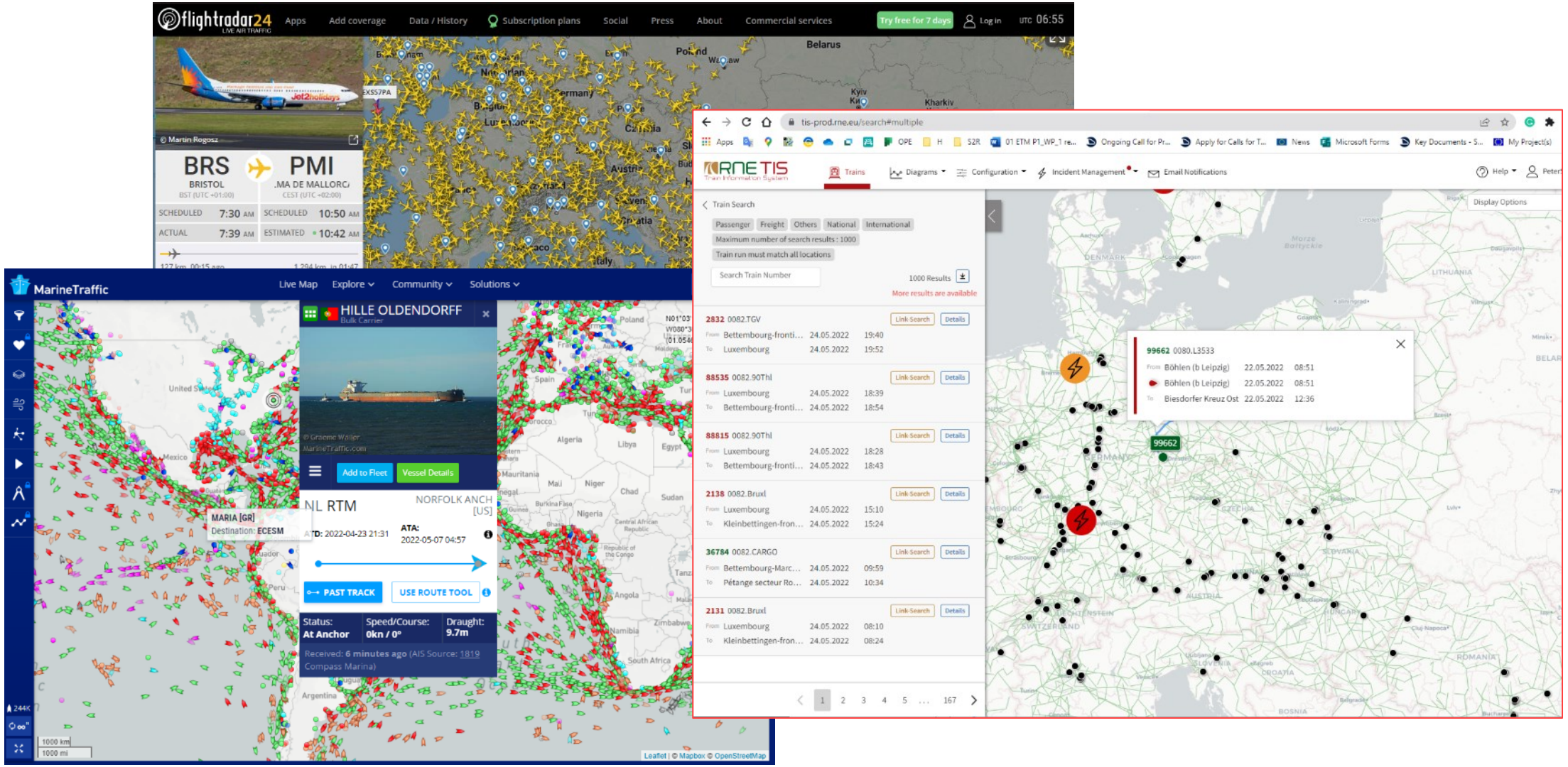
Meeting of the Advisory Groups of Railway Undertakings and Terminals

23 May 2024

RNE TIS

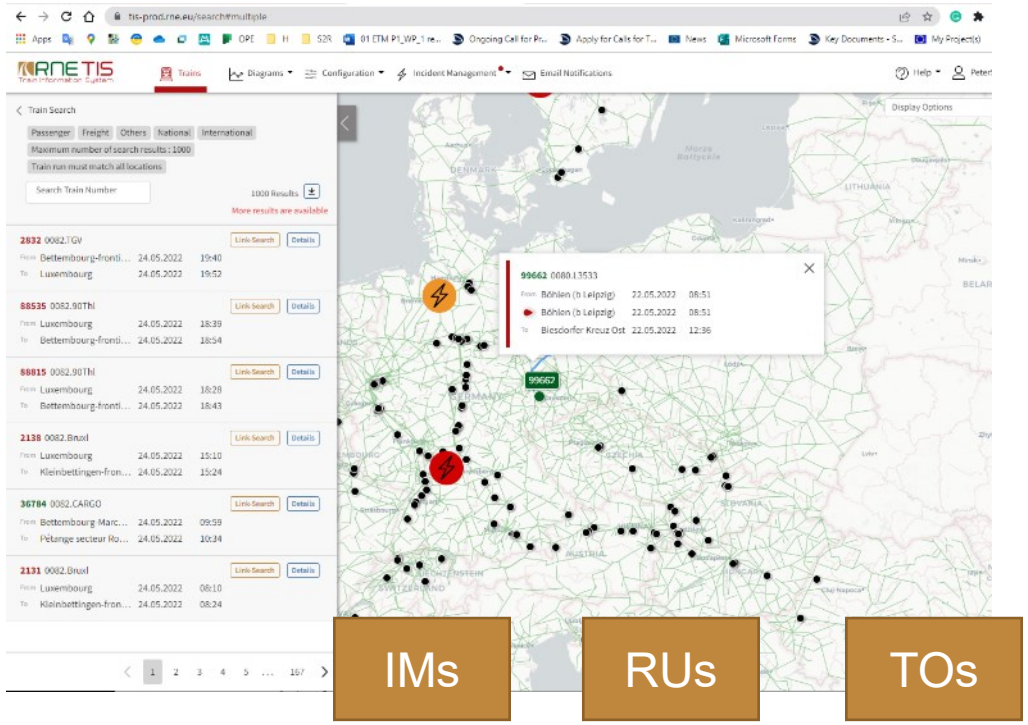
RNE TIS between platforms for sharing data on the movement of goods and people



Digital Train Information: Tracking and Tracing (TIS)

- International freight, passenger and national freight trains can be followed in **T**rain **I**nformation **S**ystem
- Nearly 30.000 trains can be identified daily in the **T**rain **I**nformation **S**ystem
- 4.700 users from 200 companies connect every month with **T**rain **I**nformation **S**ystem
- Approximately 5 million TAF/TAP TSI messages exchanged daily in **T**rain **I**nformation **S**ystem

RNE TIS as the only pan-European railway platform with train running information



- combines data from the national information systems of IMs and some RUs
- works on the unified TAF/TAP TSI platform
- provides data to national dispatch systems
- creates international routes from national data
- provides ETA
- support for managing train traffic in accidents
- Datawarehouse of train runs on the European network
- Reports on international traffic are created based on the data stored.

Where is my train located?

RNE TIS
Train Information System

Ask the national administrator for free web access

RNE
RailNetEurope

RNE TIS – linking trains and TCM

We still run an international train as several national one

RFC5 Baltic-Adriatic Corridor

Share of linked trains in RFC borders

Share of linked freight trains in RFC borders for period 2024-04

Border	IM A	IM B	Trains IM A	Trains IM B	Trains linked	Candidate IM A	Candidate IM B	Border Section	Share of linked trains higher	Share of linked trains lower	Share of linked trains border section
Bernhardsthal - Břeclav os.n.	ÖBB-Holding AG	Správa železnic, statni organizace	1,224	1,126	1,102	1,223	1,126	1,154	**90%**	**98%**	**95%**
Chałupki - Bohumín os.n.	PKP Polskie Linie Kolejowe S.A.	Správa železnic, statni organizace	1,197	1,193	1,106	1,189	1,193	175	**93%**	**93%**	**632%**
Chałupki - Bohumín-Vrbice	PKP Polskie Linie Kolejowe S.A.	Správa železnic, statni organizace	1,197	1,193	1,106	1,189	1,193	1,018	**93%**	**93%**	**109%**
Kittsee - Bratislava-Petržalka	ÖBB-Holding AG	Železnice Slovenskej Republiky	887	691	658	887	691	682	**74%**	**95%**	**96%**
Marchegg - Devínska Nová Ves	ÖBB-Holding AG	Železnice Slovenskej Republiky	4	0	0	4	0	0	**0%**	**0%**	**0%**
Międzylesie - Lichkov	PKP Polskie Linie Kolejowe S.A.	Správa železnic, statni organizace	46	45	44	46	45	45	**96%**	**98%**	**98%**
Mosty u Jablunkova - Čadca	Správa železnic, statni organizace	Železnice Slovenskej Republiky	880	883	872	880	883	886	**99%**	**99%**	**98%**
Spielfeld-Straß - Šentilj	ÖBB-Holding AG	Slovenske železnice - Infrastruktura, d.o.o.	745	636	598	744	636	660	**80%**	**94%**	**91%**
Thörl-Maglern - Tarvisio Boscoverde	ÖBB-Holding AG	Rete Ferroviaria Italiana SpA	2,626	1,893	1,672	2,622	1,893	1,825	**64%**	**88%**	**92%**
Villa Opicina - Sežana	Rete Ferroviaria Italiana SpA	Slovenske železnice - Infrastruktura, d.o.o.	1,141	792	434	1,133	792	743	**38%**	**55%**	**58%**
Zebrzydowice - Petrovice u Karviné	PKP Polskie Linie Kolejowe S.A.	Správa železnic, statni organizace	817	761	744	767	761	776	**97%**	**98%**	**96%**
Zwardoń - Skalité	PKP Polskie Linie Kolejowe S.A.	Železnice Slovenskej Republiky	0	0	0	0	0	0	**100%**	**100%**	**100%**

RNE RailNetEurope

Share of linked trains at borders April 2024

We still run an international train as several national one

Amber Rail Freight Corridor

Share of linked trains in RFC borders

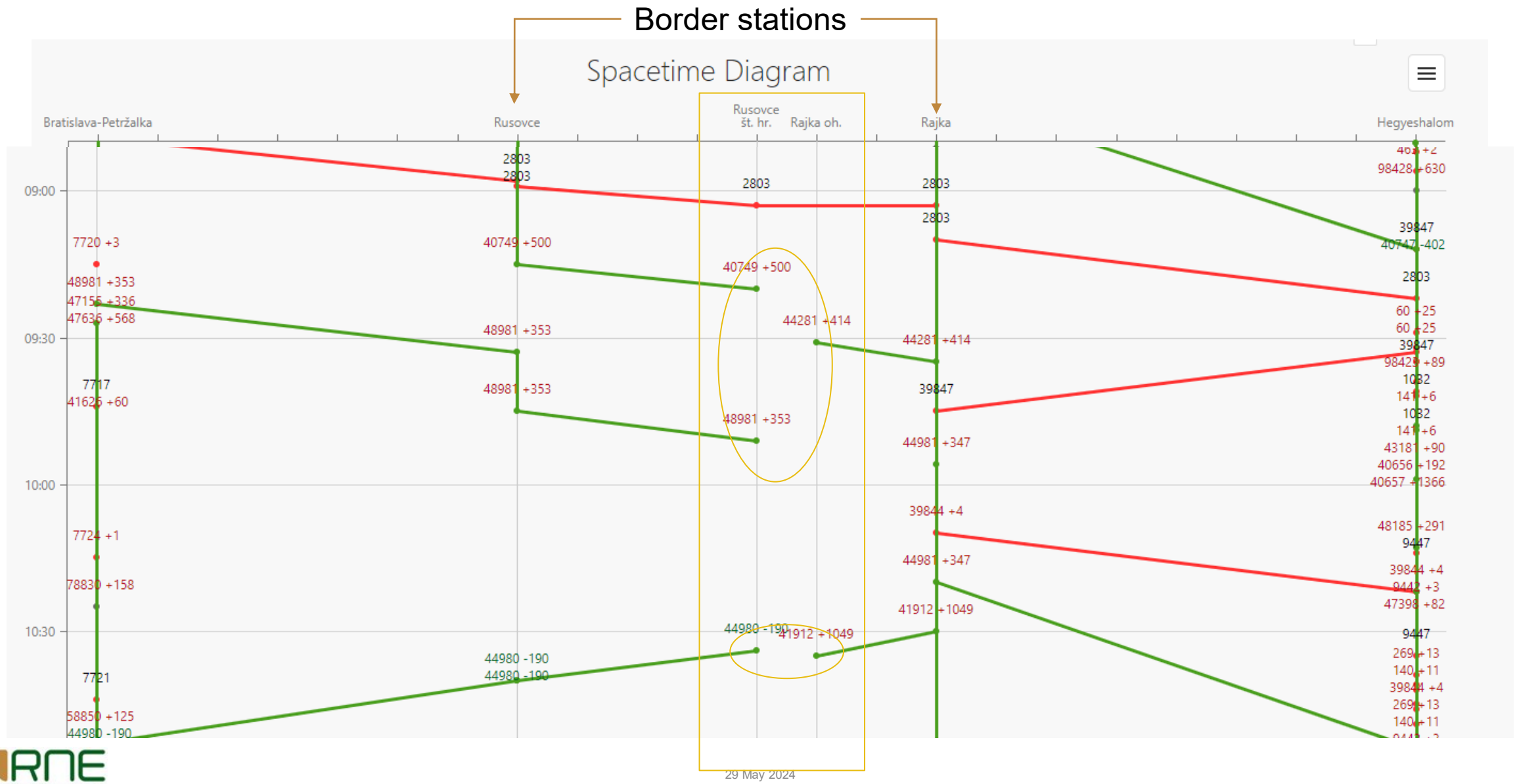
Share of linked freight trains in RFC borders for period 2024-04

Border	IM A	IM B	Trains IM A	Trains IM B	Trains linked	Candidate IM A	Candidate IM B	Border Section	Share of linked trains higher	Share of linked trains lower	Share of linked trains border section
Hodoš - Őriszentpéter	Slovenske železnice - Infrastruktura, d.o.o.	Magyar Államvasutak Zrt.	620	656	406	618	641	566	**63%**	**66%**	**72%**
Kelebia - Суботица / Subotica	Magyar Államvasutak Zrt.	Infrastruktura Železnice Srbije	0	0	0	0	0	0	**0%**	**0%**	**0%**
Komárno - Komárom	Železnice Slovenskej Republiky	Magyar Államvasutak Zrt.	316	2,127	222	316	2,127	309	**10%**	**70%**	**72%**
Muszyna - Plaveč	PKP Polskie Linie Kolejowe S.A.	Železnice Slovenskej Republiky	190	193	113	190	193	158	**59%**	**59%**	**72%**
Rusovce - Rajka	Železnice Slovenskej Republiky	Győr-Sopron-Ebenfurti Vasút Zrt.	424	454	271	400	454	328	**60%**	**68%**	**83%**
Slovenské Nové Mesto - Sátoraljaújhely	Železnice Slovenskej Republiky	Magyar Államvasutak Zrt.	10	11	7	10	11	10	**64%**	**70%**	**70%**
Zwardoń - Skalité	PKP Polskie Linie Kolejowe S.A.	Železnice Slovenskej Republiky	0	0	0	0	0	0	**100%**	**100%**	**100%**
Čaňa - Hidasnémeti	Železnice Slovenskej Republiky	Magyar Államvasutak Zrt.	252	276	143	252	275	240	**52%**	**57%**	**60%**
Štúrovo - Szob	Železnice Slovenskej Republiky	Magyar Államvasutak Zrt.	739	746	441	739	746	692	**59%**	**60%**	**64%**

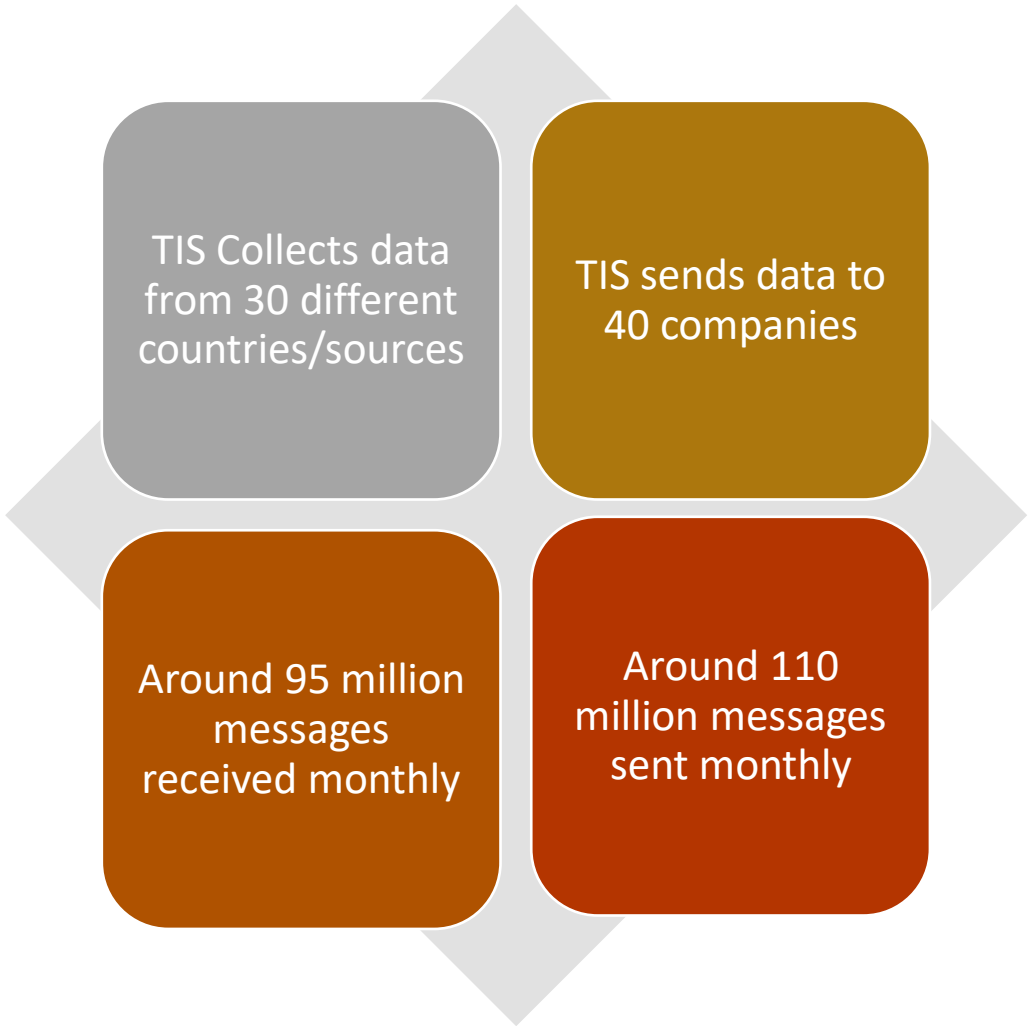
RNE RailNetEurope

Share of linked trains at borders April 2024

Trains at borders change train numbers and remain national

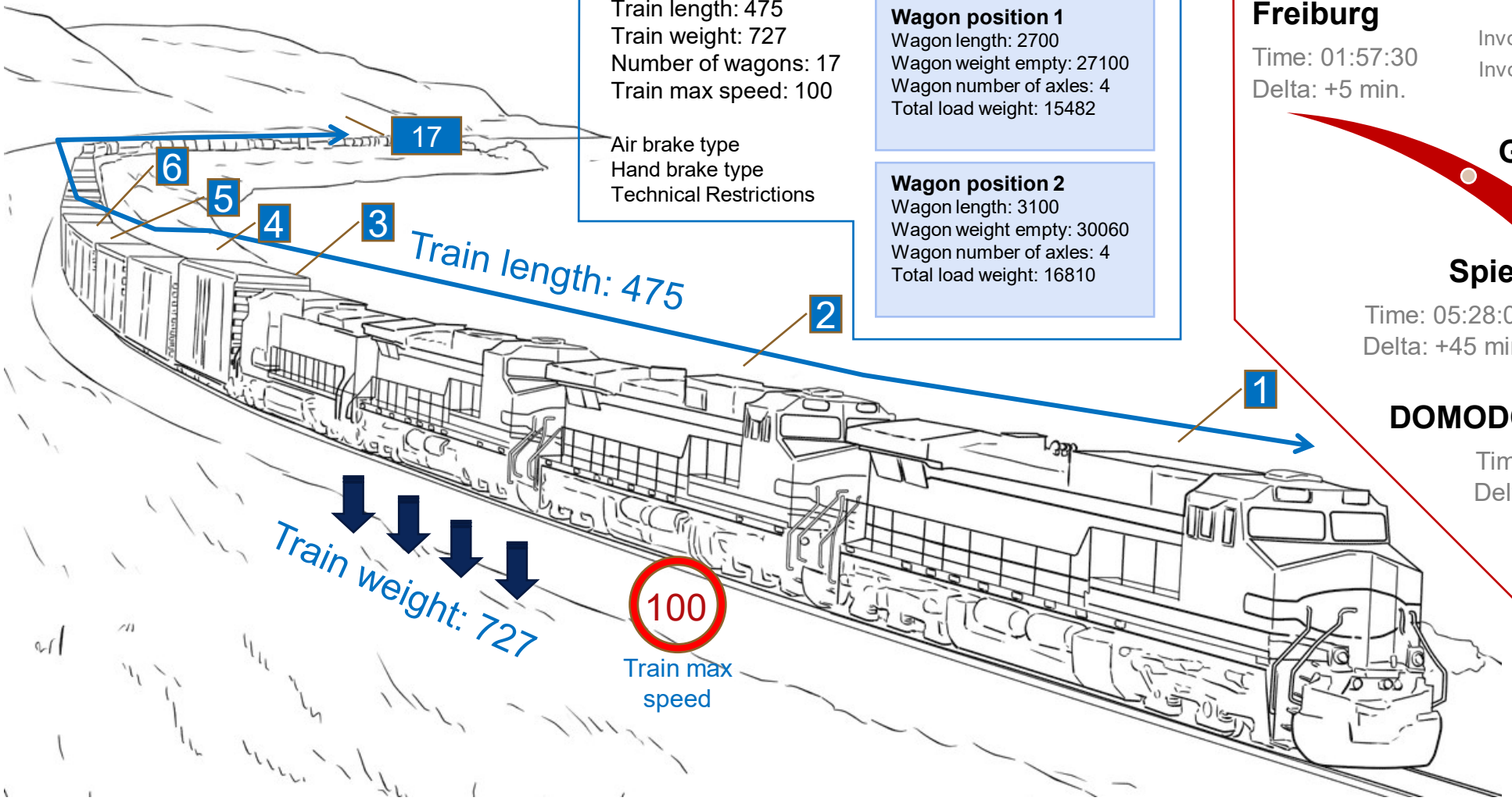


TIS Data Exchange Within the Railway Sector



Exchanged TAF TAP /TSI Messages	Rules
Path Details	1-2 days before the Departure
Path Section Notification	Before the Departure / Real Time
Train Running Information	Real time
Train Running Forecast	Real time
Train Running Interruption	Real time
Train Delay Cause	Real time
Train Composition	Before the Departure / Real Time
Wagon Performance Message	After arrival at final destination

Train Run / Composition



Train composition data

Train length: 475
Train weight: 727
Number of wagons: 17
Train max speed: 100

Air brake type
Hand brake type
Technical Restrictions

Wagon position 1
Wagon length: 2700
Wagon weight empty: 27100
Wagon number of axles: 4
Total load weight: 15482

Wagon position 2
Wagon length: 3100
Wagon weight empty: 30060
Wagon number of axles: 4
Total load weight: 16810

Train running data

Freiburg
Time: 01:57:30
Delta: +5 min.

Involved IMs: DBNetz, SBB INFRA, BLS, RFI
Involved RUs: SBB Cargo, BLS Cargo

Gellert
Time: 03:34:44
Delta: +40 min.

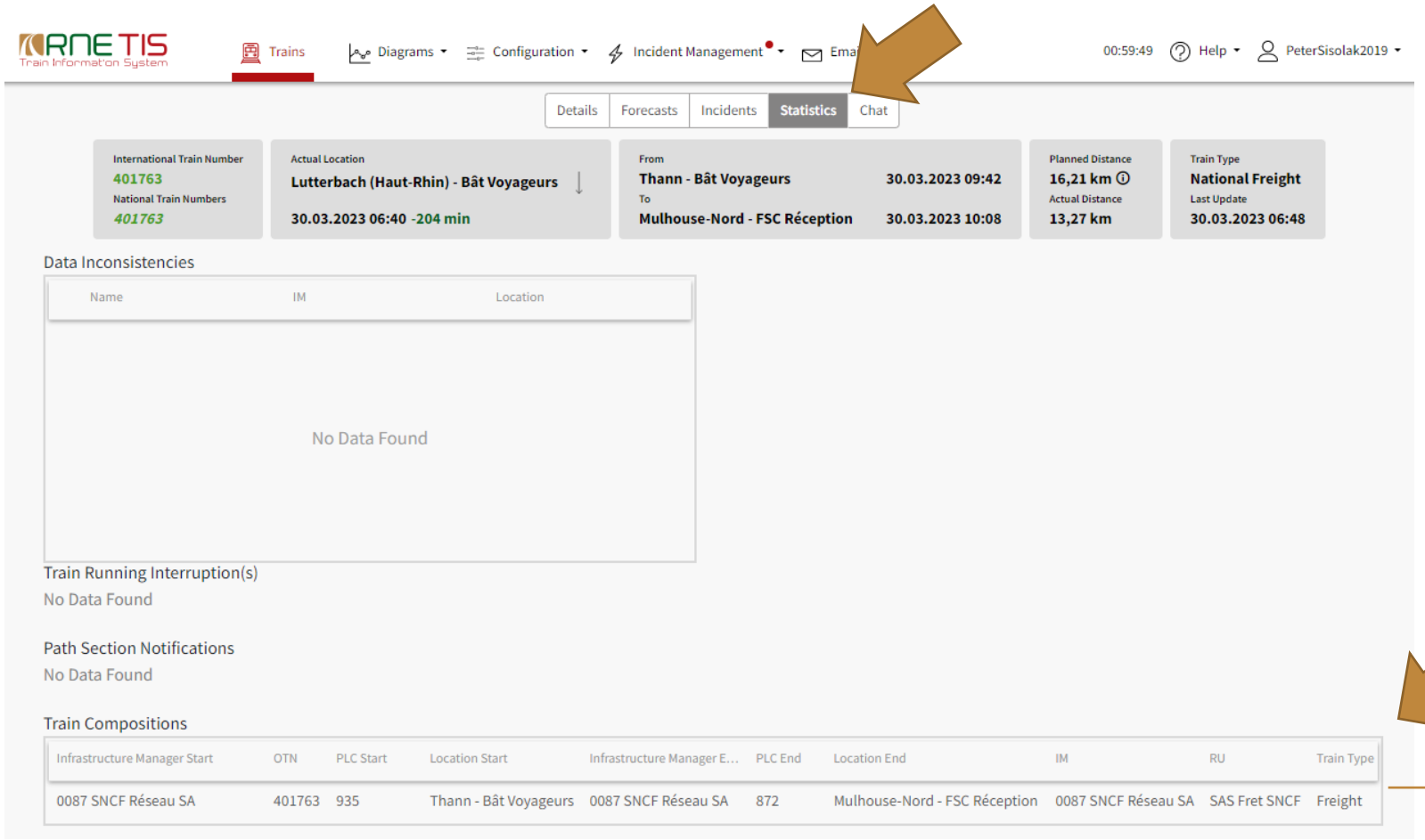
Spiez
Time: 05:28:04
Delta: +45 min.

Brig
Time: 06:18:47
Delta: +26 min.

DOMODOSSOLA
Time: 07:16:30
Delta: +28 min.

NOVARA
Time: 11:48:30
Delta: +132

Train Run / Composition is presented in TIS for subjects involved in the train run



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Wagon number of axles: 4
Total load weight: 16810

Train Compositions

Train Weight	Train Length	Train Max Speed	Train Max Axle Weight	Brake Type	Brake Weight	Vehicles	Axles	Exceptional Gauging	Dangerous Goods	Associated OTNs	Loco Number
156	28	100		Freight	59	2	8	No	Allowed		928700601208

TIS uses train composition information as reliable info to link trains with different train numbers but the same cargo.

Train Number **40000** Infrastructure A

Train Number **45000** Infrastructure B

Border Station

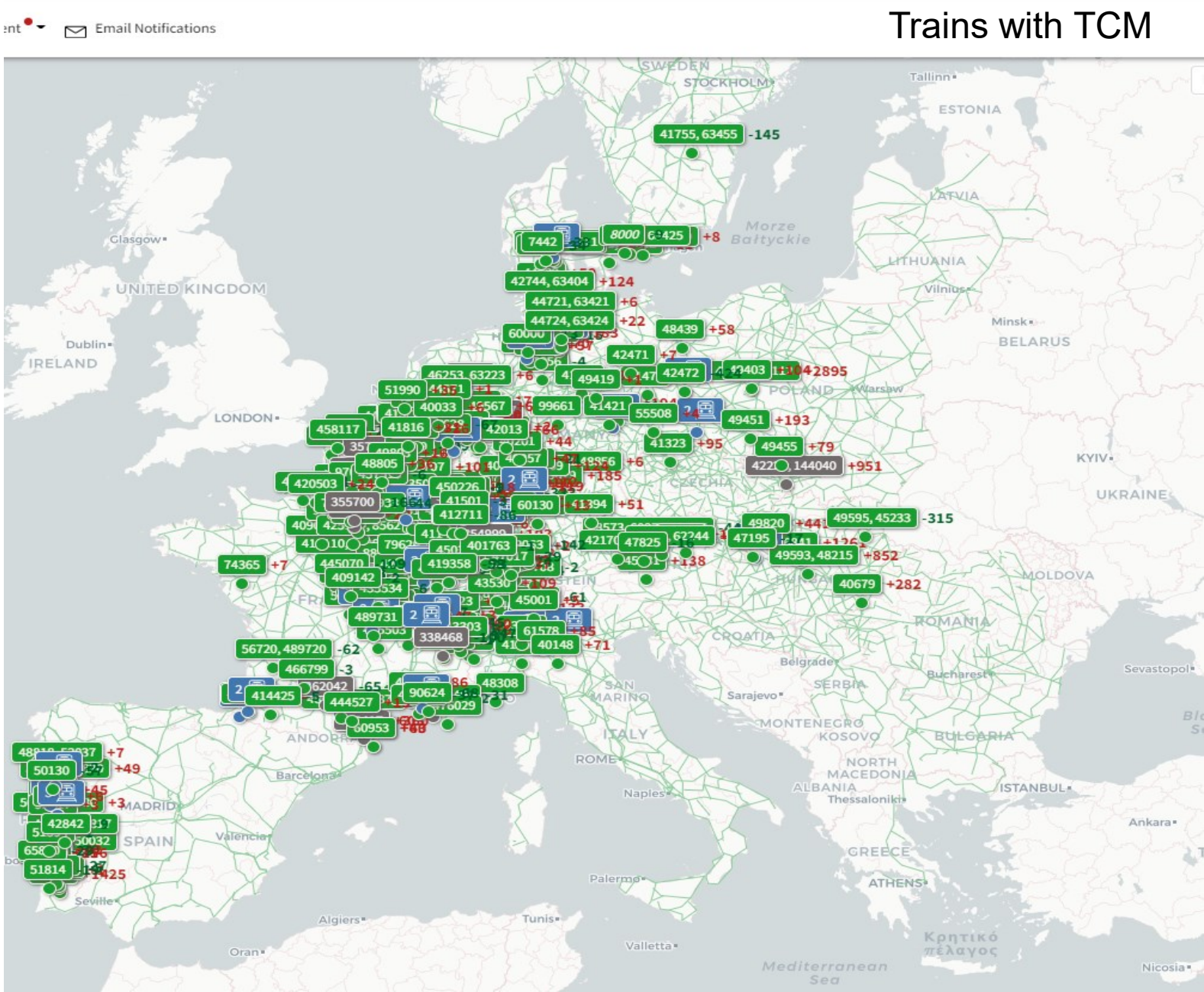
hash value (token)

A hash value (token) will be created for every train. If the token is identical at the same border and on the same day, the train will be linked automatically.

TCM Linking

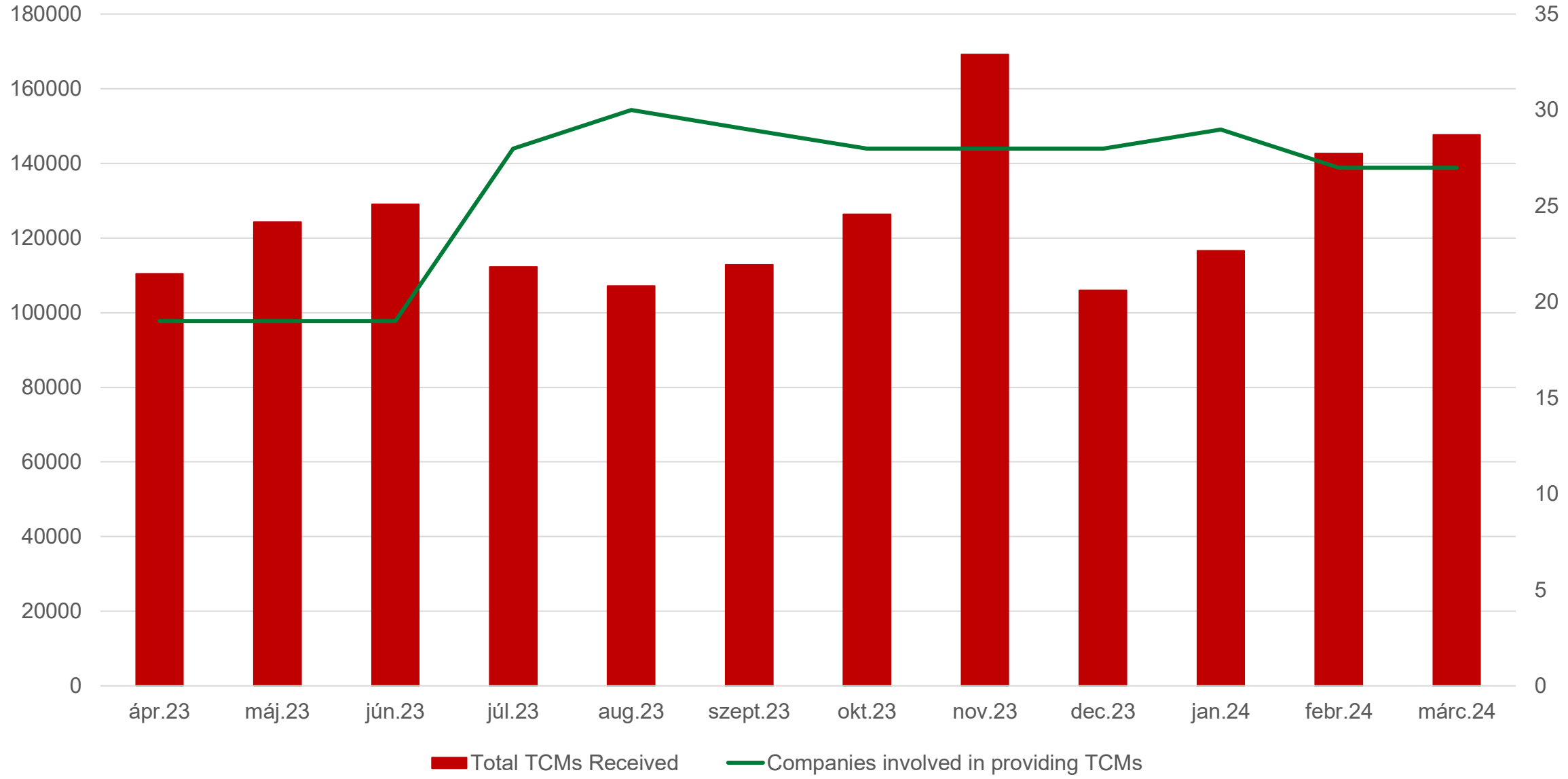
- TIS receives Train Composition Messages for around 1300 trains daily
- 15% of International freight traffic
- 5.000 trains per month are linked based on Train Composition Information

Trains with TCM



RNE RailNetEurope

Train Composition Message Statistics

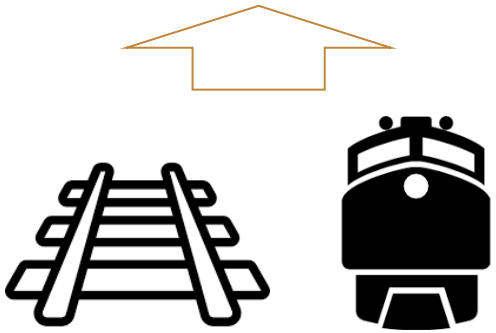


The provision of TCM messages and train linking is beneficial for the whole railway sector and logistic chain

RNE TIS
Train Information System

Train linking in TIS

- Manualy
- TIS algorithm
- TCM
  - IMs
  - RUs



- unhiding international trains
- Introducing reality
- Providing additional information to the process

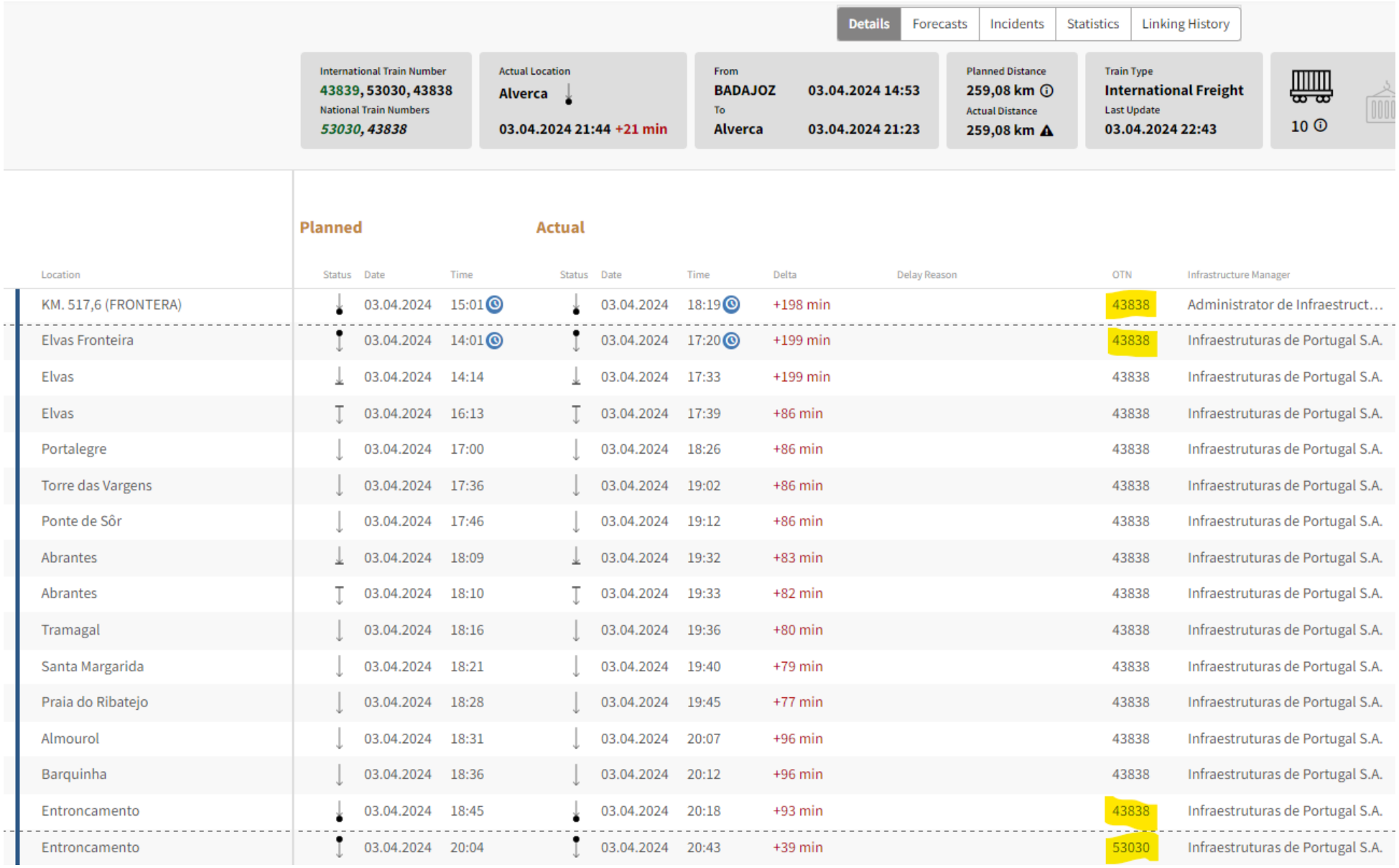
Benefits

- Complete international train running data
- Information on a train run and its composition from origin to destination for railway staff and customers
- Information on train handover and interchange
- More reliable performance reporting of international traffic
- Enhanced reporting possibilities
- Higher railway credibility

RNE RailNetEurope

Example: Train linked (by OTN and TCM rules) / Ad hoc train linked (TCM)

Example: Train linked (by OTN and TCM rules)



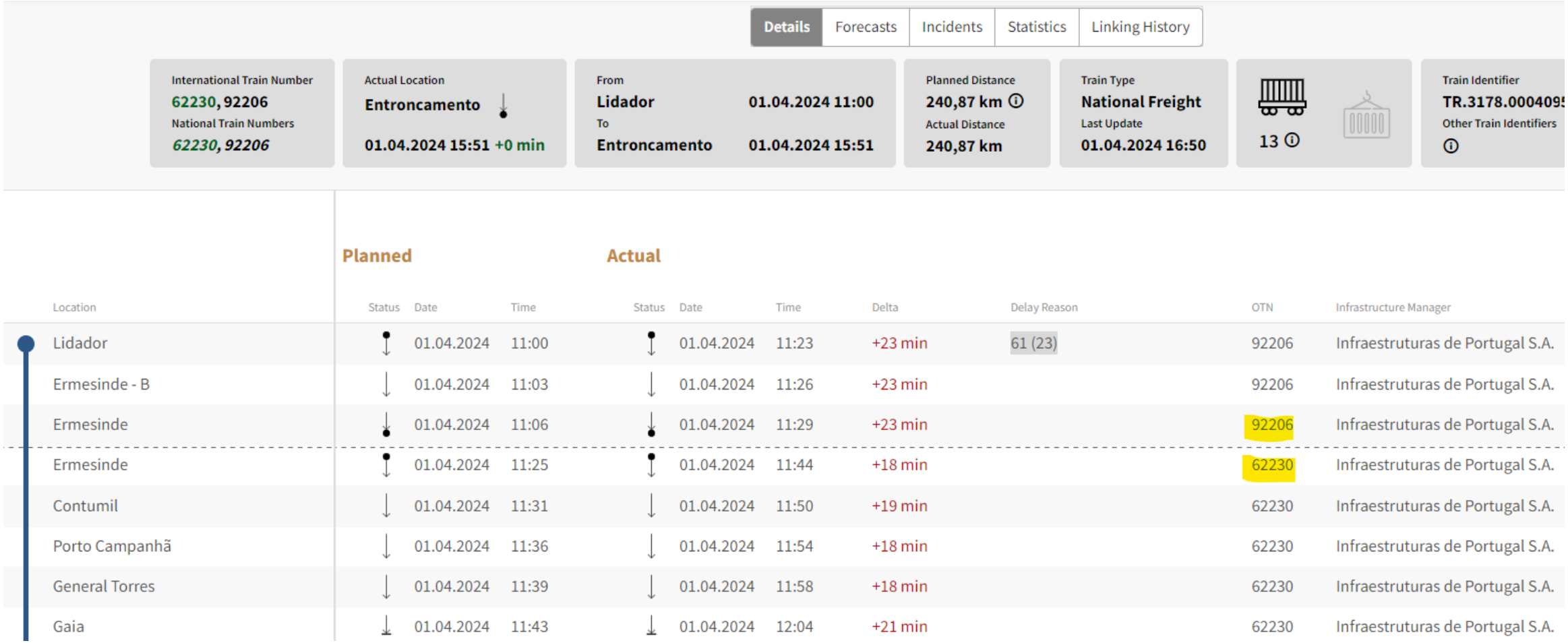
Details | Forecasts | Incidents | Statistics | Linking History

International Train Number	Actual Location	From	Planned Distance	Train Type	
43839, 53030, 43838	Alverca	BADAJOZ 03.04.2024 14:53	259,08 km	International Freight	10
National Train Numbers	03.04.2024 21:44 +21 min	To Alverca 03.04.2024 21:23	Actual Distance 259,08 km	Last Update 03.04.2024 22:43	
53030, 43838					

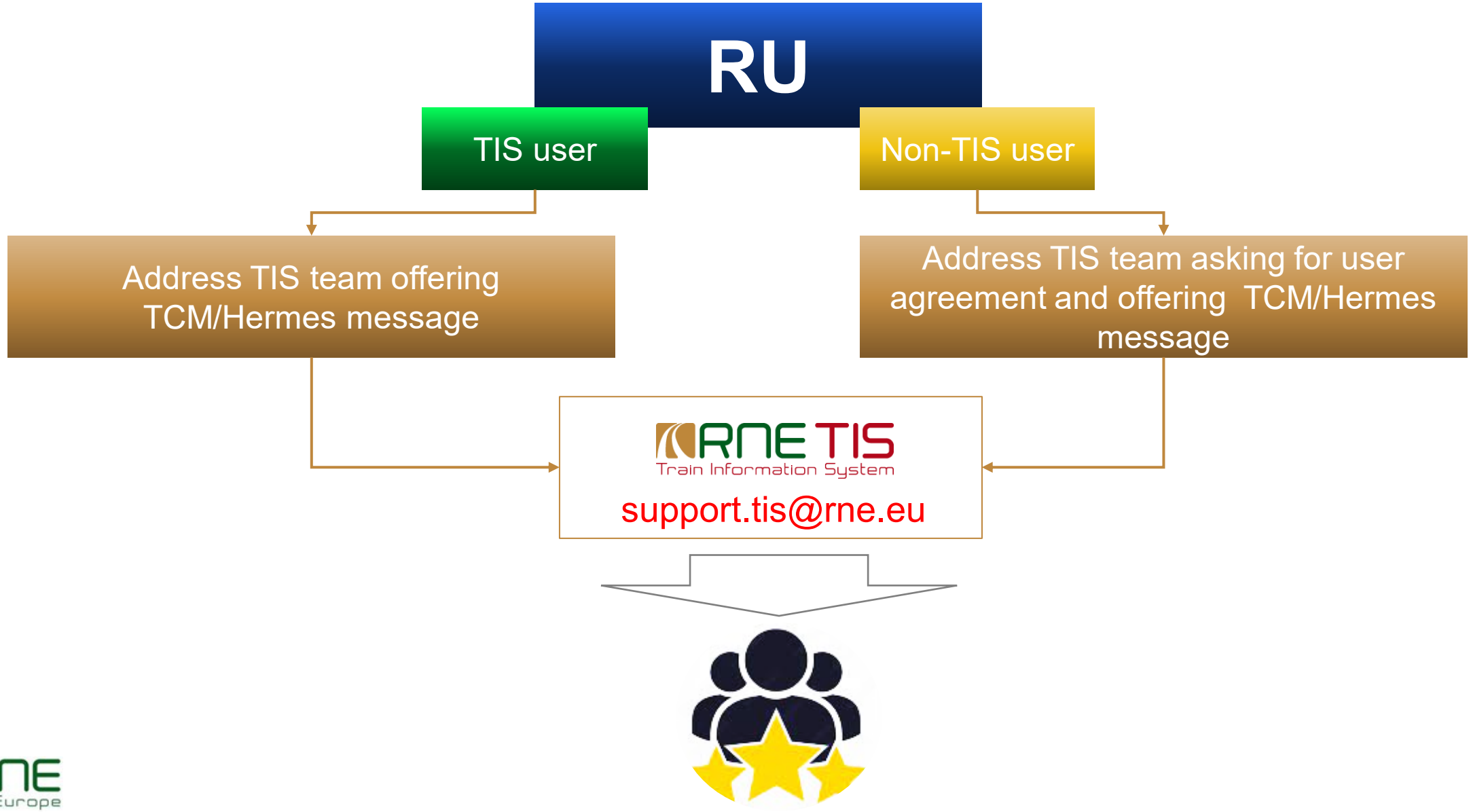
	Planned			Actual						
Location	Status	Date	Time	Status	Date	Time	Delta	Delay Reason	OTN	Infrastructure Manager
KM. 517,6 (FRONTERA)		03.04.2024	15:01		03.04.2024	18:19	+198 min		43838	Administrator de Infraestruct…
Elvas Fronteira		03.04.2024	14:01		03.04.2024	17:20	+199 min		43838	Infraestruturas de Portugal S.A.
Elvas		03.04.2024	14:14		03.04.2024	17:33	+199 min		43838	Infraestruturas de Portugal S.A.
Elvas		03.04.2024	16:13		03.04.2024	17:39	+86 min		43838	Infraestruturas de Portugal S.A.
Portalegre		03.04.2024	17:00		03.04.2024	18:26	+86 min		43838	Infraestruturas de Portugal S.A.
Torre das Vargens		03.04.2024	17:36		03.04.2024	19:02	+86 min		43838	Infraestruturas de Portugal S.A.
Ponte de Sôr		03.04.2024	17:46		03.04.2024	19:12	+86 min		43838	Infraestruturas de Portugal S.A.
Abrantes		03.04.2024	18:09		03.04.2024	19:32	+83 min		43838	Infraestruturas de Portugal S.A.
Abrantes		03.04.2024	18:10		03.04.2024	19:33	+82 min		43838	Infraestruturas de Portugal S.A.
Tramagal		03.04.2024	18:16		03.04.2024	19:36	+80 min		43838	Infraestruturas de Portugal S.A.
Santa Margarida		03.04.2024	18:21		03.04.2024	19:40	+79 min		43838	Infraestruturas de Portugal S.A.
Praia do Ribatejo		03.04.2024	18:28		03.04.2024	19:45	+77 min		43838	Infraestruturas de Portugal S.A.
Almourol		03.04.2024	18:31		03.04.2024	20:07	+96 min		43838	Infraestruturas de Portugal S.A.
Barquinha		03.04.2024	18:36		03.04.2024	20:12	+96 min		43838	Infraestruturas de Portugal S.A.
Entroncamento		03.04.2024	18:45		03.04.2024	20:18	+93 min		43838	Infraestruturas de Portugal S.A.
Entroncamento		03.04.2024	20:04		03.04.2024	20:43	+39 min		53030	Infraestruturas de Portugal S.A.

RNE RailNetEurope

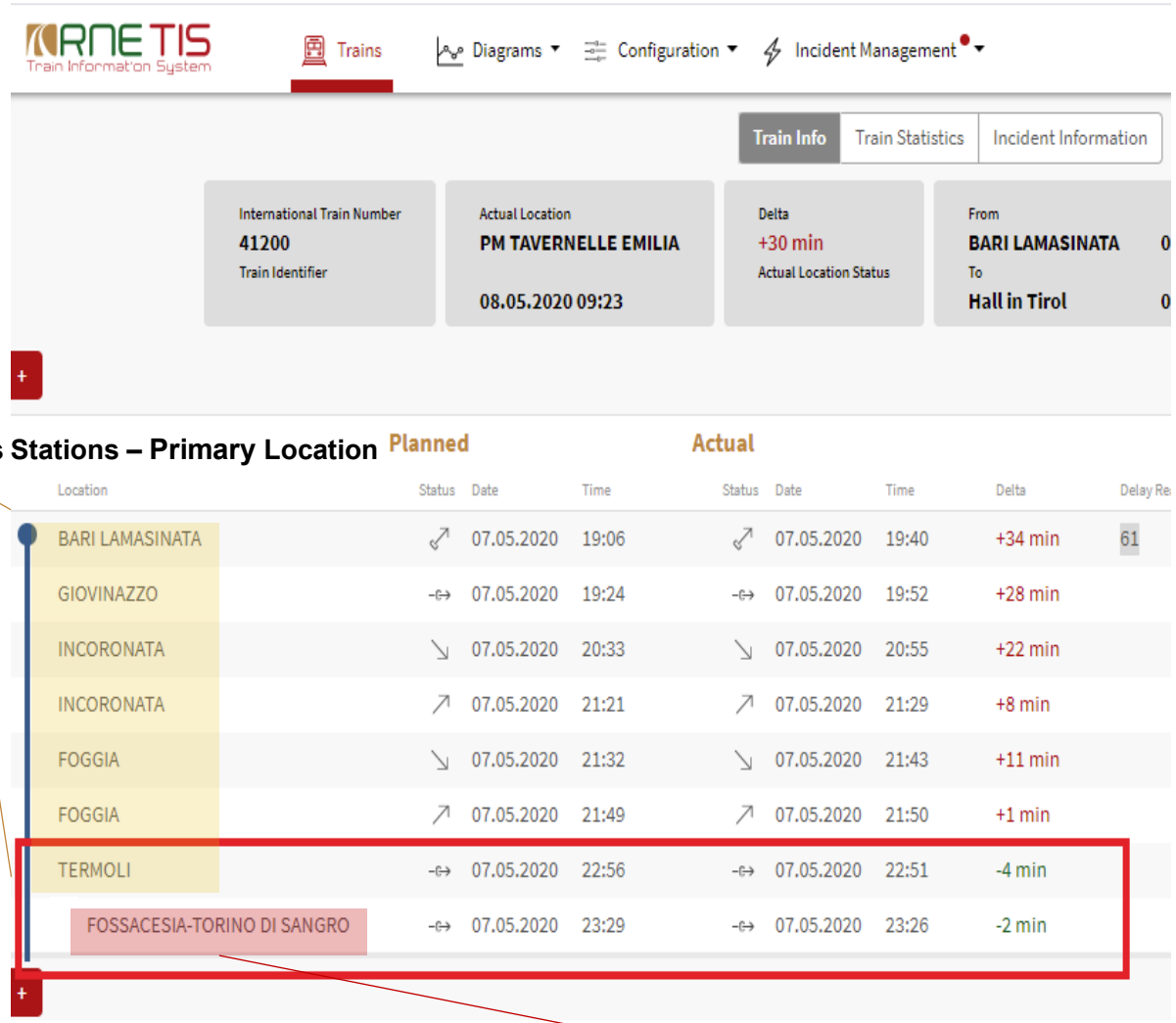
Example - Ad hoc train linked with a planned train (TCM)



Required actions from the RU side are simple and easy



TIS - Terminals connection to the RNE TIS



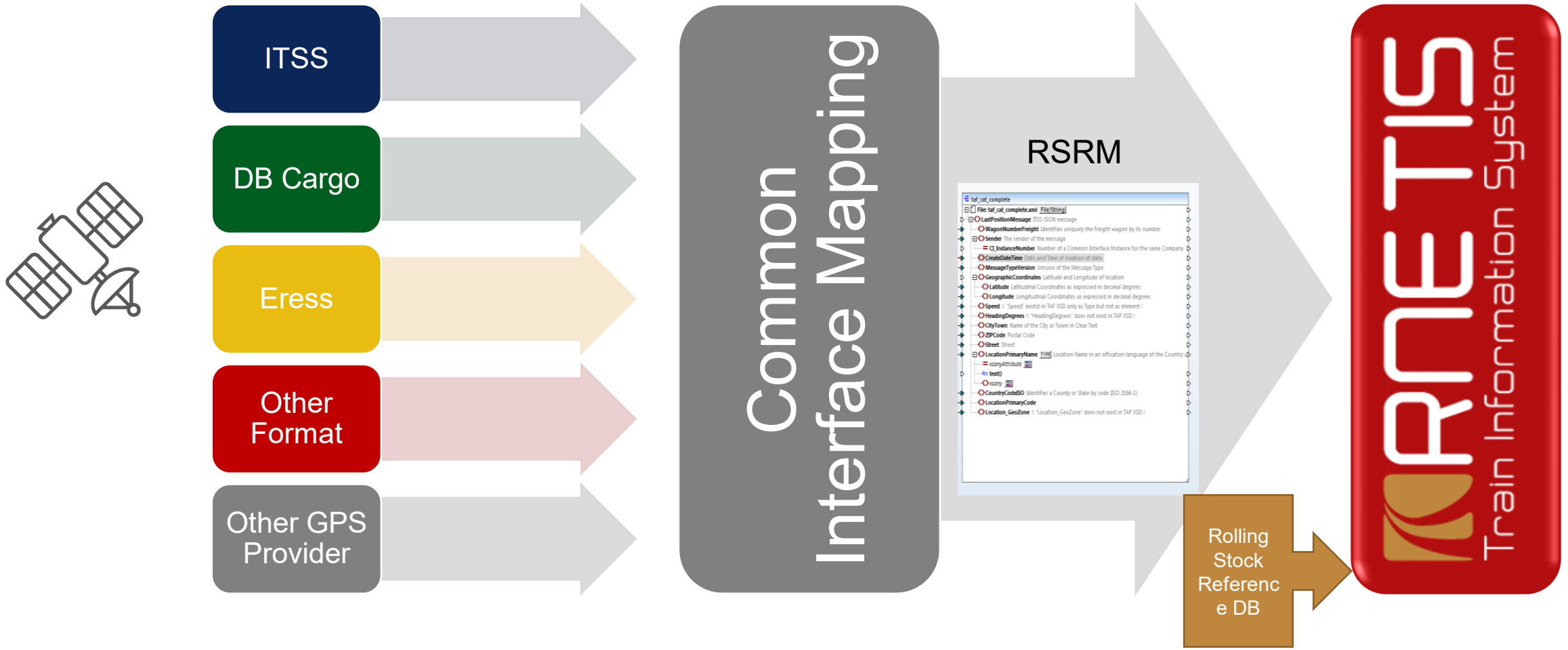
What is offered to Terminals

- Access to the TIS data
- Train run overview
- Train Composition Data
- Terminal inclusion into a train run - First/Last mile
- Qualified ETA information

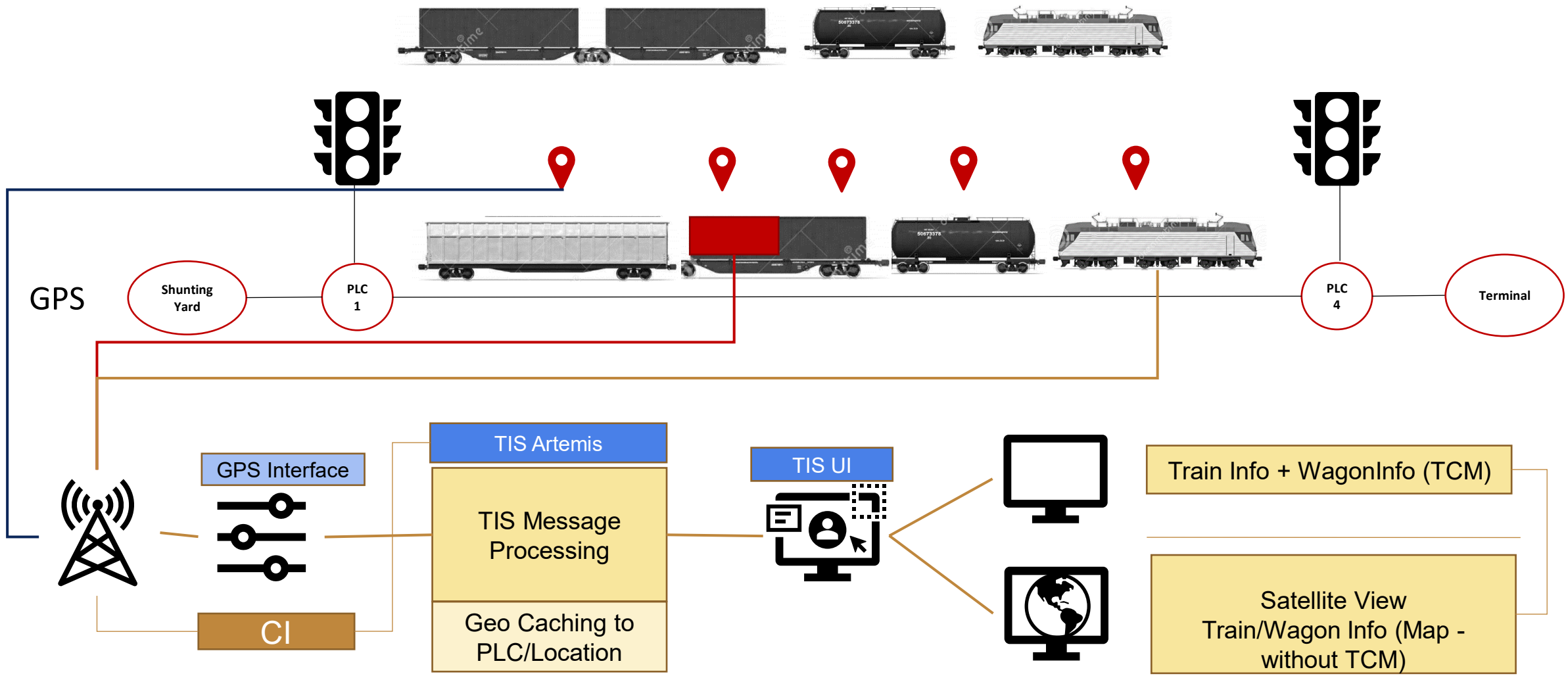
RNE TIS – developments

Mapping GNSS/GPS Messages

» Processing of different GNSS/GPS Messages with unique TAF/TAP-TSI Message (RunningStatusReportMessage - RSRM)



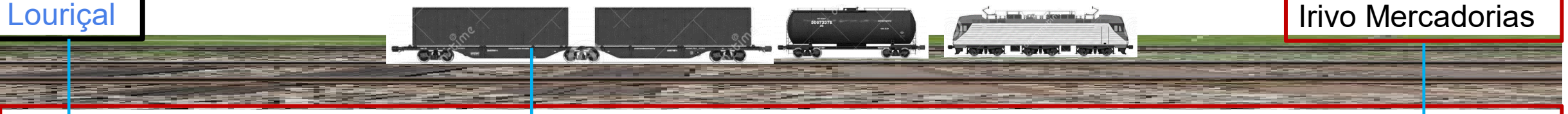
Tracking&Tracing (GPS) – Train, Wagon, Units



Satellite view will display Trains from the GPS App and Wagons, where no train can be identified.

Wagon Perfomance Message Details

Louriçal



Irivo Mercadorias

Distance 201 km

```
<PerformanceData>
  <WagonNumberFreight>319466870080</WagonNumberFreight>  unique identifier of the wagon in the train
  <UserRU>2194</UserRU>  Responsible RU
  <PeriodStart>2022-03-26T13:10:00+00:00</PeriodStart>
  <StartLocation>
    <CountryCodeISO>PT</CountryCodeISO>
    <LocationPrimaryCode>63875</LocationPrimaryCode>
    <PrimaryLocationName>Louriça</PrimaryLocationName>  => Start of the Wagon Journey
  </StartLocation>
  <PeriodEnd>2022-03-26T16:39:39+00:00</PeriodEnd>
  <EndLocation>
    <CountryCodeISO>PT</CountryCodeISO>
    <LocationPrimaryCode>8235</LocationPrimaryCode>
    <PrimaryLocationName>Irivo Mercadorias</PrimaryLocationName> => End of the Wagon Journey
  </EndLocation>
  <Country>PT</Country>
  <Kilometers>201</Kilometers>  => Wagen Performance in km
  <TotalLoadWeight>65000</TotalLoadWeight> => Total Load Weight
</PerformanceData>
<PerformanceData>
```

RNE RailNetEurope
Funded by the European Union

Scenario: no associated trains

The path of an object is displayed for the duration (default 7 days). Only those objects which operated within the timeframe will be matched. Data should be stored in the data warehouse.

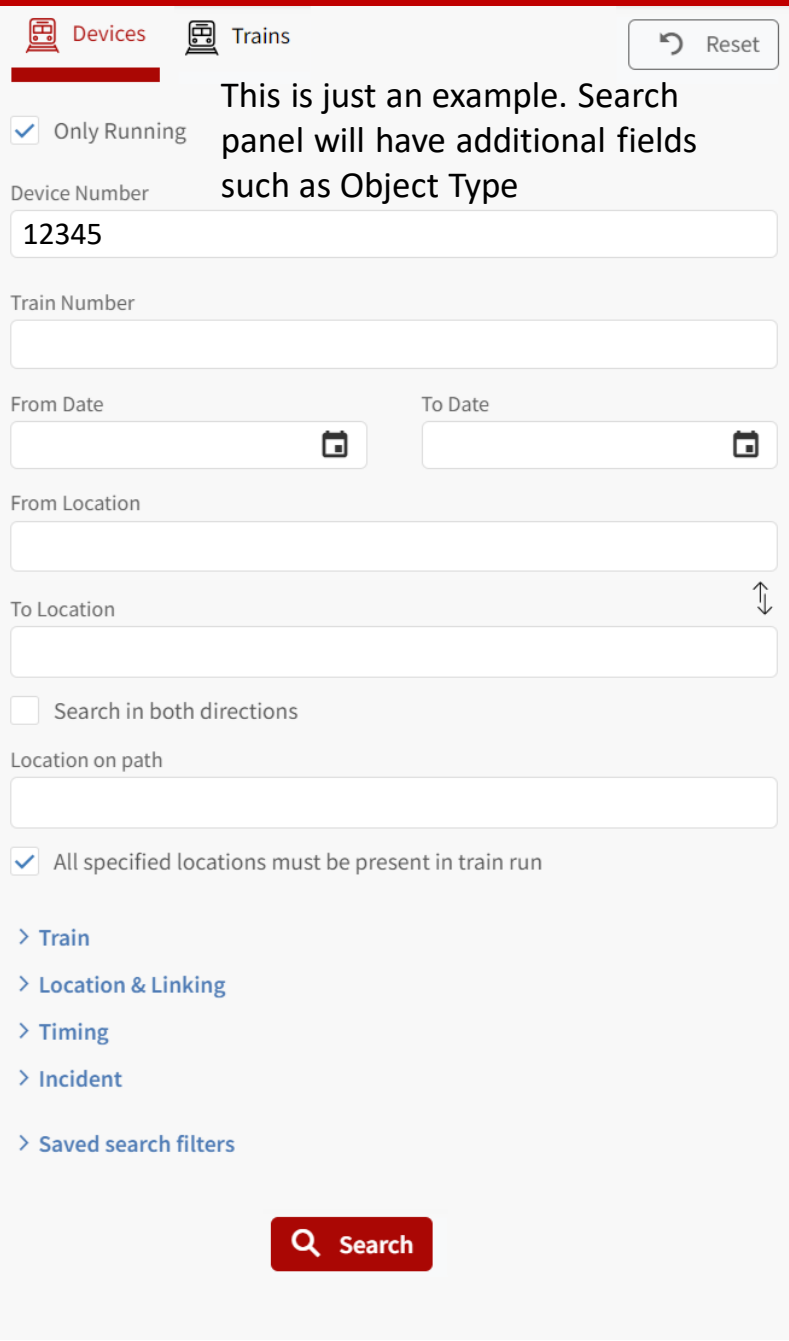
Last known location of the moving object. Objects will have different icons to reflect different Object types

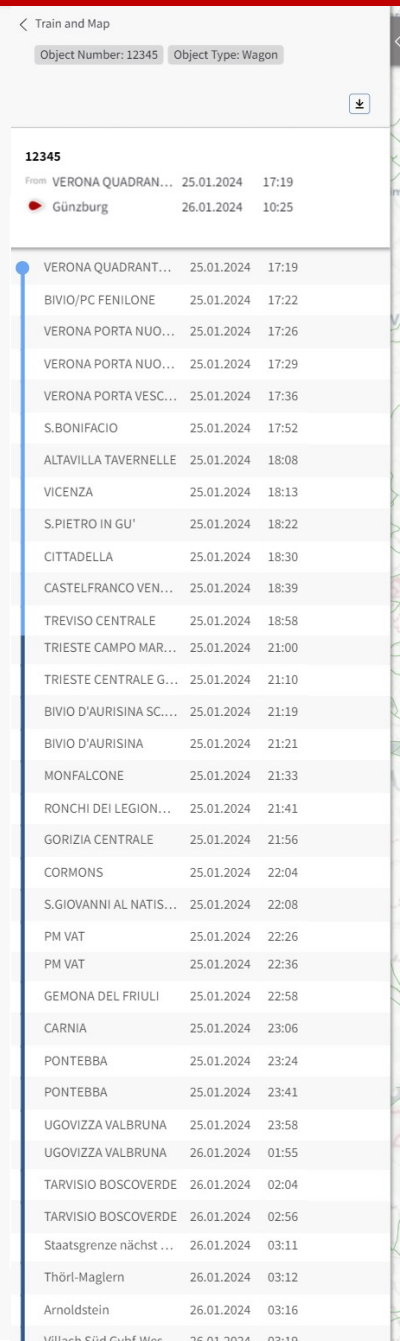
If only 1 object is matched, display the following by default:

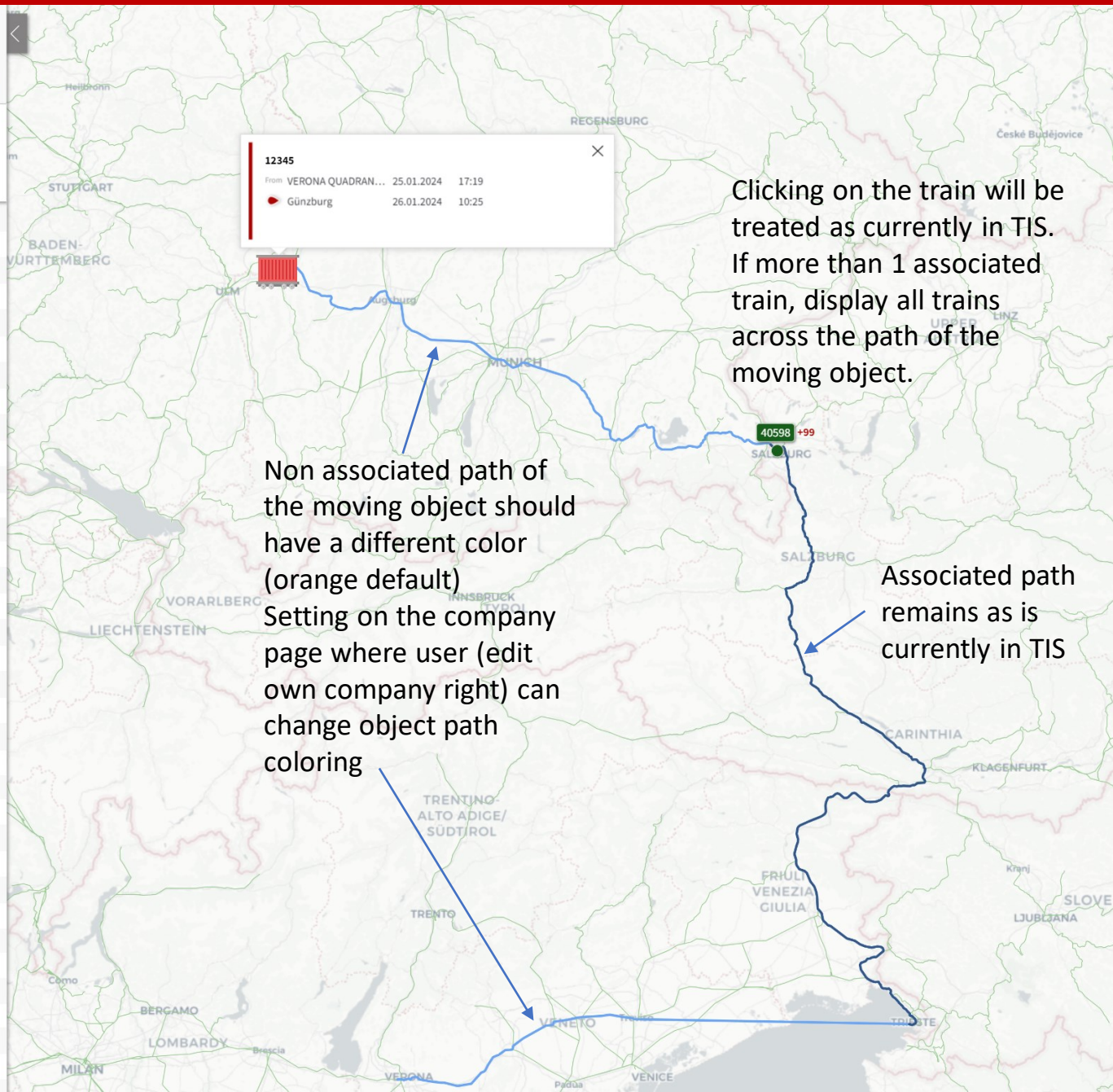
- path of the moving object on the map
- locations and timestamps

If multiple objects are matched, display moving object “cards” on the left & object icons on the map. Similar to the current train search in TIS.

Scenario: associated train(s)

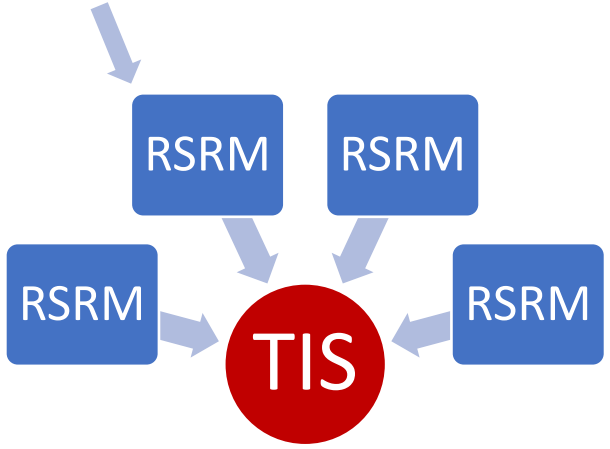






Connecting Transport Device to trains (currently in UAT)

```
<RunningStatusReportMessage xmlns:taf="http://www.era.europa.eu/schemes/TAFTSI/3.4"
  <MessageHeader>
    <MessageReference>
      <MessageType>4510</MessageType>
      <MessageTypeVersion>3.4.0.0</MessageTypeVersion>
      <MessageIdentifier>e75b6466-bad7-4e85-bec1-8581aa8672cf</MessageIdentifier>
      <MessageDateTime>2024-02-07T16:53:37.749454+01:00</MessageDateTime>
    </MessageReference>
    <Sender>3728</Sender>
    <Recipient>3178</Recipient>
  </MessageHeader>
  <MessageStatus>1</MessageStatus>
  <TelematicDeviceID>NA</TelematicDeviceID>
  <TransportDeviceID>
    <WagonNumberFreight>134513451</WagonNumberFreight>
  </TransportDeviceID>
  <ResponsibleRU>3728</ResponsibleRU>
  <LocationDateTime>2024-02-16T09:38:00+01:00</LocationDateTime>
  <GeoLocalisation>
    <GNSS_DynamicPosition>
      <GeographicCoordinates>
        <Latitude>48.335926</Latitude>
        <Longitude>16.299059</Longitude>
      </GeographicCoordinates>
    </GNSS_DynamicPosition>
  </GeoLocalisation>
</RunningStatusReportMessage>
```



① Type and identification of the object that is tracked by the telematic device.
② ID of the tracking device. “NA” if not applicable.
③ RU Responsible for the physical operation of the train/wagon/container.
④ Actual Date / Time at a specific reporting point.
⑤ TIS maps GPS coordinates to locations by using geo fencing.
⑥ Actual coordinates reported

Details | Forecasts | Incidents | Statistics | Chat | Linking History | **Wagons and Containers**

International Train Number	Actual Location	From		Planned Distance	Train Type		
99999	Sigmundsherberg	Kledering (in Zur)	16.02.2024 09:04	105,22 km	National Freight	1	1
National Train Numbers	16.02.2024 11:29 -1 min	To		Actual Distance	Last Update		
99999		Sigmundsherberg	16.02.2024 11:30	73,43 km	08.02.2024 15:45		

	Object Type	Object Number	First Time
①	Wagon	134513451	16.02.2024 08:38

More Details

Telematic Device ID ②	Sender	Responsible RU ③	Time ④	Location ⑤	Coordinates ⑥	Height above mean sea level / m	Accuracy / m	Speed / kr
NA		0081.3728 S Rail GmbH	16.02.2024 09:38	Nußdorf	48.259956, 16.367695			
NA		0081.3728 S Rail GmbH	16.02.2024 09:48	Kritzendorf	48.335926, 16.299059			

	Container	134513452	16.02.2024 09:58

More Details

Telematic Device ID	Sender	Responsible RU	Time	Location	Coordinates	Height above mean sea level / m	Accuracy / m	Speed / kr
NA		0081.3728 S Rail GmbH	16.02.2024 10:58	Ziersdorf	48.527931, 15.92024			
NA		0081.3728 S Rail GmbH	16.02.2024 11:16	Eggenburg	48.637779, 15.814873			

Add the functionality “National users” in TIS

- Address the European Commission’s request with RNE Members proposing **to adapt the TIS system to ensure IMs can individually grant access to the relevant transport authorities** (e.g. customs, National Safety Authorities (NSA), ERA, …):
  - ***To monitor the EU rail freight market and implement the required filter mechanism in TIS once approved***
- To ask RNE members for an agreement to implement this functionality in TIS:
  - ***To be included in the funding agreement of the “Technical Assistance call”;***
  - ***As this user type can be given by the IM to any authority or partner the concept is called “National User”.***
- The “National User” by default, will **only have TIS web access for the (national) network of the IM that they register** (no international view).
- Additional limitations will be applied for the “Train Delay Cause” and the “Train Composition information”, which will be hidden from the “Train Details”;
- The respective IM will have the possibility to further restrict the account by applying filters for locations, train numbers, train type, or companies of their national network.

RNE
RailNetEurope

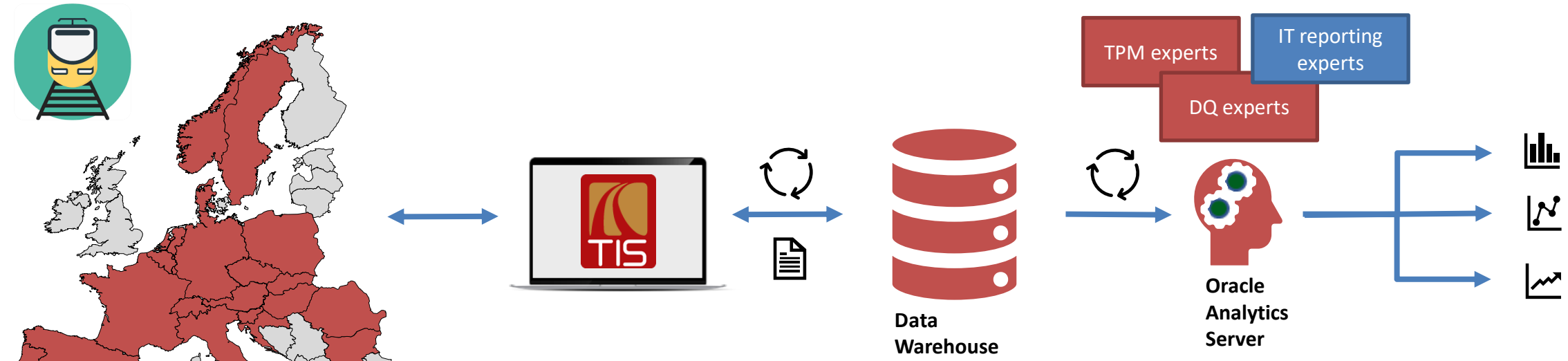
Train Performance Management

Activities

RNE collects data and became Europeans Datawarehouse

All data collected from members through RNE TIS application are stored in the data warehouse.

Based on stored data, reports are prepared and made accessible to users via Oracle Analytics Server (OAS).



TIS real-time information

- Real-time rail traffic data
- Real-time information (e.g.: incidents)

TIS data exchange function

- Data exchange via Common Interface
- Message distribution

TIS reporting function

- Pre-defined reports and graphs
- Customisable reports and graphs
- Information source for int. Train Performance Management (TPM)

Train Performance Management Activities

Interactive RNE Performance Management reports

- Interactive reports tailored to stakeholders' needs (IMs, RUs, RFCs).
- Access restricted reports

Bilateral Conversations to enhance reliability of the data at the borders

- Bilateral meetings and oriented working groups taking place to improve the quality and reliability of border section and RNE reports.

Train Performance Management Reference Book

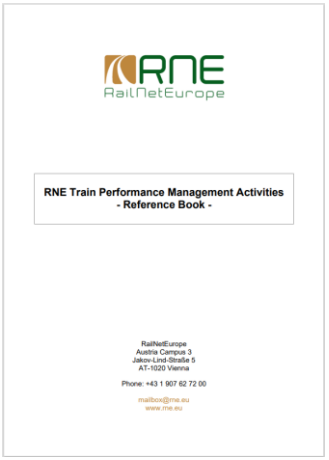
- A reference book for Train Performance Management Activities to support the experts on their tasks and guide newcomers on RNE Guidelines and tools was prepared and approved by Performance Management Group.

Reports and data sets analysis

- Data sets/reports assessed and delivered to external parties.
- Working Groups assessing data quality and investigating how to harmonise and exclude outliers that might distort performance metrics and reports.

Public Train Performance Monitoring Dashboards

- A new approach to disseminate international traffic performance was studied and is under discussion.

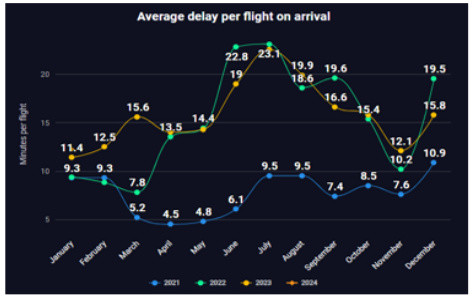


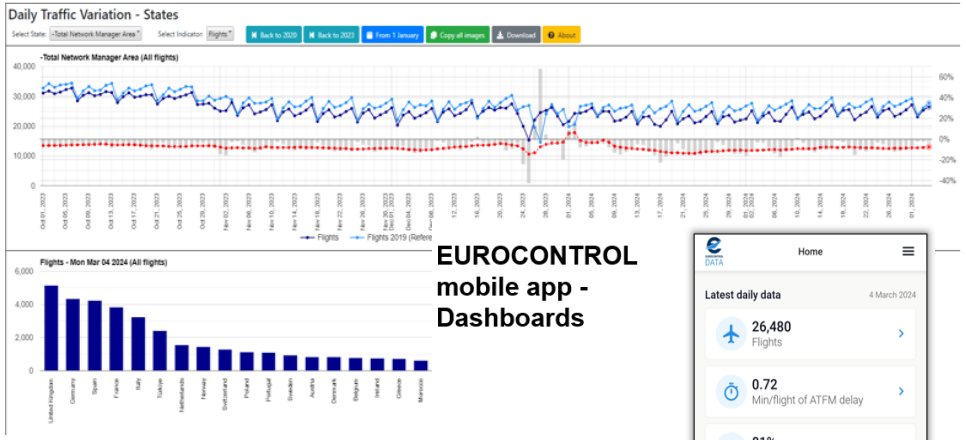
Performance Monitoring Dashboards – New Approach

Platform to disseminate **public performance management dashboards** providing information about the European railway network and international railway traffic.

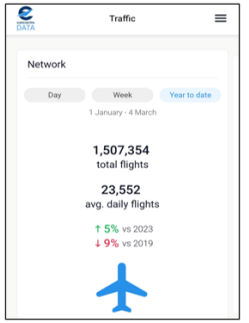
- in line with new European legislation expectations
- sensitive reports remain restricted to the proper users.

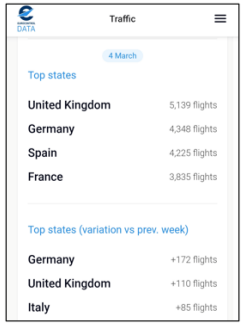
EUROCONTROL webpage – Dashboards and reports





EUROCONTROL mobile app - Dashboards





Anticipated effects

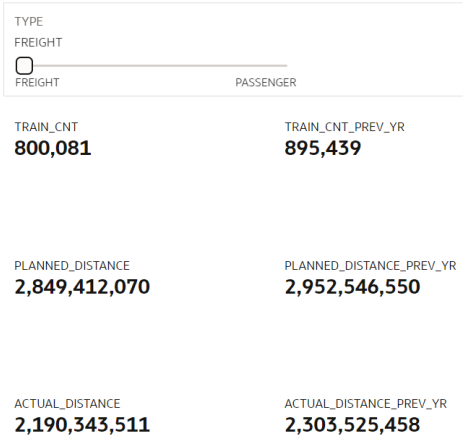
- Increase transparency of international railway traffic within the European network.
- Stakeholders will gain insights into the overall efficiency of railway services.
- Encourage the improvement of the overall railway efficiency.
- Enhance public trust in the railway sector.

RNE RailNetEurope

First proposal to initiate discussion

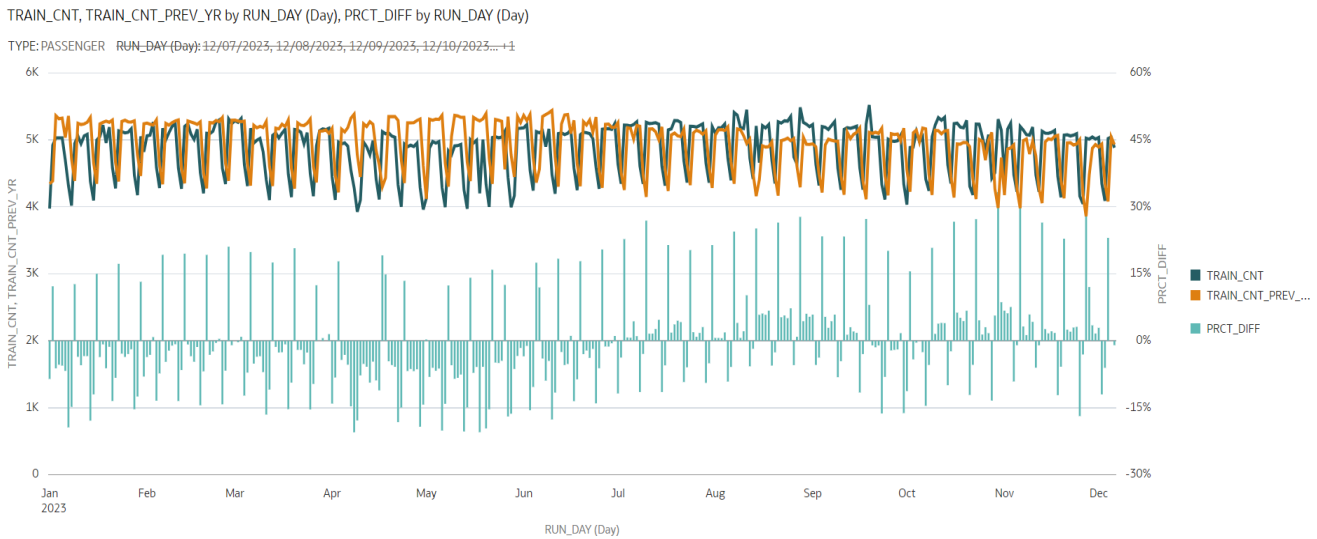
Main conditions

- Only international traffic will be considered
- TIS as the source of data
- Non-sensitive or detailed data in the public dashboards
- Comparison with previous years' timetables



Indicators under discussion with stakeholders

- Number of international trains
- % of punctuality at origin (first location in TIS)
- % of punctuality at destination (last location in TIS)
- Delay Causes: amount and distribution per month
- TrainKms
- Dwell time (reliable borders?)



Thank you for your attention