.

7.3.2. Identification of overlaps and data quality issues

By definition, ERADIS contains safety and interoperability related documents. It is the unique place where a vast range of these types of documents can easily be found. Therefore, ERADIS can be recognised as the source of reference data for other Agency systems: OSS, EVR/VVR or RINF.

Details on licences, certificates, ECM certificates data can also be used for the cross-check analysis and statistics on the number of specific railway organisations across the European railway market.

NSA, NIB, CSIs and RU Service Quality Reports provide extensive platform for in-depth analysis of the railway's safety, railway's performance and quality offered to passengers in Europe.

7.3.3. Harmonisation of definitions and templates

ERADIS and its modules were created during the time with the aim to comply with all legislation requirement and changes in this regard. Thus, as it was already mentioned, ERADIS documents have a well defined structure and contents. Licences, certificates, ECM certificates, EC Declarations and EC NoBo Certificates are based on a dedicated template.

The content of CSIs, NSA/NIB annual reports or RU SQRs are also governed by relevant legislation. In addition to legislative needs a dedicated application guides supports ERADIS user when feeding ERADIS with data.

7.3.4. Update of document validation guidelines

Due to the increasing workload, the team of ERADIS "publishers" is supported by other colleagues during workload peaks. Therefore, dedicated manuals were produced by the Register Team containing detailed instructions on publication processes and the criteria for approval/rejecting publication requests.

These documents are covering the most frequently used ERADIS modules: EC Declarations and NoBo Certificates where a common approach and uniform proceeding publication requests would imrpove data quality and a timely ERA response to the continuously increasing demands from users.

If required, all documents are kept up to date to follow the legislative changes and/or ERADIS functionality modifications.

7.4. Recommendations

From the experience gained while maintaining and using ERADIS, it can be concluded that the most frequent errors preventing documents' publication in ERADIS are human errors. They are also the main reason that put ERADIS' data quality at risk. This statement is also reflected in the survey results and supplementary feedback provided by some of the ERADIS users.

The negative feedback we have received mainly focused at the ERADIS functionality and not the data quality aspects. The unfriendly user interface, the outdated, unclear or by times unintuitive design of ERADIS' user interface may also be a major source of errors and may impact the final data quality offered by this application.

Our attention shall be focused on two aspects:

- efforts to ensure the highest possible level of data quality and improvements to ERADIS providing system with user friendly interface and
- addressing the most pressing requirements of ERADIS users.

7.4.1. Assessment of issues and implementation of costs-efficient solutions

Data quality depends on several factors, including the actions done by data providers, who own the data and therefore are responsible for its quality. The Agency though can play a role using the only instrument available: the publication.

The future is certainly made of AI based systems validating information and then publishing data, but at present, human intervention is still required. The Agency is striving for efficiency by analysing the feasibility

of automated checks of documents[3] before they are published, but currently "manual" quality checks and publications are done by a dedicated team, internal or external.

Following the final conclusions of the Subgroup Report, we could expect that: "*by implementing all technically and legislatively possible automatic validation checks of EC Declarations and their parameters, we will increase the data quality and usability by eliminating manual errors during data entry and validation and making the whole validation process more efficient. Moreover, automatization will save time, leading to a faster upload and waiting process for an applicant and faster/ tighter quality checks for a validator*" (ARHS, 2022).

7.5. Next steps

In the meantime, we propose the following actions to be taken to address ERADIS data quality challenges.

7.5.1. Creation of the ERADIS web forum / communication platform

All ERADIS users shall have a possibility to easily approach the ERA team responsible for ERADIS maintenance / development. Collecting opinions, exchange of ideas with a broad group of ERADIS users enrich discussion on the future of this system

7.5.2. Appointment of the ERADIS users group

The role of the ERADIS users group would be to provide extra support and advice in the ERA decision making process regarding the future of the system. Once appointed, the group shall define their role, methods of work and goals to be achieved. The group shall consist of representatives from the industry representatives, state institutions – all who would like to have an impact on the future of ERADIS.

The role of the initiators of this activity could be taken by the present members of the ERADIS subgroup.

The first initiative would be to take immediate action to resolve reported, related to ERADIS issues.

As advisory ERADIS representative board, the group shall express their opinions, advices, recommendations to the IT Steering Committee, who at ERA, is responsible for the IT policy.

By this, they shall have an impact and the possibility to express the most urgent needs and define direction the ERADIS activity shall follow in the future.

Taking into account the number of comments collected and recorded in section 5.1 of the Subgroup Report, the first candidate for improvement (with 20 issues reported) would be the NoBo module and its functionality.

We shall not forget about corrections concerning EC Declaration modules as well. These two areas of ERADIS shall be treated with due attention and respect.

Both are used heavily by external users and form a part of the logical chain in the vehicle's authorisation process. Any unnecessary delays resulting from lack of functionality / flexibility in these modules may directly impact deadlines to be met by the VA Team. In this regard, a special attention and priority shall be given to maintain and support users representing NoBos and huge group of manufacturers. All possible human resources shall be assigned to ensure the timely publication of EC Certificates and EC Declarations.

Survey results (especially sections 4.11 onwards) reflect further needs for improvements from users' perspectived- as already mentioned - in NoBo module (67%) and EC Declaration modules (59% for DoV, 57% for DoC and DoS).

[3] An external company ARHS delivered in 2022 a document "ERADIS – EC Declarations, Analyses of potential automatic validation checks - Scope and Methodology".

For the remaining modules of ERADIS: 43% answers vote for improvements in certificates and ECM, 41% in Register of CSM AsBos, 33% in licences. Users are also expecting corrective action for the availability of safety related data: CSIs (42%), Investigation reports (39%), NSA/NIB Annual reports (35%).

To handle a large number of improvements in a short timeframe, a system should be set up to ensure the prioritisation of actions with the greatest return of investment. Doing so would allow the Agency to address urgent ERADIS users' needs while considering the availability of ERA human and financial resources. To support ERA in this challenging activity, the proposed ERADIS users' group shall have an important role to play.

8. Subgroup 4: Railway statistics

8.1. Background and process

The Subgroup on Railway Statistics (SG4) has been setup to address data quality issues of key railway statistics, particularly with regards to the comparability across different datasets and reports due to definitions, scope and sources used.

The members of this Subgroup are international organisations and industry bodies that collect and publish identical or similar railway statistics as part of their annual reporting, legal obligations, monitoring activity or membership management. The Agency also collects data on general railway statistics, although with a focus on the safety and interoperability domain, or uses secondary sources for its own reports, analyses and statistics.

Following a call for nominations, experts from the organisations listed below were appointed and Eurostat has been co-chairing this Subgroup.

- European Commission (DG MOVE and Eurostat)
- UIC (representing also CER)
- EIM
- IRG-Rail (members from Austria, Germany, Italy, Poland, United Kingdom)
- OECD (ITF)
- NSA Germany
- NSA Italy
- NSA Ireland
- NSA Lithuania
- NSA Luxembourg
- PRIME
- UNECE

The table below provides an overview of the data collected and the relevant publications of the organisations member of SG4.

Table 3 : Overview of organisations and data collection activities

Organisation	Data collected	Link to publications
NSA	CSI data, relevant for train-km, tonne-km, etc	CSI dataset and national purposes
Eurostat	Statistics according to Regulation (EU) 2018/643 and Common Questionnaire for Inland Transport Statistics	Transport Statistics
ITF (OECD)	Common Questionnaire for Inland Transport Statistics	ITF Transport Statistics
UNECE	Common Questionnaire for Inland Transport Statistics	UNECE Working Party on Transport Statistics (WP.6)
DG MOVE	Stats according to Commission Implementing Regulation (EU) 2015/1100 on Rail Market Monitoring Scheme TENTec and own production of a Pocketbook	RMMS Statistical Pocketbook TENTec Public Portal
IRG-Rail	Market monitoring by national rail regulatory bodies	Market Monitoring

Organisation	Data collected	Link to publications
PRIME	Platform of main IMs collecting KPIs for benchmarking as per Article 7f of Directive (EU) 2016/2370	PRIME KPI Subgroup PRIME External Report PRIME KPI Catalogue
UIC	Various statistics from UIC members, Railisa database	UIC Statistics
CER	Statistics from CER members for annual activity report	CER Annual Reports
EIM	Statistics from EIM members for annual report	EIM Annual Reports
ERA	Common Safety Method on Common Safety Targets Surveys of NSA for interoperability data	Safety and Interoperability Progress Reports Report on Railway Safety and Interoperability in the EU

During the first meeting, the members of the Subgroup stated their interest in participating in the Task Force aiming for data consistency, avoiding duplicated data collections from the rail sector and higher simplicity, comparisons and further clarifications of indicators' definitions, reasons for recurrent missing data, market coverage of results, comparisons with Eurostat indicators. The latter are in fact seen as the broadest scope in terms of geographical and market coverage of railway statistics.

Based on the categories of the Eurostat/ITF/UNECE Common Questionnaire, the Subgroup identified through a metadata survey a list of 21 published indicators that are fed with data from at least one of the organisations participating in SG4.

Table 4: Overview of indicators by organisation

N.	Indicator	ERA	DG MOVE	Eurostat	UIC	EIM*	IRG-Rail	OECD (ITF)	NSAs	PRIME	UNECE
Infrastructure											
1.	Line-km	√		√	√	√	√	√	√	√	√
2.	Electrified Line-km			√	√	√	√	√		√	√
3.	High-speed Line-km			√	√	√	√	√		√	√
4.	Track-km			√	√	√		√	√	√	
5.	Line-km equipped with ERTMS	√					√			√	
6.	Line-km part of TEN-T		√			√	√				
7.	Freight and multi-modal terminals		√				√				
Transport equipment											
8.	Rolling stock			√	√			√			√
9.	Vehicles equipped with ERTMS	√							√		
Enterprises											
10.	Number of RUs			√			√	√			√
11.	Number of IMs			√				√			√

N.	Indicator	ERA	DG MOVE	Eurostat	UIC	EIM*	IRG-Rail	OECD (ITF)	NSAs	PRIME	UNECE
12.	Revenue		√		√	√	√				
13.	Investments and maintenance		√	√	√	√	√	√			√
14.	Number of train drivers	√	√		√						
Traffic											
15.	Train-km	√	√	√	√	√	√	√	√	√	√
Transport measurement											
16.	Tonnes transported			√	√			√	√		√
17.	Tonne-km	√	√	√	√	√		√	√	√	√
18.	Passengers transported			√	√		√	√			√
19.	Passenger-km	√	√	√	√	√	√	√	√		√
20.	Modal split freight transport	√	√	√				√			√
21.	Modal split passenger transport	√	√	√				√			√

*EIM is not publishing statistics on its own, but its members company collect data for UIC, PRIME, Eurostat

In each organisation, the official naming used for the indicators may vary slightly from the list above.

SG4 held a total of 3 meetings on 20 October 2022, on 16 December 2022 and on 15 February 2023. The Agency gave a presentation at the 40th UIC Statistics Plenary meeting on 22 November 2022 to inform the UIC members of the work performed in SG4.

8.2. Data quality issues

SG4 concentrated its work on the comparability of data and therefore focused on the definitions of indicators, the geographical and market scope of reporting, the frequency and methods of data collection, the identification of data sources and of the ultimate data providers. Inconsistencies of some results and raw data have been discussed, however SG4 members preferred to bilaterally address quality issues specific to certain results, countries, years.

Among others, the Subgroup identified as major inconsistency the scope of application of the data collection on Line-km performed by Eurostat according to the Common Questionnaire and to Regulation (EU) 643/2018 (annex V ex-G) versus the data collection performed by ERA, NSAs and DG MOVE[4]. Specifically, Art. 1(3) and 1(4) of Directive (EU) 2016/797 on railway safety and Art. 2(3) and 3(1) of Directive (EU) 2016/798 on interoperability should define the lines and consequently the rail traffic and the undertakings that fall within the scope of the definition 'Union rail system'. Such scope, depending on each Member State, is supposedly made of Line-km equal or slightly smaller than the scope of the Eurostat rail transport statistics as defined by Art. 2 of Regulation (EU) 643/2018 which includes also several lines beyond the main national rail network. However, although the Safety and Interoperability Directives exclude rail networks '*functionally separate from the rest of the Union rail system and intended only for the operation of local, urban or suburban passenger services, as well as undertakings operating solely on those networks*', the legislation does not provide a specific definition of 'functionally separate' and of 'Union rail system'. In addition, the Directives allow Member States to apply additional exclusions from the scope of application for privately owned railway

[4] DG MOVE collects rail market data from Member States for the RMMS report as per Commission Implementing Regulation (EU) 2015/1100. ERA collects rail safety and interoperability data within its Registers as well as from Member States for the Common Safety Indicators

infrastructure, sidings and other minor infrastructure. Overall, the Safety and Interoperability Directives do not impose on the Member States a notification requirement to the Commission to define within their territory the 'Union rail system' and the exclusions from the scope they have applied. In fact, the definition of the scope is demanded to the transposition of the Directives in the national legal framework, thus not allowing to get a clear picture at EU level of the statistical population from which to collect data. Beside specific rail lines, another example are the rail networks of ports which are included in the scope of the Directives by some MS (e.g. Belgium and Italy) but not by others (e.g. Hamburg port[5]. In this respect, SG4 discussed the particular case of Germany whereby, based on the national transposition of the Safety and Interoperability Directives, the scope of application, data collection and NSA oversight is limited to the network of DB Netz[6] and a few other IMs while the rail regulatory body oversight and related data collection is extended to 100+ IMs.

Considering the above and without prejudice to the interpretation of EU law which remains a competence of the European Commission and of the Court of Justice of the EU, SG4 concluded that for statistical purposes '*functionally separate*' means primarily lines that are physically separated from the network of the main national IM and/or are classified at national level as lines providing exclusively very local short-range passenger services in a region. These railways may include narrow gauge lines or isolated networks.

The analysis of all the 21 indicators addressed in SG4 is clearly driven by the scope of application of the Line-km indicator which helps to segment statistics and allow each data provider and data collector to perform the necessary exclusions from the overall data they may have.

The aforementioned unclear scope of application was tested by Eurostat which compared the latest data on Line-km per MS between 3 different sources: the Common Questionnaire, the CSI data and the RINF. As shown in Annex 1, there are clearly not only scoping but also data quality issues and inconsistencies as by default the Line-km included in the Common Questionnaire scope are supposedly equal or higher than the Line-km in ERA's scope. On the contrary, the statistics show a very different picture which suggests erroneous reporting.

For rail industry bodies (e.g. EIM, UIC, PRIME) the comparability of data with official sources is largely linked to the coverage of their data collection efforts. These bodies rely in fact on data provided by their members only and, although being major RUs and IMs, they cover most but not the entire rail market.

The table below provides an overview of the scope, market coverage and data providers of the international organisations involved in SG4.

Table 5 : Overview of organisations and their main data providers

Organisation	Legal basis	Geography and market segments	Data collection method and frequency	Main data providers
European Commission **DG MOVE**	Regulation (EU) 2015/1100 EC Regulation (EU) 2017/2177 and voluntary	Union rail system in the EU27 IMs, RUs (freight and all segments of passenger transport), terminals	Every 2 years and annual Surveys based on secondary data	EU Member States (primarily Ministries of Transport and rail regulatory bodies) Terminal operators through RNE and UIRR

[5] Report 'Fostering the rail sector through the European Green Deal: Rail-Port synergies, ERA 2022 https://www.era.europa.eu/system/files?file=2023-01/fostering_the_railway_sector_through_the_european_green_deal_-_rail-ports_synergies_1.pdf

[6] On 26 January 2023 the Commission sent a letter of formal notice (ref. INFR(2022)2100) as per Art. 258 of the TFEU considering the transposition by Germany of the Safety and Interoperability Directives as incorrect due to the non-application of all the requirements to all of its regional networks. https://ec.europa.eu/atwork/applying-eu-law/infringements-proceedings/infringement_decisions/index.cfm?lang_code=EN&typeOfSearch=false&active_only=0&noncom=0&r_dossier=INFR%282022%292100&decision_date_from=&decision_date_to=&title=&submit=Search

Organisation	Legal basis	Geography and market segments	Data collection method and frequency	Main data providers
European Commission **Eurostat***	Regulation (EU) 643/2018 and Common Questionnaire	Nearly all railways in the EU27+EFTA IMs, RUs (freight and passenger transport)	Every quarter, every year and every 5 years depending on indicators. Surveys based on secondary data	EU Member States (primarily national statistical institutes and Ministries of Transport)
ERA	Directive (EU) 2016/798 - CSI data	Union rail system in the EU27+Switzerland and Norway IMs, RUs	Every year Surveys based on secondary data	National rail safety authorities
UIC	N/A	Global IMs, RUs (freight and all segments of passenger transport)	Every year Surveys based on primary data	UIC member companies (primarily national main IMs and incumbent State-owned RUs)
IRG-Rail	Directive 2012/34/EU Article 57	Main rail system in 31 European countries + other minor local IMs IMs, RUs (freight and all segments of passenger transport)	Every year Surveys based on secondary data	Rail regulatory bodies based on data collected at national level mainly from RUs/IMs
NSAs	National legislation, Directive (EU) 2016/798 - CSI data, annual reports of RUs/IMs	National rail system, scope of reporting depending on transposition of the Safety and Interoperability Directives IMs, RUs	Every year Surveys based on primary data	RUs and IMs
PRIME	Directive 2012/34/EU Article 7f	22 IMs in Europe Main track of IMs' networks	Every year Surveys based on primary data	PRIME member companies

*OECD (ITF) and UNECE collect data for the same indicators data as per the Common Questionnaire from their member countries not included in the Eurostat scope (EU27+EFTA+Kosovo)

During its meetings, SG4 discussed each indicator to exchange views on possible issues with definitions, scope, challenges of data collection or analysis, overlaps between reporting lines and specific recommendations. The definitions of the 2019 Glossary for Transport Statistics by Eurostat/ITF/UNECE has been used as a basis for most of the indicators.

Table 6 : Key findings on data quality by indicator

N.	Indicator	Key findings	Key challenges for data quality
		Infrastructure	
1.	Line-km	➢ UIC definition also includes line-km within workshops and marshalling yards, but IMs in Europe do not apply this provision systematically ➢ The correct length of Line-km in scope of the data collection performed by different organisations can be known only at local/IM level ➢ IRG uses route length definition instead and excludes 'non-public' track-km;	➢ The scope of application of the Interoperability and Safety directives is dependent on the national transposition of the Directives in national law and on the relevant exclusions that MS may have opted for certain lines/networks

N.	Indicator	Key findings	Key challenges for data quality
			➢ Beside comparing results per country across different international organisations, data quality is hard to ensure if data submitters do not clearly know the scope of application. Diverging results per country may be due to mistakes or misunderstanding of the scope
2.	Electrified Line-km	➢ Eurostat include in the statistics all lines where at least one track is electrified ➢ The cases of possible misalignment of statistics where only one track of a double tracks line is equipped are rare ➢ ERA's RINF has current information on all the parameters of the installed energy subsystem while UIC data provide information on the installed traction current	
3.	High-speed Line-km	➢ The EU legal basis is clear with the Interoperability Directive, Art. 2(b) of EC Regulation (EU) 2015/1100 (RMMS), Common questionnaire and UIC defining dedicated lines with speed >=250 km/h and 'upgraded lines with speed >=200 km/h as high-speed infrastructure	➢ The definition available in Annex I point 1 of the Interoperability Directive leaves some room for interpretation: ○ *(a) specially built high-speed lines equipped for speeds **generally** equal to or greater than 250 km/h;* ○ *(b) specially upgraded high-speed lines equipped for speeds **of the order of** 200 km/h;* The words 'generally' and 'of the order of' open the door to interpretation. In particular for b), it is questionable if specific short sections of lines with maximum speed 200 km/h should be accounted for in the indicator of high-speed Line-km.
4.	Track-km	➢ Eurostat accounts for the main running and other tracks including sidings but excluding tracks maintained but not operated; ➢ For ERA (RINF and CSI) each track of a multiple-track railway line is counted including sidings (unless used only for shunting). Private sidings, tracks at warehouses/depots/workshops are excluded; ➢ UIC includes sidings, junctions, tracks in workshops, sidings not for public access; ➢ PRIME excludes track-km within service facilities as they focus on 'main track-km'	➢ Beside the issue of scope of application, different organisations require certain exclusions of infrastructure for this indicator. Since there is no harmonisation, results across different sources may differ slightly
5.	Line-km equipped with ERTMS	➢ ERA is publishing country-level statistics in its Report on Safety and Interoperability based mostly on information available in RINF ➢ DG MOVE is publishing data on ERTMS deployment, but these statistics are limited to the lines part of the TEN-T network	
6.	Line-km part of TEN-T	➢ Detailed statistics including geo-mapping (TENTec database) are available from DG MOVE	➢ Accounting for rail nodes and Line-km belonging to multiple corridors

N.	Indicator	Key findings	Key challenges for data quality
		➢ Data can be best sourced from DG MOVE instead of data collection questionnaires to IMs and Member States' authorities	
7.	Freight and multi-modal terminals	➢ There is a slight difference in definitions available from EU law given that the RMMS Regulation states '*freight terminal' means a place equipped for the transhipment and storage of intermodal transport units, where at least one of the modes of transport is rail*' while Art. 11(b) of Regulation (EU) 1315/2013 (TEN-T) states '*Rail infrastructure shall comprise… freight terminals and logistic platforms for the transhipment of goods within the rail mode and between rail and other transport modes.'* ➢ The Rail Facilities Portal contains data on terminals collected as per EC Regulation (EU) 2017/2177, however the list of terminals and their location is not available for download	➢ Reporting mistakes due to data submitters not understanding the details of Freight Terminal definition across different legal basis ➢ Statistics collected directly from stakeholders without using data from the Rail Facilities Portal
		Transport equipment	
8.	Rolling stock	➢ ERA has in the European Vehicle Register (EVR) comprehensive information on the entire EU fleet however, according to the current EU legal basis (EC Decision (EU) 2018/1614), the EVR is unfortunately not publicly available. Although statistics are currently not published, ERA applies the principle of counting vehicle registrations. Therefore, in the case of a trainset composed of 8 coaches, each coach has its own registration number and therefore there will be 8 different registration numbers for each coach composing a trainset that can be separated only in workshops. ➢ For UIC statistics on *tractive stock* for EMU/DMU (i.e. trainsets) like the TGV are accounted as one tractive vehicle, regardless of the number of coaches (i.e. bodies of MUs with passenger seats) composing the trainset. While for *passenger stock*, if for example a trainset (i.e. MU) is made of 8 coaches then it is counted as 8 bodies of MU. ➢ UIC statistics refer to vehicles operated by RUs regardless of if they are owned or leased and of the country of registration. Vehicles under repair are also excluded. For UIC leased vehicles are assimilated to ownership by a RU if leased for more than 1 year. ➢ Results of country-level statistics may differ if the country of registration or the country of main operation of the vehicle (operating RU) is considered	➢ How to account for passenger trainsets ➢ How to allocate to country-level statistics leased vehicles ➢ Risk of not capturing data from all RUs with results biased on incumbent/main/national companies ➢ Language issues creating difficulties for data submitters to understand the different definitions of vehicles (e.g. railcars vs trainsets)
9.	Vehicles equipped with ERTMS	➢ ERA is publishing statistics in its Report on Safety and Interoperability following an annual voluntary survey of NSA. More precisely ERA publishes the number of on-board units instead of number of vehicles equipped.	➢ Responsiveness and accuracy of ERA data based on NSA surveys is not great ➢ ERA is unable to feed Eurostat with reliable statistics from its registers since the EVR has missing references to ERATV on vehicle types ➢ How to account for trainset like high-speed trains as they may have

N.	Indicator	Key findings	Key challenges for data quality
			one ERTMS on-board unit in each of the two cabins, or one.
		Enterprises	
10.	Number of RUs	➢ The available Eurostat data based on MS' submissions is very fragmented. Some bias also present due to the indicator 'integrated companies' used (e.g. RU+IM not unbundled, holding groups controlling RUs and main IM) ➢ IRG is collecting data on 'active RUs' and therefore they survey their members according to 'active licences' since there are several cases of companies that hold a valid licence but are not operational on the market ➢ The records in the OCR register at ERA do not allow reliable results to estimate this indicator	➢ Making statistics using the number of licences or safety certificates is an opportunity to fill this indicator. However, there are some risks of bias due to valid licences belonging to companies not active in the market, changes of legal entities and therefore licences and safety certificates due to M&A ➢ Risk of bias due to vehicle manufacturers holding a licence and a safety certificate but not being a RU ➢ How to produce country-level statistics with consideration of profiled enterprises and the treatment of foreign subsidiaries of large RUs with respect also to Structural Business Statistics. Large RU groups may also control multiple RUs in the same country ➢ The scope of application of the Interoperability and Safety directives is dependent on the national transposition of the Directives in national law and on the relevant exclusions that MS may have used for certain lines/networks. As a consequence, RUs with exclusive operations on those lines/networks are to be excluded from relevant statistics on the 'Union rail network'
11.	Number of IMs	➢ The available Eurostat data based on MS' submissions is very fragmented ➢ According to Art. 12(5) of Directive (EU) 2016/798, NSAs shall inform ERA of the IMs' safety authorisations that they issue, renew, amend or revoke. However, this provision is not consistently implemented, and ERA does not have reliable data. Moreover, safety authorisations are not mentioned among the documents that ERA has to store in its registers according to Art. 37 of Regulation (EU) 2016/796 ➢ IRG is collecting data from its members. However, in some MS like Germany the rail regulatory body is in charge of the oversight of 100+ IMs much beyond the scope of application of the Safety and Interoperability Directive. These secondary IMs are not minor as they account for about 15% of the German rail network (about 5600 km of lines) ➢ Some NSA publish on their website the list of IMs present in the country (e.g. EBA in Germany) or the safety authorisations they have issued (e.g. ANSFISA in Italy)	➢ The scope of application of the Interoperability and Safety directives is dependent on the national transposition of the Directives in national law and on the relevant exclusions that MS may have opted for certain lines/networks ➢ In some countries, there are many individual IMs (e.g. very small IMs in Germany controlled by regional governments) in charge of only few kilometres of line due to institutional reasons. These cases risk to pollute the data for this indicator

N.	Indicator	Key findings	Key challenges for data quality
		➢ The number of valid safety authorisations per year is a reliable representation of this indicator, provided the scope of application of relevant legislation is clarified ➢ The IM codes available in RINF, derived from the OCR register at ERA, do not allow reliable results to estimate this indicator	
12.	Revenue	➢ IRG, DG MOVE and UIC collect revenue data at different degree of detail of market segments and for different purposes ➢ IRG and DG MOVE collect secondary data through surveys, while UIC collects primary data from its RUs and IMs members. No organisation collects annual accounts of RUs/IMs	➢ Data risk to be polluted by other sources of revenue not related to rail transport business such as real estate ➢ Data comparability and coherence can be impacted by the financial year of companies, when not corresponding to the calendar year ➢ Public funds are very difficult to account for given such revenues may be generated by diverse type of transactions: compensation for PSO contracts of RUs, investment grants (from EU, national or regional public bodies), equity capital injection, infrastructure maintenance or investment ➢ RUs/IMs may use diverging accounting principles for public funds
13.	Investments and maintenance	➢ Eurostat is collecting data on capital investments on the infrastructure (new, upgraded or renewed), on rolling stock (new or upgraded) as well as data on recurrent maintenance of the infrastructure. However, the response rate is low ➢ DG MOVE collects data for RMMS but only on infrastructure and with information on the source of funding being public, EU or own funding of IMs ➢ UIC collects generic data on infrastructure, passenger, freight, rolling stock and other investments	➢ It is unclear if the spending on maintenance includes labour or only capital ➢ For Eurostat data the main bias is that they only capture public sector spending in terms of allocation or actual spending in the reporting year thus missing data of investments and maintenance financed by RUs/IMs with own funds or by regional/local authorities ➢ The data is mostly sourced by submitters from the States' budgets, therefore the yearly allocation follows an income approach and not the capital approach with depreciation of really completed/on-going investments. ➢ The data collection method through surveys of MS' authorities risks to provide partial or bias results, not capturing all RUs/IMs and their own investments financed without public funds
14.	Number of train drivers	➢ ERA publishes this indicator as number of drivers with an EU licence following a survey of NSAs ➢ DG MOVE is collecting data for RMMS on the number of employees of which drivers ➢ UIC collects data on drivers using as definition the mean annual FTE	➢ Licenced drivers may not hold a complimentary certificate and therefore be inactive ➢ Self-employed drivers, not employees of a RU, are difficult to account for

N.	Indicator	Key findings	Key challenges for data quality
		➢ Yearly statistics for this indicator would be very important given the alleged scarcity of train drivers in the EU	➢ The current legal basis of Directive 2007/59/EC prescribes national registers of issued driving licences which are not interoperable. The IMI register is not fit for statistical analyses ➢ It is hard to produce statistics on complementary certificates as these are hold by RUs and specific to given lines/operations to which each driver is assigned
		Traffic	
15.	Train-km	➢ Actual and not planned train-km are accounted for ➢ Test runs of rolling stock to be included since such trains consume infrastructure capacity and contribute to wear and tear of the tracks ➢ Gross hauled tonne-km of trains is a better indicator to show wear and tear of infrastructure ➢ Certain countries flag data to Eurostat as confidential while they submit publicly available data to ERA	➢ Risk of not capturing data from all RUs with results biased on incumbent/main company
		Transport measurement	
16.	Tonnes transported	➢ Negligible difference of definitions between Eurostat and UIC, except wording (see Annex 3 for further details) ➢ Gross-gross weight includes packaging and the tare weight of the wagon (definition A.V-15 of 2019 glossary for transport statistics) = net tonnage according to UIC rail lexique	➢ Risk of not capturing data from all freight RUs with results biased on incumbent/main company ➢ Reporting mistakes due to data submitters not understanding the details of the tonnes definitions ➢ The treatment of rolling highways in combined transport
17.	Tonne-km	➢ Same situation as for tonnes transported (gross-gross in 2019 glossary for transport statistics = net tonnes-km for UIC, see Annex 3 for further details) ➢ Unclear how empty freight train runs are accounted ➢ Certain countries flag data to Eurostat as confidential while they submit publicly available data to ERA	➢ Risk of not capturing data from all freight RUs operating in a country with results biased on incumbent/main company ➢ Collecting country-level data from large RU groups with operations in multiple countries, through subsidiaries and with high cross-border traffic
18.	Passengers transported	➢ Indicator not considered informative for country-level statistics	➢ Risk of double counting in case of multi-carrier trips ➢ Low accuracy of passenger volumes on trains without reservation and of passengers with travel passes instead of single tickets
19.	Passenger-km	➢ Unclear definition and data segmentation for urban/sub-urban/light rail/regional/local passenger trains ➢ Certain countries flag data to Eurostat as confidential while they submit publicly available data to ERA ➢ Misaligned definitions of high-speed services in EU law:	➢ Risk of not capturing data from all passenger RUs operating in a country with results biased on incumbent/main company ➢ Collecting country-level data from large RU groups with operations in multiple countries, through subsidiaries and with high cross-border traffic

N.	Indicator	Key findings	Key challenges for data quality
		○ Art. 3(36) of Directive (EU) 2016/2370 (new Recast Fourth Railway Package market pillar) uses as definition the speed thresholds services running on dedicated lines at speed equal to or greater than 250 km/h. However, the law includes also, for services to be labelled as high-speed, to be 'operated without intermediate stops between two places separated at least by a distance of more than 200 km'. ○ Art. 2(b) of EC Regulation (EU) 2015/1100 (RMMS) considers high-speed services all trains operated with high-speed rolling stock that travel at least 200 km/h for at least part of the service and the use of high-speed infrastructure is not always necessary.	➢ Certain sub-urban services excluded from statistics by data submitters (e.g. RER trains in Paris not operated by SNCF but by RATP) ➢ Conflicting EU legal bases on the definition of high-speed services ➢ Definition of high-speed services from Art. 3(36) of Directive (EU) 2016/2370 too restrictive with risk of biased statistics, for example reporting almost no high-speed services in Italy and Germany, due to the very stringent requirement of the >200 km between intermediate stops
20.	Modal split freight transport	➢ Eurostat, DG MOVE and ERA publish this indicator which is calculated in-house based on traffic and transport measurement data	➢ Comparing results of rail modal split across organisations may be biased by the composition of the competing modes (all transport modes, only land transport, treatment of transport by pipeline, including extra-EU transport or not) ➢ Inability to consider domestic transport modal split vs international transport modal split if data not collected accordingly ➢ The treatment of combined transport
21.	Modal split passenger transport	➢ Eurostat, DG MOVE and ERA publish this indicator which is calculated in-house based on traffic and transport measurement data	➢ Comparing results of rail modal split across organisations may be biased by the composition of the competing modes (all transport modes, only land transport, treatment of urban modes and shared mobility, including extra-EU transport or not) ➢ Inability to consider domestic transport modal split vs international transport modal split if data not collected accordingly

8.3. Impact of data quality issues

Differences in scope, unclear definitions and a lack of understanding of the indicators generate data quality issues of railway statistics. In fact, it is very difficult to perform quality checks of diverging results across sources of country-level statistics if scope and definitions are not clear for the ultimate data providers. A misunderstanding of what to report can hide a clerical error of data submission.

The published statistics are extensively used by researchers, consultants and policy makers to produce studies, analyses and monitoring the development of the rail sector and its performance. Policy measures, investments and forecasts are based on and designed around published statistics. Data quality issues thus can generate distortions or uninformed decisions if the data sources are not coherent and reliable.

As an example, Eurostat compared its latest data on rolling stock with UIC data. As shown in Annex 3, there are clearly not only scoping but also data quality issues and inconsistencies as by default the Eurostat data is supposedly equal or higher than the UIC data since in the latter the RUs not member of UIC active in a country are excluded.

8.4. Recommendations

The Subgroup concluded its work by providing in the table below a list of recommendations with regards to each of the indicators analysed. These recommendations are to be considered as an informed and robust advice aimed at informing rail stakeholders, data providers, data analysts, policymakers and overall, the organisations involved in railway statistics. The recommendations could be used as a source to update definitions in guidance documents and data collection questionnaires to best inform data providers and achieve a higher quality of data. An important source with lots of potential for statistical analyses are the ERA Registers which, although historically not designed for statistical purposes, are a prominent reliable source of primary data. Using more ERA Registers will allow an increase of statistical accuracy and reduce the cost and effort on Member States and rail industry of recurrent and uncoordinated data collection processes through surveys.

Table 7 : Recommendations of SG4

N.	Indicator	Recommendations
1.	Line-km	➢ Data is to be collected by clearly indicating the applicable definitions and/or legal basis to allow data submitters to consider the relevant exclusions of Line-km. This will allow coherent comparisons of the differences between statistics published by different organisations ➢ Data collectors need to be clear in their questionnaires/guidance documents on the scope of application of their statistics and on the relevant exclusions of specific tracks to be performed (lines, sidings, tracks in depots, etc)
2.	Electrified Line-km	➢ N/A
3.	High-speed Line-km	➢ The definition applied should follow the EU legal basis (Interoperability Directive and Art. 2(b) of EC Regulation (EU) 2015/1100 (RMMS)) 'dedicated lines' with speed clusters >= 250 km/h and 'upgraded lines' with speed >= 200 km/h'. For general statistics on high-speed Line-km, >= 250 km/h is the threshold to be applied ➢ Access lines to dedicated high-speed lines are to be included
4.	Track-km	➢ Data collectors need to be clear on the scope of application of their statistics and on the relevant exclusions of specific tracks (sidings, tracks in depots, etc)
5.	Line-km equipped with ERTMS	➢ The scope of application needs to be clear, if country-level statistics include all Line-km or only those belonging to the TEN-T corridors ➢ It is advisable to publish statistics not only as absolute values but also as % of track-km equipped compared to the total network in scope instead of simply the total number of track-km equipped in a country/corridor
6.	Line-km part of TEN-T	➢ For corridors made of parallel routes, all relevant line-km are to be counted
7.	Freight and multi-modal terminals	➢ When collecting data on freight terminals, it is important to clarify the definition of 'freight terminals' in scope, if they are to include only intermodal terminals where rail is one of the modes or also other rail-only freight terminals ➢ Extracting data from the Rail Facilities Portal should be facilitated and used as a key source of terminal data, reducing the burden on data collection from industry. Additionally, the provision of terminal data through RINF could address this issue.
8.	Rolling stock	➢ For statistics with vehicle-type level of detail, it is important that the relevant definitions are clear to allow data providers to count for example high-speed trains as 1 trainset or number of railcars composing a trainset (if accounting for tractive vehicles or passenger transport assets). Drawings and examples in guidance documents are helpful ➢ The data collector needs to state if country-level statistics are to be fed with vehicle data based on country of registration (preferred method) or country of main operations and what methodology is to be applied for leased vehicles

N.	Indicator	Recommendations
		➢ Broader access to EVR data should be provided [7]. The publication of country-level aggregated statistics has no concern on companies' business data confidentiality and would reduce pressure on data providers. Moreover, sourcing primary data from the vehicle register instead of surveys is the most reliable and accurate data collection process, similarly to the sourcing done for road vehicles statistics
9.	Vehicles equipped with ERTMS	➢ Broader access to EVR data should be provided[8]. The publication of country-level aggregated statistics has no concern on companies' business data confidentiality and would reduce pressure on data providers. Moreover, sourcing primary data from the vehicle register instead of surveys is the most reliable and accurate data collection process, similarly to the sourcing done for road vehicles statistics ➢ EVR accuracy is to be improved, registration entities shall ensure proper referencing of vehicles' characteristics with ERATV and log of restriction codes in order to allow data extraction from EVR for analytical purposes regarding safety and interoperability. This will also increase the overall accuracy of the register for safety and interoperability purposes ➢ It is advisable to publish statistics not only as absolute values but also as % of the total tractive fleet registered in a country. The absolute number would always bias the data visualization on larger countries ➢ The data requestor for statistics need to state if data is requested as number of on-board units or tractive vehicles equipped. It is important also to explain in guidance documents how to account for trainset like high-speed trains as they may have one ERTMS on-board unit in each of the two cabins or one for the whole trainset
10.	Number of RUs	➢ The data collector needs to state that country-level statistics are to be based on the number of active RUs (usually licenced and with a valid safety certificate). Holding companies of large RU groups are not to be accounted ➢ Data collectors need to be clear in their questionnaires/guidance documents on the scope of application of their statistics and on the relevant exclusions of RUs to be performed ➢ A foreign-owned RU is to be counted in country-level statistics of the country of licensing (most often, it has created an affiliate as a local legal entity, but some RUs use the same license to operate in multiple countries) ➢ The data collection method/analysis need to be clearly stated (e.g. if statistics are based on surveys, active RUs, licences and/or safety certificates). For the time being, a data scraping exercise from registers backed-up by results of surveys is a best practice to come to more accurate numbers ➢ The extraction of licences and safety certificates data from ERADIS could be, with certain assumptions/considerations on robustness and completeness, used as a proxy to produce country-level statistics for this indicator ➢ A proper common organisation identifier across rail databases should be ensured
11.	Number of IMs	➢ NSAs shall systematically implement Art. 12(4) of Directive (EU) 2016/798 and regularly submit data on IMs' safety authorisations to ERA ➢ The data collection method/analysis need to be clearly stated. A data scraping from registers is a best practice (however, the consistency between RINF and ERA Organisation Codes database is to improve) ➢ An EU register of safety authorisations, for example within ERADIS which is already storing RUs' licences and safety certificates, is recommended ➢ A proper common organisation identifier across rail databases should be ensured
12.	Revenue	➢ Statistics on revenue should be collected as 'operating revenue from rail-related activities of RUs or IMs'. If different definitions are to be applied, clear guidance is to be provided in documents/data collection questionnaires. ➢ Statistics on revenue from public sector funds should be collected by breaking-down the type of revenue (payment for services, grants for capital investments, equity

[7] Making EVR public requires an amendment to Commission Implementing Decision (EU) 2018/1614. For statistical purposes, the public access to EVR could continue to remain restricted with regards to the identity of vehicle owners/keepers given that the main purpose is allowing the public to access vehicle fleet numbers and vehicle details at country-level aggregated level. Personal data available in EVR will continue to be protected according to applicable EU and national legislation.

[8] Same as above for indicator 8. Rolling Stock

N.	Indicator	Recommendations
		capital injections) and allocated to the reporting year using the income approach. Relevant definitions to be made clearer in guidance documents/data collection questionnaires by referring to the IAS 20 standard.
13.	Investments and maintenance	➢ The data collection guidance documents/questionnaire need to clarify if the income approach is expected, if the calendar year is the reference timeframe, what is to be included in maintenance data (if only capital or also labour) and what is the source of funding (public or own capital of companies).
14.	Number of train drivers	➢ Within the upcoming revision of Directive 2007/59/EC, it is important to consider new provisions on registers to allow for statistical purposes simple data extraction on the licences valid and issued per year
15.	Train-km	➢ The methodology applied by primary data providers needs to clearly outline if actual (recommended) or planned train-km are accounted and if traffic from other trains not in RU commercial use (test runs for rolling stock, maintenance yellow fleet trains) is included ➢ The country-level statistics shall also include traffic from foreign-owned RUs
16.	Tonnes transported	➢ The methodology applied by primary data providers needs to clearly outline the country of loading principle for international trains and what definitions are used for tonnes transported (payload only, packaging included, etc)
17.	Tonne-km	➢ Country-level statistics shall also include traffic from foreign-owned RUs on the country's territory ➢ The methodology applied by primary data providers needs to clearly outline how and if empty freight train runs are accounted, the country of loading principle for international trains and what definitions are used for tonnes transported (gross-gross, gross, net, etc)
18.	Passengers transported	➢ The methodology applied by primary data providers for collecting ridership data needs to be clearly outlined (surveys, tickets sales data, tickets checked/scanned, load factor data, etc) including the methodology to estimate passenger volumes on trains without mandatory reservation and of passengers with travel passes instead of single tickets
19.	Passenger-km	➢ The methodology applied by primary data providers for collecting ridership data needs to be clearly outlined including the country of embarkation principle for international trains ➢ The country-level statistics shall also include traffic from foreign-owned RUs ➢ The definition of urban/sub-urban rail services remains challenging for statistics. It is best to collect data not based on the commercial classification of services but rather based on the type of rolling stock used and the Functional Urban Area concept[9] in conjunction with the definition from Art. 3(6) of Directive (EU) 2016/2370 (new Recast Fourth Railway Package market pillar) ➢ It is important to define if light rail transport is included in the statistics and if not exclude relevant traffic according to the definitions available in EU law. From a rolling stock perspective, Art. 2 (29) of Directive (EU) 2016/797 (interoperability) and art. 3(16) of Directive (EU) 2016/798 (safety), while from a rail services perspective Art. 3 (10) of Regulation (EU) 2018/643 (Eurostat rail stats) ➢ Statistics on high-speed services to be collected according to the services operated by high-speed rolling stock that use high-speed infrastructure for at least part of the journey. The relevant speed clusters are to be aligned with the definition used for infrastructure: >200 km/h for upgraded lines or >= 250 km/h for dedicated lines. For general statistics on high-speed passenger-km, >= 250 km/h is the threshold to be applied.

[9] EU-OECD developed in 2019 a harmonised definition of a Functional Urban Area which allows, following a methodology, to define urban centres, cities, commuting zones. This is also linked to the proposed update of the TEN-T regulation, where FUA is used for SUMP and urban nodes

N.	Indicator	Recommendations
20.	Modal split freight transport	➢ The methodology for calculating the modal split with regards to competing modes needs to be clearly outlined, particularly the relevant exclusions applied (e.g. extra-EU transport, international transport, etc) need to be clearly outlined
21.	Modal split passenger transport	➢ The methodology for calculating the modal split with regards to competing modes needs to be clearly outlined, particularly the relevant exclusions applied (e.g. extra-EU transport, international transport, etc) need to be clearly outlined

8.5. Next steps

SG4 members were very satisfied with the results produced, achieved through active participation in just three meetings. The work on comparing definitions of indicators and experiences on collecting data for railway statistics across different international organisations, allowed to break silos, exchange, brainstorm and get inspiration for improving data collection and updating guidance documents used by the organisations involved. SG4 members praised ERA for the initiative and asked to extend the work of SG4 in whatever possible format. An example, based on which future interactions could be shaped, is the Thessaloniki forum which is a Commission expert group involving regulators of airports.

In a possible follow-up of SG4, work should focus more on the local/national level to reach the ultimate data providers (RUs/IMs) to discuss discrepancies of results as well as feed providers with appropriate guidance materials and training to understand the scope of application, the purpose and the definitions applied by different data collection exercises performed by different organisations.

9. Cross-cutting recommendations and conclusions

The Task Force mapped data quality issues, defined the target situation and gave recommendations to improve data quality in four fields of railway data. Beyond the subgroup specific findings, there are recommendations that are more broadly applicable. The table below gathers these cross-cutting recommendations for data providers, data collectors, and the Agency in particular. When the word data collectors is used, it refers to all organisations involved in the Task Force which request and bundle railway data.

Table 8 : Cross-cutting task force recommendations

Category	Observation	Recommendations
1. Scope	- Railway data is provided by a large number of organisations. Differences are typically not easy to explain due to unclarity on scope(s) and the remit of the data collectors (see Table 5) - There is no structured overview of which part of the Union rail system falls under the Interoperability and Safety Directives, and which parts are excluded according to Art. 1(4) of Directive (EU) 2016/797 and Art. 2(3) of Directive (EU) 2016/798 - Data providers can easily make mistakes (e.g. under or overreport) if the different scopes are not properly understood - Users of railway statistics can have difficulties to understand to what extent statistics are accurate and relevant for their use case	1.1 Member States should be encouraged to explicitly specify the network(s) or lines(s) that fall outside the scope of application of the Interoperability and Safety Directives. The EC may consider issuing interpretative guidelines on how to best report on the networks/lines outside of scope including the treatment of specific infrastructure such as sidings and ports 1.2 Data collectors should explicitly communicate on the scope that is covered. For indicators that are collected by multiple organisations, data collectors should clarify how the scope differs from other data collectors. For this, guidelines should be properly adjusted
2. Definitions	- Beyond differences in scope, inconsistencies in definitions for indicators are a main source of variance in data quality - The complexity of a definition is an additional source of variance	2.1 Data collectors should continue to simplify and clarify definitions where possible 2.2 Data collectors should promote that harmonised definitions are adopted to the greatest possible extent. This will facilitate data sharing and reduce the administrative burden for data providers 2.3 Data collectors should provide sufficiently detailed guidance on interpreting definitions with examples and where helpful drawings to facilitate an accurate understanding amongst data providers 2.4 Alignment of statistical definitions in processes and procedures of data providers should be promoted
3. Administrative burden – Data access and provision	- ERA registers have not been set up for statistical purposes. In absence of credible alternative sources, they do carry great statistical value - Because registers are not fully leveraged for statistical information, additional data collection efforts amongst providers take place, which is a misalignment with the 'once only' principle - The EVR is not publicly accessible, limiting the sector's insights into rolling stock. In aviation and maritime, such databases are readily available - NSAs inform the Agency by email about IM safety authorisation. The reporting happens erratically, increasing the administrative	3.1 The use of ERA registers for statistical purposes could reduce administrative costs and improve the accuracy of providing and collecting statistics across the railway sector. The possible statistical relevance of registers should be acknowledged when drafting legislation with regards to data access and utilisation rights 3.2 The EVR Decision could be amended to allow broader access to vehicle data, at least in aggregated form per MS 3.3 An ERADIS module should be created to register IM safety authorisations in a standardised way in compliance with Safety Directive Art 12(4)

Category	Observation	Recommendations
	burden for parties wishing to identify the IMs that are authorised in each MS	
4. Administrative burden – Usability of ERA registers	- The technical functionalities (e.g. user interfaces) of some ERA registers were deemed to be suboptimal, which impedes data entry and analysis	4.1 Register users are encouraged to propose change requests concerning the efficient usage of the systems. The most pressing changes should be prioritised to lower administrative burdens and improve accessibility
5. Governance – Coordination	- Coordination between railway data providers and data collectors is deemed critical to harmonise the interpretation of definitions, clarify differences in scope, improve reporting practices and promote greater data quality - It was noted that insufficient coordination mechanisms exist in the discussed areas	5.1 Existing groups can be leveraged (e.g. RINF Joint Workgroup, CSI contact points) to periodically explicitly address data quality issues 5.2 For registers (such as ERADIS) communication channels should be set up to ensure that users can easily provide feedback 5.3 Where no group exists and the added value is evident, one should be set up. In the field of railway statistics the Eurostat expert group on Rail Transport Statistics, could be complemented with an initiative, similar to an initiative like the Thessaloniki Forum in the field of Aviation, to broaden participation and scope. These groups are critical to follow up on the recommendations of this task force
6. Governance – Quality assurance	- The subgroups identified several data quality issues specifically at country level - An increase in the number of steps and actors involved in data provision negatively impacts the accuracy, consistency, and timeliness of data - There exists a need to address structural data quality issues on a country specific level, which requires a concerted involvement of data providers and data collectors	6.1 Eurostat is encouraged to initiate country data quality reviews in the field of railway statistics, analogous to its national accounts process. In each country review, data providers (e.g. RUs, IMs) and data collectors collectively evaluate the quality of data as reported by providers in that country: ➢ Six countries could be targeted each year, so that all countries in scope are covered in a five-year cycle ➢ Prior to the meeting, data providers indicate practical and methodological difficulties with retrieving data. Data collectors identify and share all detected quality issues ➢ This process facilitates harmonisation and improves the quality of reporting
7. Data quality processes and resources	- The responsibility for assuring data quality is by default assigned to the data provider - In many cases, the data collector is well positioned to cross-check data quality and spot potential issues - Data quality assurance is a laborious process that, depending on the scope of activities, requires substantial resources - Amongst data collectors, there are varied data quality practices and procedures, in terms of iterations, scope, depth, and interactions with involved stakeholders. - Reasons for data collectors not to invest in data quality assurance can be the perceived by the lack of primary responsibility and the limited availability of resources	7.1 Data collectors should acknowledge that they are well positioned to detect data anomalies and contribute to data quality in ways that single data providers cannot. 7.2 Data collectors are encouraged to share practices and scripts to detect anomalies 7.3 Data collectors should be adequately resourced to perform quality assurance of their datasets and registers 7.4 Data collectors should proactively engage data providers when anomalies are detected to ask for clarifications and corrections if needed

Category	Observation	Recommendations
8. Railway organisation identifiers	- Unique alphanumerical organisation identifiers for the railway sector have been introduced by means of Commission Implementing Decision (EU) 2018/1614 - Organisation variables occur in multiple registers. They are however not structurally identified by this unique code. This complicates completeness checks and analyses	8.1 Data collectors should introduce organisation identifiers in applicable registers, to promote linked data and facilitate reporting 8.2 Considering the possible greater use of the organisation identifier across multiple databases, an evaluation of the OCR would be beneficial to ensure that it is fit for purpose and to improve the quality of data currently included in the OCR register

The Agency's Analysis Team shall promote the uptake of these recommendations within the Agency and beyond. The responsibility for the follow-up of each recommendation shall be coordinated within the Agency. It is also noted that the Agency's Linked Data activities contribute to the implementation of several recommendations. The Economic Steering Group shall be informed on the progress in these fields.

ERA wants to warmly thank all participants to the Task Force for their involvement and strong contributions. A special thanks goes out to Eurostat for dedicating a considerably amount of time to make the Task Force a success.

A concluding remark is that this Task Force has a clear focus on four distinct topics. Considering the fruitful experience, the Task Force recommends that data quality is more actively discussed and assessed with regards to other fields and registers.

Annex 1 Comparison of line-km

This comparison by Eurostat on rail network lengths (line-km) for reference year 2020 was established on 18 October 2022.

Line-km Year 2020	Eurostat/ITF /UNECE Common Questionnair	RINF	ERA CSI item R08	diff ERA CSI / CQ	Comments on findings
AT	5,607	5,221	5,299	-5%	The 225 km of narrow gauge network seem excluded from RINF and ERA CSI
BE	N/A	3,907	3,618		Data in the CQ are missing
BG	4,029	3,726	4,029	0%	The 125 km of narrow gauge network seem excluded from RINF (not from ERA CSI)
CH	5,317	5,843	3,837	-28%	The 1.386 km of narrow gauge network seem excluded from ERA CSI (not from RINF)
CZ	9,542	9,662	9,599	1%	The 102 km of narrow gauge network seem excluded from RINF, however the total Line-km are surprisingly higher than in the other two databases
DE	38,394	34,252	33,299	-13%	The CQ data refer to 2019. The 513 km of narrow gauge seem excluded from RINF and ERA CSI, however the unbalance of results is very large especially for RINF
DK	1,998	2,048	2,633	32%	ERA CSI and CQ include 172 km of regional S-train, while ERA CSI and RINF seem to include also 38 km of Copenhagen metro and 110 km light rail and 487 km of local train lines
EE	1,167	1,011	1,167	0%	Given the perfect consistency between CQ and ERA CSI, it is unclear why there are still 156 km missing in RINF
EL	2,345	3,021	2,345	0%	Given the perfect consistency between CQ and ERA CSI, it is unclear why there are a lot more km in RINF
ES	16,135	15,316	15,519	-4%	Some 459 km on 1.671 km narrow gauge lines seem to be excluded from RINF
FI	5,918	5,726	5,918	0%	Given the perfect consistency between CQ and ERA CSI, it is unclear why there are still 192 km missing in RINF
FR	26,838	27,915	30,000	12%	30.000 km in ERA CSI side are likely an approximation
HR	2,617	2,436	2,617	0%	We cannot guess what are the missing 181 km in RINF
HU	7,787	5,260	7,687	-1%	There are likely 309 km of narrow gauge and 37 km of large gauge excluded from RINF. There are about 2100 km missing in RINF.
IE	2,045	N/A	1,683	-18%	Ireland is missing in RINF. We cannot guess what are the missing 362 km in ERA CSI compared to the CQ, potentially a different applicable legal scope
IT	16,782	16,258	17,536	4%	CQ and RINF are a bit closer than ERA CSI
LT	1,910	1,763	1,910	0%	There are more than 100 km missing in RINF
LU	271	279	275	1%	Despite the small size of the network, there is no perfect matching
LV	1,859	1,505	1,859	0%	It seems there are 33 km of narrow gauge excluded from RINF, however it is hard to understand the important discrepacy with the other two databases
NL	3,041	3,027	3,075	1%	
NO	3,851	3,907	4,208	9%	The km in ERA CSI is surprisingly much higher than in the other two databases
PL	19,383	19,802	19,404	0%	
PT	2,526	2,451	2,526	0%	The 96 km of narrow gauge lines seem excluded from RINF, however the results for RINF and ERA CSI are not matching
RO	10,769	10,355	16,863	57%	The line-km in ERA CSI have a major inconsistency. Moreover, it is hard to understand while on the contrary there is fairly good matching between CQ and ERA CSI for the track-km indicator
SE	10,909	10,824	10,826	-1%	
SI	1,209	1,195	1,209	0%	Minor discrepancy for RINF
SK	3,627	3,841	3,627	0%	While CQ and ERA CSI are perfectly matching, there are 214 km missing in RINF
UK	16,377	15,905	16,268	-1%	Discrepancy for RINF
	Colour legend		Perfect matching CQ - ERA CSI		
			Minor inconsistency		
			Major inconsistency		

Annex 2 Comparison of track-km

This comparison by Eurostat on rail network lengths (track-km) for reference year 2020 was established on 18 October 2022.

Track-km					
Year 2020	Eurostat/ITF /UNECE Common Questionnai	RINF	ERA CSI item R03	diff ERA CSI / CQ	Comments on findings
AT	N/A	7,335	7,522	N/A	Data in the CQ are missing. It is unclear the discrepancy between RINF and ERA CSI
BE	N/A	6,796	6,542	N/A	Data in the CQ are missing. It is unclear the discrepancy between RINF and ERA CSI
BG	5,464	4,709	6,454	18%	Perfect consistency between CQ and CSI on line-km, not at all on track-km
CH	N/A	11,614	5,470	N/A	Data in the CQ are missing. The narrow (metric) gauge should not explain the difference in track-km
CZ	15,360	11,759	15,486	1%	Big discrepancy between RINF on one side, CQ and ERA CSI on the other side
DE	N/A	53,507	60,872	N/A	Data in the CQ are missing. It is unclear the large discrepancy between RINF and ERA CSI
DK	N/A	3,068	3,729	N/A	Data in the CQ are missing. It is unclear the large discrepancy between RINF and ERA CSI
EE	2,143	1,108	2,143	0%	Big discrepancy between RINF on one side, CQ and ERA CSI on the other side
EL	3,039	3,606	3,039	0%	Big discrepancy between RINF on one side, CQ and ERA CSI on the other side
ES	22,274	21,304	21,533	-3%	There is a minor discrepancy between RINf ERA CSI
FI	8,599	6,512	6,707	-22%	Perfect consistency between CQ and CSI on line-km, not at all on track-km
FR	53,382	53,401	48,027	-10%	Big discrepancy between ERA CSI on one side, CQ and RINF on the other side
HR	3,950	2,679	2,871	-27%	Perfect consistency between CQ and CSI on line-km, not on track-km
HU	11,393	5,416	8,906	-22%	Perfect consistency between CQ and CSI on line-km, not at all on track-km
IE	2,477	N/A	2,166	-13%	Ireland is missing in RINF. We cannot guess what are the missing km in ERA CSI compared to the CQ, potentially a different applicable legal scope
IT	24,515	24,496	25,538	4%	CQ and RINF are much closer than ERA CSI which is surprisingly higher than the CQ
LT	2,346	2,469	3,465	48%	Big discrepancy between ERA CSI on one side, CQ and RINF on the other side
LU	628	479	677	8%	Big discrepancy between RINF on one side, CQ and ERA CSI on the other side
LV	2,216	1,853	3,358	52%	Big discrepancies across all the three databases, while on Line-km CQ and ERA CSI are perfectly matching
NL	3,041	5,591	7,097	133%	Contrary to line-km where results are farily consistent, big discrepancies on track-km
NO	4,196	3,907	4,477	7%	The CQ is inconsistent with ERA CSI, while RINF seems to miss km. Surprisingly the same value for RINF is available for Line-km and Track-km
PL	37,269	28,595	37,393	0%	Contrary to line-km where results are farily consistent, big discrepancy between RINF on one side, CQ and ERA CSI on the other side
PT	3,224	3,146	3,224	0%	78 km are missing in RINF, consistently with the result on Line-km
RO	20,071	13,318	19,784	-1%	Contrary to Line-km, there is a major inconsistency between RINF on one side and CQ and ERA CSI on the other side
SE	15,557	13,034	15,401	-1%	Big discrepancy between RINF on one side, CQ and ERA CSI on the other side
SI	2,178	1,518	2,177	0%	Big discrepancy between RINF on one side, CQ and ERA CSI on the other side
SK	N/A	4,942	6,866	N/A	Data in the CQ are missing. Contrary to Line-km, the discrepancy between RINF and ERA CSI is very big
UK	31,940	32,121	31,722	-1%	Contrary to Line-km, there are discrepancies for all databases
	Colour legend		Perfect matching CQ - ERA CSI		
			Minor inconsistency		
			Major inconsistency		

Annex 3 Comparison of rolling stock statistics

This comparison by Eurostat between "transport equipment" data of the Common Questionnaire (CQ) and "rolling stock" of railway statistics available from UIC, for reference years 2020 and 2021, was established on 14 February 2023.

	Tractive stock		Passenger transport stock	Freight transport stock
Countries	**locomotives**	**railcars**		
Austria	CQ > UIC (~10%)	CQ << UIC (50%)	CQ < UIC (20%)	CQ = UIC
Belgium	Missing from CQ			
Bulgaria	Missing from CQ			
Croatia	CQ > UIC (~33%)	CQ = UIC	CQ = UIC	CQ = UIC
Czech Republic	CQ > UIC (~40%)	UIC 2020 > CQ > UIC 2021	CQ < UIC (20%)	CQ > UIC (~50%)
Denmark	CQ >> UIC	CQ < UIC 2021 (~15%)	CQ >> UIC	absent from CQ and UIC
Estonia	Missing from UIC			
Finland	Missing from CQ			
France	CQ > UIC 2020 (~30%)	CQ << UIC 2020 (40%)	CQ > UIC (~50%)	CQ >> UIC
Germany	Missing from CQ			
Greece	Missing from UIC			
Hungary	CQ > UIC (~50%)	CQ > UIC (~50%)	CQ > UIC (~25%)	absent from UIC
Ireland	Missing from CQ			
Italy	CQ 2020 >> UIC	absent from CQ		
Latvia	CQ > UIC (~33%)	CQ >> UIC	absent from CQ and UIC	CQ > UIC (~40%)
Lithuania	CQ = UIC	CQ < UIC (~20%)	CQ = UIC	CQ = UIC
Luxembourg	CQ < UIC (~30%)	Missing from UIC		CQ = UIC
Netherlands	Missing from CQ			
Poland	CQ >> UIC	CQ >> UIC	CQ >> UIC	Missing from UIC
Portugal	CQ > UIC (~60%)	CQ < UIC (~40%)	CQ ~ UIC	Missing from UIC
Romania	CQ >> UIC	Missing from UIC		CQ > UIC 2020 (~20%)
Slovakia	CQ > UIC 2020 (~30%)	CQ > UIC 2020 (~30%)	CQ < UIC (~35%)	CQ > UIC (~10%)
Slovenia	CQ = UIC	CQ << UIC	CQ > UIC (~20%)	CQ ~ UIC
Spain	CQ > UIC (~33%)	CQ << UIC	CQ ~ UIC	CQ > UIC 2021 (~33%)
Sweden	CQ >> UIC	CQ >> UIC	CQ >> UIC	Missing from UIC and CQ
Switzerland	absent from CQ	CQ >> UIC	CQ 2020 >> UIC	Missing from CQ
Norway	Missing from CQ and UIC			
Albania	Missing from UIC			
Bosnia-Herzegovina	CQ = UIC 2020	CQ ~ UIC 2020	CQ ~ UIC 2020	CQ ~ UIC 2020
North Macedonia	CQ = UIC	CQ << UIC	CQ = UIC 2020	CQ ~ UIC
Montenegro	Missing from CQ			
Serbia	CQ 2020 >> UIC	Missing from UIC	CQ 2020 >> UIC	CQ 2020 < UIC (~25%)
Kosovo	Missing from UIC			
Turkey	CQ 2020 ~ UIC	CQ >> UIC	CQ 2020 < UIC (~35%)	CQ 2020 ~ UIC except on total
Ukraine	CQ 2020 ~ UIC	Missing from CQ	CQ 2020 ~ UIC	CQ 2020 ~ UIC

Annex 4 Overview of CQ and UIC definitions for tonne / tonne-km

Below a practical explanation of the lexical differences between CQ and UIC.

CQ Glossary for transport statistics		UIC rail lexique		Items to include from a freight train			
Tonne	Tonne-km	Tonne	Tonne-km	Goods[10]	Packaging	Tare weight[11]	Wagon weight
	A.IV-13 gross-gross kilometre hauled	Total gross tonnage of a train	Gross tonne-km worked	X	X	X	X
	A.IV-14 gross tonne-km hauled	Gross weight (tonnage) of a wagon / gross hauled tonnage of a train	Gross tonne-km hauled	X	X	X	X
A.V-15 gross-gross weight of goods (metric to be used for rail transport stats)		Net weight (tonnage) of a wagon	Net tonne-km	X	X	X	
A.V-16 gross weight of goods				X	X		

[10] This metric is to be used (net mass of goods) for the European statistics on international trade in goods
[11] This metrics includes containers, pallets, road goods vehicles

Annex 5 Comparison of tonne-km and passenger-km

This comparison by Eurostat between "transport measurement" data (in millions tonne-km or passenger-km) of the Common Questionnaire (CQ), of the EU regulation on rail transport statistics (when not confidential) and ERA Common Safety Indicators for reference year 2020 was established on 18 October 2022.

Tonne-km (millions)

2020	Eurostat/ ITF / UNECE Common Questionnaire	Eurostat EU regulation 643/2018	ERA CSI R07	diff ERA CSI / CQ
AT	20.498	20.498	21.600	5%
BE	:	:	9.974	
BG	4.503	4.503	9.000	100%
CH	11.067	11.067	11.027	0%
CZ	15.251	15.251	32.833	115%
DE	108.405	109.219	108.407	0%
DK	2.450	2.450	2.450	0%
EE	1.729	1.729	1.729	0%
EL	:	:	555	
ES	8.920	8.920	0	-100%
FI	10.138	10.137	10.140	0%
FR	31.559	31.559	27.142	-14%
HR	3.279	3.279	3.279	0%
HU	11.595	11.595	11.671	1%
IE	74	74	74	0%
IT	20.750	20.750	24.099	16%
LT	15.865	15.865	15.865	0%
LU	:	162	218	35%
LV	7.979	7.979	7.979	0%
NL	6.665	6.665	6.664	0%
NO	4.110	4.110	4.121	0%
PL	51.096	51.096	52.218	2%
PT	2.402	2.302	2.345	-2%
RO	12.291	12.291	9.423	-23%
SE	22.094	22.094	22.094	0%
SI	4.726	4.726	3.988	-16%
SK	7.268	6.908	6.908	-5%
UK	15.212	:	15.159	0%

: in EU reg means usually that the data is confidential

Passenger-km (millions)

2020	Eurostat/ITF/ UNECE Common Questionnaire	Eurostat EU regulation 643/2018	ERA CSI R02	diff ERA CSI / CQ
AT	7.417	7.375	7.400	0%
BE	:	:	7.755	
BG	1.119	1.118	1.228	10%
CH	13.340	13.267	12.301	-8%
CZ	6.665	6.623	6.665	0%
DE	:	57.787	56.398	-2%
DK	3.755	3.940	3.042	-19%
EE	263	263	263	0%
EL	640	640	662	3%
ES	12.060	12.060	11.190	-7%
FI	2.820	2.820	2.820	0%
FR	56.606	56.606	59.003	4%
HR	449	448	449	0%
HU	4.854	:	4.761	-2%
IE	956	834	864	-10%
IT	22.269	22.269	21.558	-3%
LT	237	237	258	9%
LU	269	268	103	-62%
LV	413	413	413	0%
NL	9.164	:	4.048	-56%
NO	1.804	1.801	1.715	-5%
PL	12.487	:	12.286	-2%
PT	2.552	2.563	2.551	0%
RO	3.720	3.720	3.542	-5%
SE	8.129	8.129	8.001	-2%
SI	397	338	397	0%
SK	2.180	2.133	2.133	-2%
UK	25.074	:	24.530	-2%

: in EU reg means usually that the data is confidential

Annex 6 Comparison of passenger train-km and freight train-km

This comparison by Eurostat between "rail traffic" data (in thousand train-km) of the Common Questionnaire (CQ), of the EU regulation on rail transport statistics (when not confidential) and ERA Common Safety Indicators for reference year 2020 was established on 18 October 2022.

Passenger train-km (1 000)

2020	Eurostat/ITF/ UNECE Common Questionnaire	Eurostat EU regulation 643/2018	ERA CSI R05	diff ERA CSI / CQ
AT	113.388	113.388	111.100	-2%
BE	:	:	80.800	
BG	:	19.702	20.700	5%
CH	194.880	194.880	157.312	-19%
CZ	137.515	137.515	133.458	-3%
DE	:	790.000	814.976	3%
DK	61.882	72.768	57.678	-7%
EE	5.329	5.329	5.300	-1%
EL	7.403	7.403	8.000	8%
ES	0	136.103	124.947	-8%
FI	33.804	33.804	33.080	-2%
FR	284.730	:	297.050	4%
HR	12.781	12.781	12.800	0%
HU	85.422	:	81.849	-4%
IE	14.860	14.860	14.700	-1%
IT	272.268	272.268	259.780	-5%
LT	6.067	6.067	6.014	-1%
LU	:	:	7.300	
LV	5.921	5.921	5.921	0%
NL	140.401	:	140.400	0%
NO	37.113	37.113	43.600	17%
PL	153.906	:	157.521	2%
PT	27.474	27.474	26.689	-3%
RO	57.377	57.377	51.503	-10%
SE	116.302	116.302	112.760	-3%
SI	8.271	7.611	7.600	-8%
SK	34.099	34.099	34.146	0%
UK	455.093	:	452.718	-1%

: in EU reg means usually that the data is confidential

Freight train-km (1 000)

2020	Eurostat/ITF/ UNECE Common Questionnaire	Eurostat EU regulation 643/2018	ERA CSI R06	diff ERA CSI / CQ
AT	39.701	39.892	38.800	-2%
BE	:	:	11.800	
BG	:	8.432	8.400	0%
CH	26.659	26.659	26.064	-2%
CZ	29.525	29.525	35.882	22%
DE	259.799	259.799	236.757	-9%
DK	3.382	3.382	3.382	0%
EE	1.247	1.247	1.300	4%
EL	1.119	:	1.100	-2%
ES	22.837	22.067	22.870	0%
FI	13.910	13.921	13.700	-2%
FR	53.940	53.940	56.980	6%
HR	5.786	5.786	7.200	24%
HU	36.531	15.612	18.162	-50%
IE	150	150	390	160%
IT	47.239	47.239	48.000	2%
LT	9.535	9.535	9.535	0%
LU	:	399	400	0%
LV	4.795	4.795	4.796	0%
NL	8.433	8.433	10.700	27%
NO	7.542	7.633	9.800	30%
PL	65.350	65.351	77.499	19%
PT	5.874	5.874	5.271	-10%
RO	20.210	20.269	21.006	4%
SE	35.051	35.051	35.050	0%
SI	6.890	8.430	9.000	31%
SK	11.431	12.075	14.079	23%
UK	30.752	:	30.671	0%

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