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INTERGOVERNMENTAL ORGANISATION FOR INTERNATIONAL CARRIAGE BY RAIL

OTIF

Analysis of how OTIF should proceed with TAF TSI

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Jan Hampl

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Executive summary

This report provides an analysis and considers different options of how OTIF could proceed with TAF TSI (Technical specification for interoperability relating to the telematic applications for freight subsystem). The first part aims to explain the principles and concept of TAF TSI itself. The second part deals with the main question of whether or not to transpose TAF TSI into the OTIF regulations. The analysis includes a summary of the advantages and disadvantages, and considers different aspects arising from the possible extension of the TAF TSI concept into the non - EU OTIF contracting states.

The main findings of the study are as follows:

- The provisions of the TAF TSI assume a liberalised railway market which requires the exchange of information in accordance with harmonised procedures and data formats. On the other hand, international rail freight traffic among the non-EU OTIF contracting states is organised on the "exchange of vehicles" principle, which requires less exchange of information (than specified in the TAF TSI) and does not assume the liberalised railway market. Not all TAF TSI specifications are therefore suitable for transposition into OTIF law.

- Another finding of the study is the relatively high cost of implementation for non-EU OTIF countries and also the non-existence of financial support for them (which is not the case in the EU, where TAF TSI implementation is co-funded by EU funds). Where only a limited number of neighbouring countries apply the "TAF TSI concept", it is questionable whether countries such as, for example, Iran would be able to make use of the TAF TSI concept. On the other hand, there are also certain investment costs if the TAF TSI concept is not implemented, but another IT system. From this perspective, it may also be interesting for non-EU States to take over a Europe-

wide, recognised IT standard for the exchange of information in rail freight traffic. Some parts of TAF TSI were also implemented voluntary outside the EU (e.g. Balkan region). This indicates a positive business case of TAF TSI outside the EU as well.

- Due to different transport requirements and differing organisation of the railways, different regions may need different approaches in terms of international information exchange. The TAF TSI concept is not the only possible platform dealing with the exchange of information. There is no evidence suggesting that the TAF solution is the best option for the exchange of information in the Euro-Asia region. OTIF should therefore be careful before giving preference to the "TAF TSI concept" by transposing it into OTIF law.

- A legal basis for the transposition of TAF TSI into UTP TAF is set out in APTU Article 8 § 2 in connection with the UTP GEN-B. However, transposition of the TAF TSI into OTIF law would not be straightforward, as the core TAF TSI regulation itself refers to several appendices that are published and regularly updated on the website of the European Railway Agency, including the data and message model in XML files. This combination of law and IT specifications makes the situation very specific and particularly tricky to transpose into international OTIF law.

- Today we can also see examples of the voluntary use of the TAF TSI data model, e.g. in Serbia, Ukraine or Russia, whose railway companies realise the need to exchange information for freight traffic and which have already applied some of the IT modules based on TAF TSI (RNE, RAILDATA), which help them to exchange information for trains operating from/to the EU. Such platforms are very useful and suitable for international traffic outside the EU as well. They are available to the non-EU OTIF contracting states and can handle basic information and ensure the interoperability of the following information, e.g.:
  - Electronic consignment note
  - Tracking of trains/wagons
  - Estimated time of arrival of consignment (especially important for the customer)

  These platforms, which are summarised in Annex 1, could be of added value for non-EU OTIF CS.

The findings of this study do not draw a conclusion on how OTIF should proceed with TAF TSI, as such a conclusion should be drawn by OTIF's Member States. Possible ways on how to proceed have been suggested (in chapter 2.9, Inventory of possible ways on how to proceed with TAF TSI) and can be summarised as follows:

1) Do not transpose TAF TSI

   a) Do nothing within OTIF
   b) Promote the use of TAF TSI solutions on a voluntary basis
   c) Voluntary scheme + application guide issued by OTIF

2) Transpose TAF TSI into an OTIF regulation

   a) Full transposition of the TAF TSI into OTIF law (UTP), including its technical appendices.
   b) Partial transposition, meaning that the core requirements of the TAF TSI would be transposed into OTIF law, but would refer to the technical details as published centrally on the website of the European Railway Agency.

For the latter two options, the TAF TSI could be transposed in such a way that the requirements are either voluntary or mandatory in non-EU OTIF Member States. The arguments set out in this study suggest making any transposed requirements voluntary.

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Introduction

This paper explains the principles of TAF TSI (Technical Specifications for Interoperability for Telematics Applications for Freight) and considers whether it might be possible, with OTIF's help, to broaden application of these principles to the non-EU OTIF contracting states, and particularly whether or not the TAF TSI should be transposed into an OTIF regulation.

The first part deals with the TAF TSI itself. It describes briefly the problem of information exchange in international rail freight traffic. EU railway policy is also introduced, as well as the main legislative means (Directives, Regulations) to achieve interoperability within the EU, in particular interoperability among the telematic systems for rail freight traffic. The first part of the study concludes with an introduction to Regulation No. 62/2006, which is none other than the TAF TSI. Please note that the study is based on the EC Regulation 62/2006 - 1st TAF TSI, which has been replaced by EU Regulation 1305/2014 - revised TAF TSI (more information in chapter 1.6, "Revised TAF TSI Regulation No 1305/2014").

After the introduction to the TAF TSI and the concept underlying it, the second part deals with the question of how OTIF should deal with TAF TSI, in particular whether or not to transpose TAF TSI into an OTIF regulation. For the purpose of the analysis the advantages and disadvantages of spreading the TAF TSI concept into non-EU contracting states are described as well as other different aspects, which should also be taken into account. The study is concluded with a list of possibilities of how could OTIF proceed with TAF TSI.

The paper also includes Annex 1, which is a list of IT products developed in accordance with TAF TSI and their availability to non – EU OTIF contracting states. Annex 2 contains a summary of the messages prescribed by TAF TSI. In Annex 3 the interviewed persons for the study are listed and Annex 4 contains the comments of ERA and CER to the first draft of the study.

1. TAF TSI

1.1.Description of the problem

The diagram below shows a freight transport operation by road compared with freight transport by rail. When transporting goods by rail, there are several interfaces between the various partners involved (consignor, RU, IM, etc.). Cooperation among these entities goes hand in hand with the exchange of information which is needed to complete the transport chain successfully. For road transport these data exchanges are handled among consignors, consignees and the companies providing transport, whereas for rail, due to the many interfaces, these information exchanges become more complex and more numerous, as we can see in Figure 1.

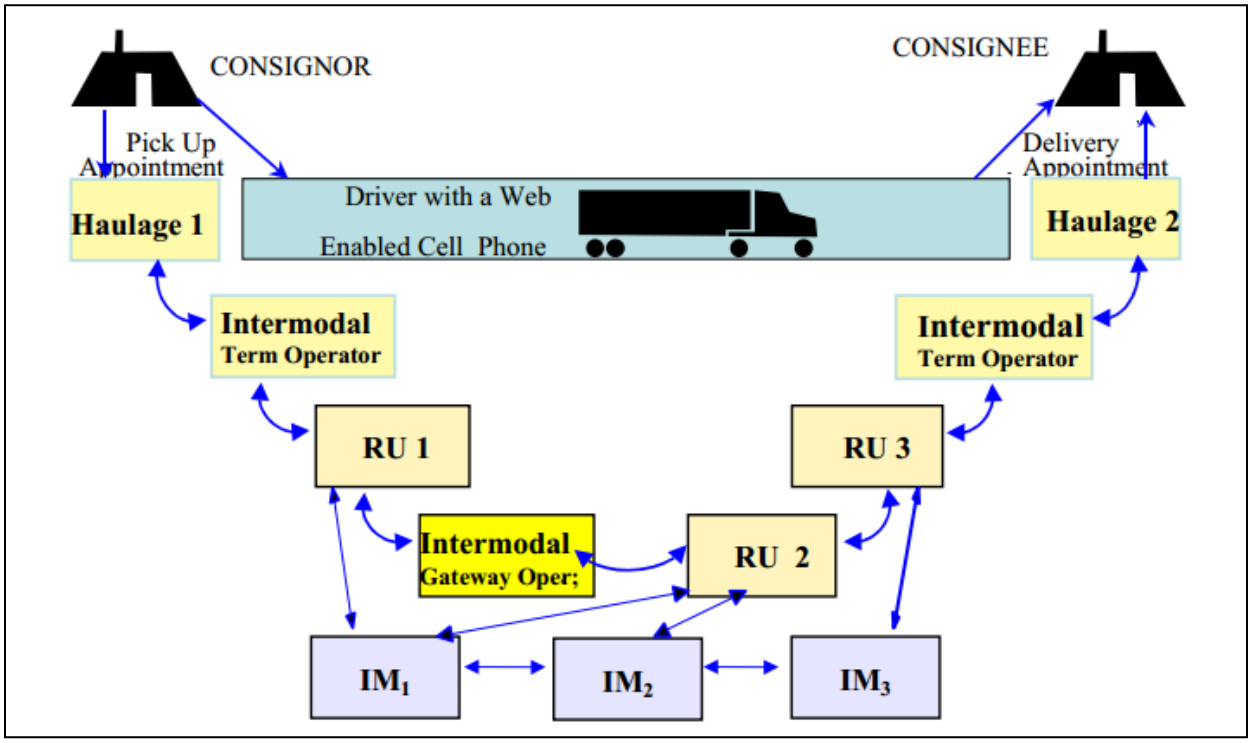


Figure 1: Key interfaces in freight transport[1]

To make the rail freight transport process easier, different entities (customers, IMs, RUs, etc.) started to develop different kinds of IT systems for exchange of data related to the transport chain. As an example of how large such an IT system can be, we can take the national Czech freight railway undertaking – ČD CARGO. Its operational and business IT system, called PROBIS, consists of many modules which are interconnected. The diagram of the PROBIS IT system is shown below.

[1] BERGER, R. AEIF. *"TELEMATIC APPLICATIONS" subsystem for Freight Services: FIGURES AND SEQUENCE DIAGRAMS OF THE TAF TSI MESSAGES*. 2004.

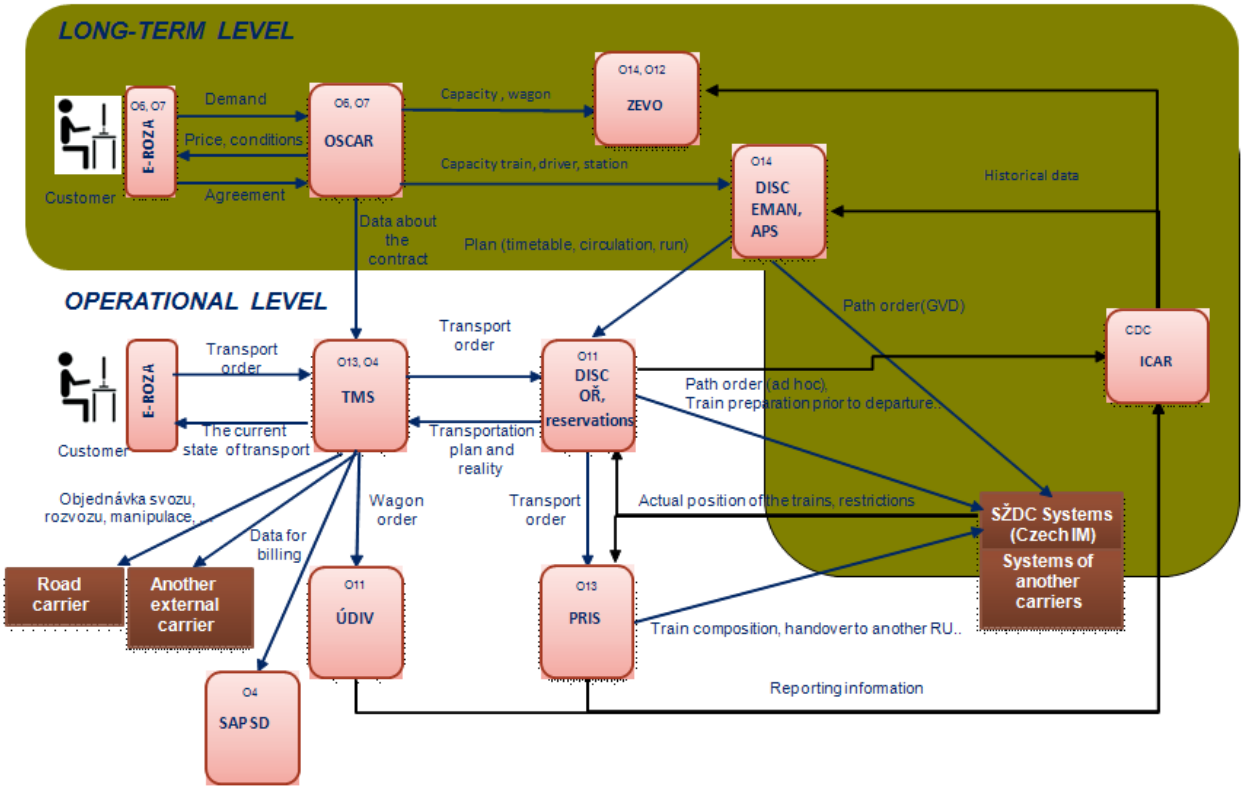


Figure 2: IT Architecture of PROBIS

Explanation of abbreviations:

- E-ROZA – Customer portal, connects customers with all the IT systems
- OSCAR – Cargo Business system (covering functionalities such as: customer care, pricing, product management, purchasing, order reservations...)
- ZEVO – Vehicle management database
- ICAR – Data warehouse, storing information from all other applications
- DISC EMAN – Dispatching information system, modelling and analysis of the freight transport plan
- DISC APS – Dispatching information system, locomotives and staff
- TMS – Transportation management system, consolidation basis for invoicing
- DISC OŘ – Dispatching system of ČDC, operative management
- ÚDIV – Central control of vehicles
- PRIS – Operational information system station

There are nowadays tens of such systems across the European railway stakeholders (RUs, IMs, keepers, customer, etc.). Unfortunately, these systems have been developed in the past without close international cooperation, which has caused the non-standardised situation we now have:

- Most IT systems are able to exchange data domestically but not internationally.
- The data/messages are mostly generated with different formats and are not therefore readable by other systems (e.g. those of other RUs, IMs, etc.) which do not support those formats.
- Each system was built with different aims (some of the RUs focused on developing their IT applications for operations and management of wagons, while others built up their IT systems with the focus on business processes, etc.).

In the past there have been some attempts to create a common platform for international data exchange in rail freight traffic (e.g. RAILDATA), but only some stakeholders participated in these projects. This situation implies that we have a lot of different systems for data exchange in rail freight traffic, but generally they are not able to communicate with each other and there is no standardised environment for data exchange (mainly in the international exchange of data).

This situation is incompatible with the objectives of EU rail policy, because the EU is creating interoperability between the different national legacy systems through technical harmonisation. The EU's aim is to create a common European rail area. The concept of interoperability and how to achieve it is set out in European Directive 2008/57/EC on the interoperability of the rail system within the EU. The Directive sets out the conditions which have to be met in order to achieve interoperability within the EU. These conditions are specified in the respective TSI (technical specification for interoperability) for each of the followings subsystems: infrastructure, energy, control-command and signalling, rolling stock (structural subsystems) and traffic operation and management, maintenance, telematic applications for passenger and freight services (functional subsystems). This means that the TAF TSI is part of a comprehensive legal framework to facilitate interoperability at technical and operational levels.

1.2.TAF TSI Regulation No 62/2006

Here we come to the TAF TSI (Telematic application for freight technical specification for interoperability), which was issued as Commission Regulation No 62/2006 (This Regulation has been replaced by Regulation no 1305/2014, known as the revised TAF TSI, for more information please see the chapter 1.6 of this document). TAF TSI was developed to facilitate the international exchange of information on cross-border rail-freight services. It sets the functional and technical standards (mainly content and format of data) for exchanging information between IMs, RUs and other stakeholders. The

contribution of such a uniform exchange of information should be in increasing efficiency, service quality, reducing freight handling costs and providing better customer information.

1.3.The concept of TAF TSI

The TAF TSI is structured into the following 7 chapters:

1) Introduction – defines technical and geographical scope as well as content of the TSI.
2) Definition of subsystem/scope – specifies functions within the TSI/outside the TSI and gives an overview of the subsystem description.
3) Essential requirements – specifies which essential requirements the TAF system must meet (e.g. safety, reliability and availability etc.).
4) Characterisation of the subsystem – describes the TAF subsystem, especially the functional and technical specifications.
5) Interoperability constituents – this chapter is not relevant to TAF subsystem as there are no interoperability constituents determined as far as the subsystem TAF is concerned.
6) Assessment of conformity and/or suitability for use of the constituents and verification of the subsystem – this chapter is also not relevant for TAF subsystem.
7) Implementation – sets out the practical steps for implementation of TAF TSI.

The TAF TSI also includes several technical annexes, which describe in more detail the provisions set out in chapter 4 (Characterisation of the subsystem).

The TAF TSI concentrates on operational interoperability in rail freight transport. This means the interoperability of telematic applications intended to support transport processes. The concept of creating the uniform data exchange platform for rail freight traffic within the EU in accordance with TAF TSI is summarised in chapter 4 (Characterisation of the subsystem) and consists of the followings points:

1.3.1. TAF TSI prescribes processes and protocols for data exchange for the following functionalities:

- Consignment note data
- Path request at short notice (figure 2 shows an example of the data flow)
- Train preparation
- Train running forecast
- Service disruption information
- Train location
- Shipment Estimated Time of Interchange/Arrival

- Wagon movement
- Interchange reporting

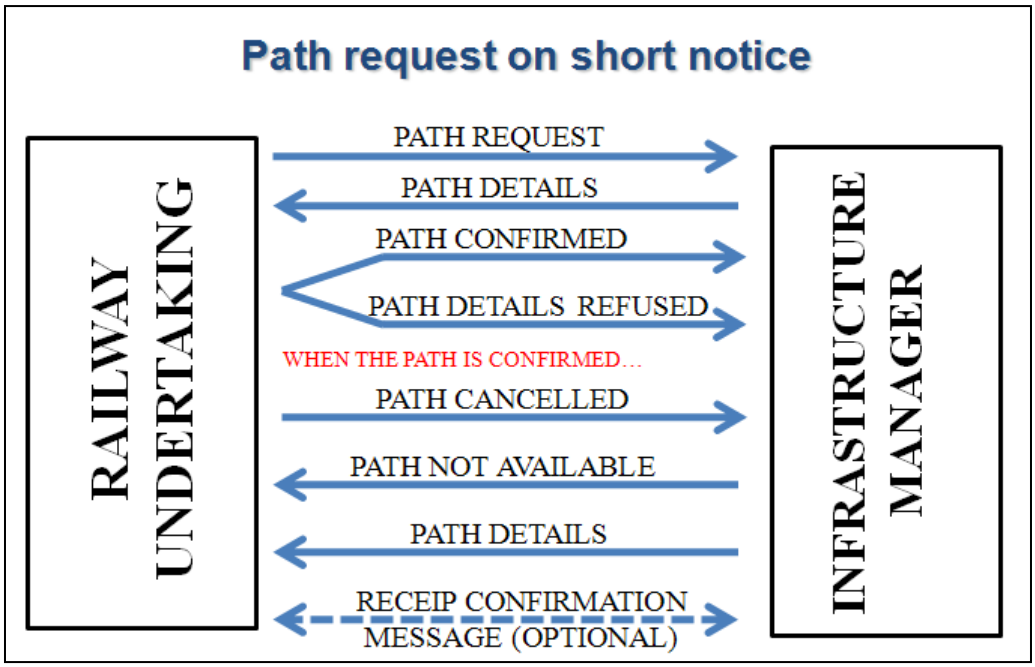


Figure 3: Path request at short notice functionality data flow

This means a harmonised definition of the following parameters:

- **When** (at which point in a specific process)
- **What** (which kind of information and content)
- **Who** (partner or partners) and
- **How** (in what format) **the data must be exchanged between the partners**.

Note: All the messages prescribed by TAF TSI are summarised in Annex 2.

1.3.2. Databases

The concept of TAF TSI also prescribes the creation of various databases, which serve different purposes in the overall concept of TAF TSI. The databases which must be implemented by different entities involved in TAF TSI are as follows:

- **Infrastructure Restriction Notice Database** - IM must install this database, which specifies all the restrictions on the network. This database has been removed from the revised TAF TSI (EU 1305/2014)
- **Reference files** – contains unique location ID, company ID, etc. across the EU to identify uniquely the actors and locations within the TAF TSI.

- **Rolling Stock Reference Database** - contains administrative and technical data about the wagons
- **Wagon and Intermodal Unit Operational Database (WIMO)** - this database is used for the storage and provision of the data elements needed for operational purposes and for the tracking of wagons
- **Trip plan for wagon/intermodal unit** – this database is used for dynamic trip planning

1.3.3. Common interface

Nowadays there are different IT systems generating messages with different formats. TAF TSI therefore prescribes the mandatory use of a so-called **common interface**. Using this should ensure that all systems which are needed to implement TAF TSI (RUs, IMs internal legacy systems, databases, etc., see figure 4) can communicate with each other through a standardised message format. As a common interface is used, the non-standardised legacy systems can continue to be used. The common interfaces transform the legacy system's output to a standardised TAF message format in which it can be understood as input to other, previously incompatible, legacy systems.

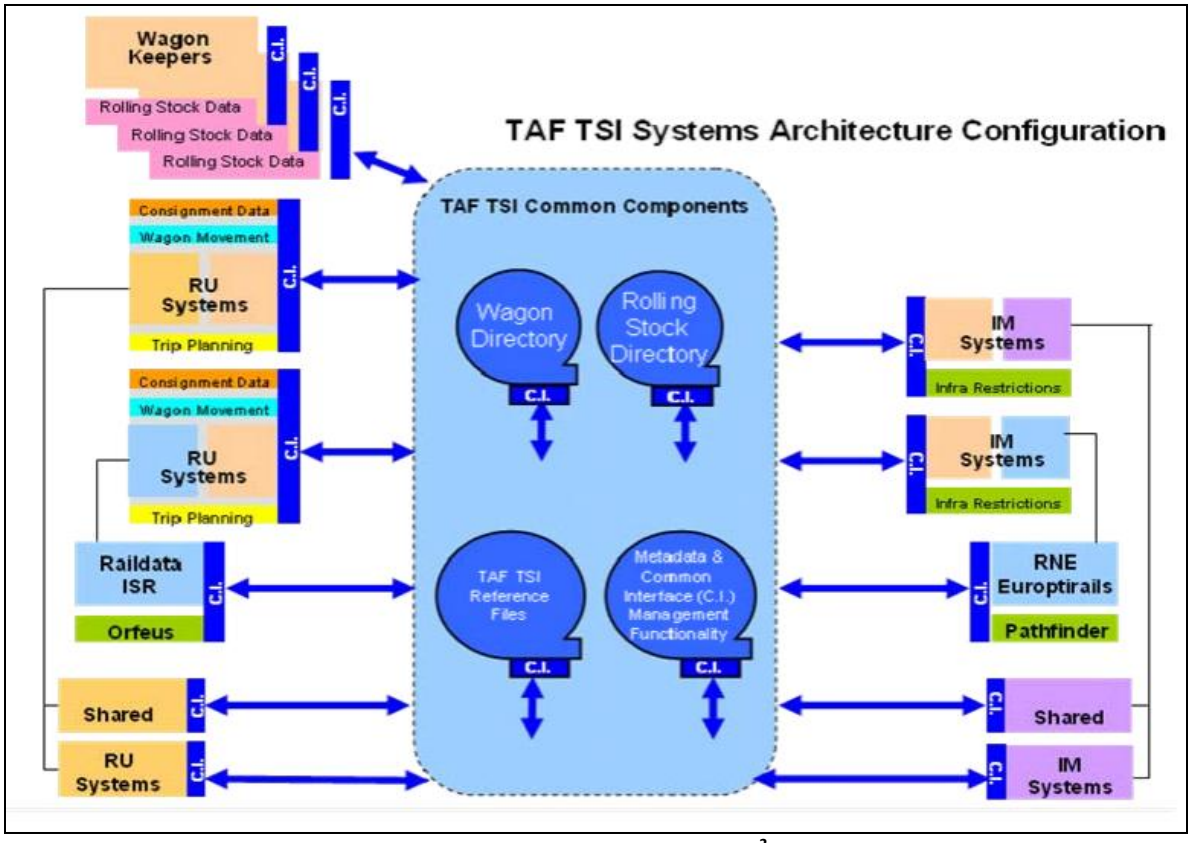


Figure 4: global architecture of TAF TSI[2]

1.4.Implementation of TAF TSI

The implementation of TAF TSI is a very complex process and it requires the cooperation and involvement of many different stakeholders from the railway area across the EU. The implementation according to the initial master plan did not go well, as the railway stakeholders were not able to meet the implementation dates. The European Commission therefore accepted a new consolidated Master Plan to replace the old one (from 2007). The plan was published in May 2013 and sets final dates when each functionality within TAF TSI should be implemented. These dates are listed in figure 5 and according to it, full implementation of TAF TSI is expected by 2021, although without the TID (Train Identification) most of the functionalities should be implemented by 2018. Some projects have already been finished.

Many legacy IT systems at RUs and IMs are now being updated in order to comply with TAF TSI requirements. Implementation is generally achieved in the following steps:

1. Adjusting the national IMs' and RUs' IT systems to TAF TSI
2. Installation of the common interface

[2] ERA. *STRATEGIC EUROPEAN DEPLOYMENT PLAN FOR THE EUROPEAN-WIDE IMPLEMENTATION OF THE TECHNICAL SPECIFICATION FOR INTEROPERABILITY TELEMATIC APPLICATIONS FOR FREIGHT (TAF TSI): Deliverable 3 – Overall TAF system development plan from-concept-to-delivery*. 2007.

3. Implementation of the prescribed supporting databases.

There are many actors involved in the implementation of TAF TSI, who have different roles, such as: monitoring TAF TSI implementation, development of products in accordance with TAF TSI, financing the development, development of the product on their own initiative, etc.

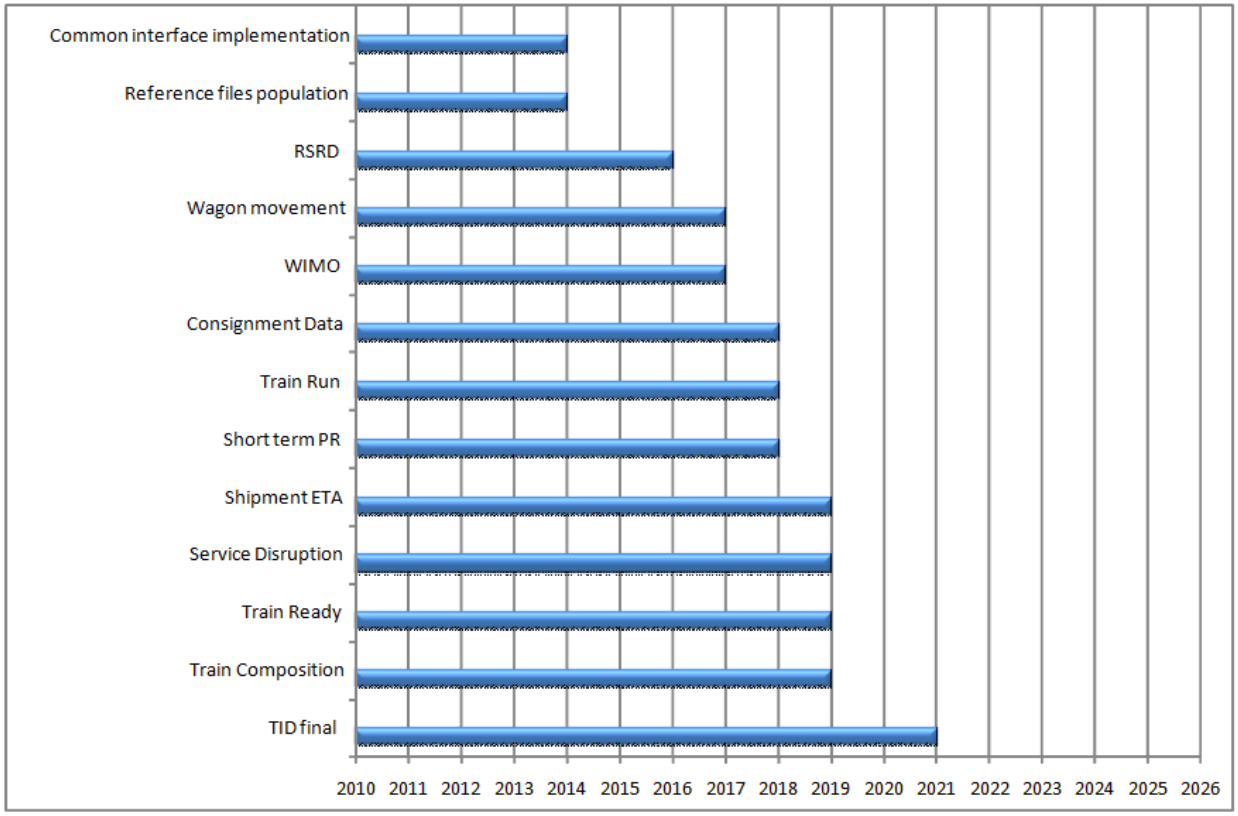


Figure 5: Target implementation dates[3]

The monitoring of TAF TSI implementation already involves many actors. The individual TAF stakeholders have to report on their implementation progress to the Commission through the Steering Committee. The Steering Committee is responsible for monitoring implementation of the TAF and reporting to the Commission 4 times per year. ERA will assess implementation with a view to determining whether the objectives and deadlines have been achieved. ERA will be responsible for the Change Management Process and publication of the Technical Documents.

Besides the monitoring of implementation, the European Commission now co-finances some of the products which are being developed in accordance with TAF TSI.

[3] ERA. *TAF-TSI Master Plan – v4.0*. 2013.

The UIC was tasked with developing the common interface and reference files (reference files will be hosted at RailNetEurope in the future). These essential parts of TAF TSI are developed inside the so-called Common Component Group by UIC.

There is also RailNetEurope (RNE), which is a system for cooperation between European IMs. They joined forces in order to develop platforms for the international exchange of information. Their products, such as the Train information system (TIS RNE) and Path coordination system (PCS RNE), are now a vital part of the practical implementation of TAF TSI.

An association of European RUs called RAILDATA maintains the applications such as ORFEUS and USE-IT. Those platforms also became standard tools for the practical implementation of TAF TSI among the European RUs. CIT was also involved in TAF TSI implementation as it works together with RAILDATA on defining the electronic consignment note used with the help of ORFEUS.

The UIP has initiated the development of RSRD[2], which not only complies with TAF TSI, but also provides some additional data.

1.5.Scope of the TAF TSI and its possible extension

Chapter 1.2 (Geographical scope) of the TAF TSI states that: "The geographical scope of this TSI is the trans-European conventional rail system as described in Annex I to the Directive 2001/16/EC. But this TSI may also be applied to the complete freight transport rail network of the Member States of the EU, **with the restriction that the requirements of this TSI are not mandatory for freight transport arriving from or going to a non EU country.**"

Nevertheless there is rail freight traffic arriving from or going to non-EU OTIF countries as well as traffic between non-EU OTIF countries only. The second part of this study therefore deals with the question of how the non-EU OTIF countries could join the standardised area for data exchange in rail freight traffic with the help of OTIF.

1.6. Revised TAF TSI Regulation No 1305/2014

1 January 2015 entered into force new regulation No 1305/2014, known as revised TAF TSI. (For better understanding of development of TAF TSI here is the link on Chronology of TSIs: http://www.era.europa.eu/Document-Register/Pages/Status-of-Technical-Specifications-for-Interoperability.aspx)

The main changes introduced in the revised TAF TSI (Regulation No 1305/2014) in comparison to the 1st TAF TSI (Regulation No 62/2006) could be summarised in following points:

- Broadening the Geographical and technical scope: TEN network + Off-TEN network
- Removal of detailed definition of messages within the legal text
- Introducing the new TAF/TAP national contact points (Appendix III)
- Reinforcement of the role of Freight customer within the regulation
- Deletion of some messages, functionalities withdrawn (Infrastructure restriction notice database)
- Extraction of the sequence definition for train running forecast and shipment ETI/ETA
- Better alignment with TAP TSI and OPE TSI

The report does not fully take in account the revised TAF TSI regulation, as in the time of carrying out the study 1st TAF TSI was in force. Nevertheless the changes introduced in the revised TAF TSI have no impact on the aim of the study.

2. Analysis of how should OTIF proceed with TAF TSI

The main task of this study is to analyse how OTIF should proceed with TAF TSI. There are several options:

- Transpose the TAF TSI into an OTIF regulation (UTP TAF). The application of a UTP TAF could be either voluntary or mandatory.
- Recommend that the non-EU OTIF member countries use/join the TAF TSI concept on a voluntary basis.
- No recommendation/negative recommendation regarding TAF TSI concept to the non-EU countries.

The following chapters consider different requirements, aspects, advantages and disadvantages of broadening the "TAF TSI concept" towards the non-EU countries and the final conclusion is explained at the end.

2.1.The significance/advantages of the TAF TSI outside the EU

Implementation of the TAF TSI is a big project and it is anticipated that complete implementation within the EU should be achieved in the near future (complete implementation by 2021). This means that all EU countries, which constitute a significant part of the Euro-Asia region, will use the standardised platform for data exchange. It might also be interesting for non-EU OTIF countries to use the TAF TSI concept, especially for the following reasons:

- The TAF TSI offers unified platforms for international data exchange (will be used in the whole EU soon)
- Information interoperability is needed for international rail freight traffic
- The technical concept of TAF TSI has been completed and finalised
- There are many products complying with TAF TSI available on the market (see Annex 1)
- The implementation of TAF TSI has general advantages: increasing efficiency and service quality, reducing freight handling costs and providing better customer information
- See also other benefits in the comments from ERA (Annex 4 of this document)

The transposition of TAF TSI is anticipated by COTIF itself. APTU Article 8 § 2 states:

"In principle, each subsystem shall be subject to one UTP. Where relevant, a subsystem may be covered by several UTP and one UTP may cover several subsystems."

The UTP GEN-B defines each subsystem referred to in APTU Article 8 § 2. One of the functional subsystems stated in UTP GEN-B chapter 1 (List of the subsystems) is "telematics applications for passenger and freight services". In the EU the subsystem is covered by TAF TSI (for freight services) and by TAP TSI (for passenger services). Therefore, according to this justification, it seems appropriate to develop UTP TAF, which would transpose TAF TSI.

On the other hand there are other aspects which should also be taken into consideration in this analysis. These are summarised in the following chapters.

2.2.Interoperability vs. exchange of vehicles

EU railway policy promotes (beside other things) a liberalised railway market and aims to establish railway interoperability (figure 6). The TAF TSI was issued in order to support and realise this idea in the area of telematic application for rail freight traffic. In line with these principles (liberalisation and interoperability) the TAF TSI defines specific procedures and items. The TAF TSI is not only meant to be used exclusively for international railway traffic but also for (internal) liberalised railway supply market within every EU member country. There are currently 539[4] registered freight RUs and dozens of IMs across the EU and the interoperability of information among them should be ensured in accordance with the rules set out in the TAF TSI. TAF TSI foresees several models of organising rail freight transport:

- One RU with different (n) IMs
- Different (n) RUs with different (n) IMs (this principle can apply internationally as well as domestically within one state)

On the other hand if we look at the majority of the non-EU OTIF countries and how international rail freight transport is organised there, we see the much simpler principle referred to as "exchange of vehicles". This principle is based on a fully integrated national railway company, which manages infrastructure and is the monopolistic train operator. Some non-EU OTIF States have legally opened their railway market, but without practical implementation. Therefore, on the territory of each state there is normally only one national railway company that both maintains the infrastructure and provides rail transport services. As we can see in figure 6 - The national railway company (RU1) runs the vehicles on its network to the border, where another state railway company (RU2) takes these vehicles over and runs them on its own network (perhaps to the next border where this process continues further with the same scenario). This scenario is also known as n RUs with n IMs.

[4] Licences and Certificates: Statistics. *ERADIS: EUROPEAN RAILWAY AGENCY DATABASE OF INTEROPERABILITY AND SAFETY* [online]. Accessible from: https://eradis.era.europa.eu/safety_docs/licences/statistics_ru.aspx

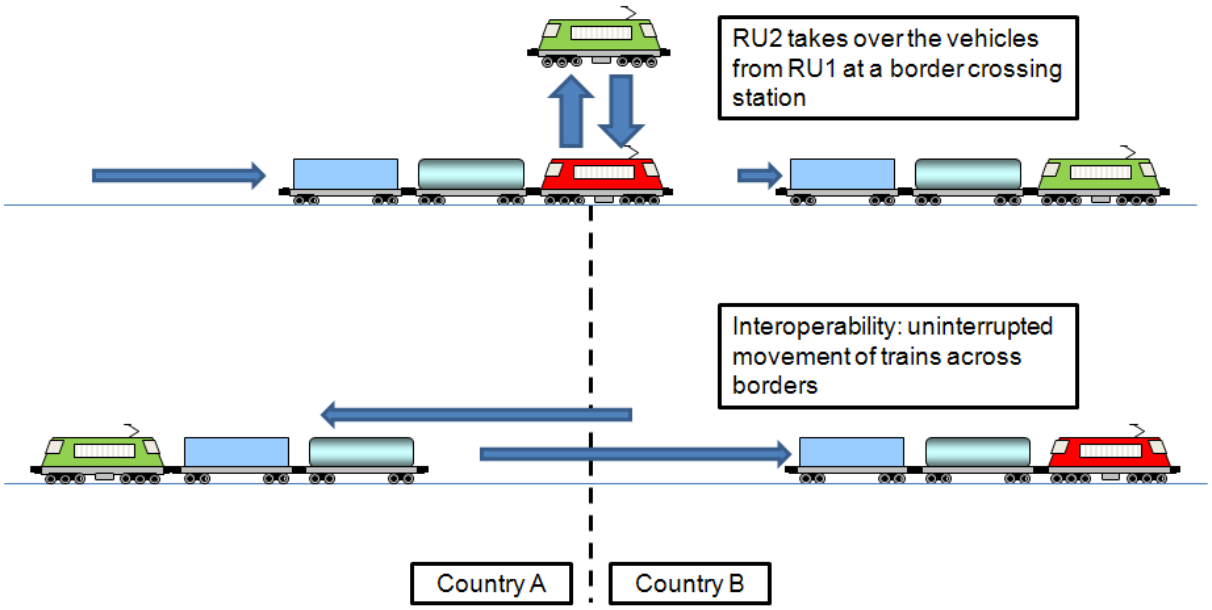


Figure 6: Exchange of vehicles (n RUs with n IMs, above) compared to interoperability (one RU with n IMs, below)

These two principles of organising international rail freight transport are different and also require different types of the information which has to be exchanged.

2.3. Not all TAF TSI provisions are suitable for non-EU OTIF contracting states.

A significant part of TAF TSI specifies how the different processes (e.g. path request at short notice, train preparation) should be communicated between RUs and IMs. These specifications are based on the fact that after liberalisation of the railway supply market within the EU, there may be many RUs and IMs, as well as new principles for organising railway transport (e.g. one RU with n IMs, figure 6). TAF TSI reflects this development and specifies some messages which are suitable for a liberalised EU railway market but which are not suitable for direct transposition into UTP TAF.

For example, the provision concerning a path request at short notice defined in the TAF TSI (chapter 4.2.2.1) set out the procedure for contracting the path at short notice. The path at short notice is communicated between the RU and IM. In this case, the TAF TSI also considers the situation that is typical only for the liberalised rail market within the EU – one RU operates the train on several IM networks. Therefore, the IT systems should be adapted to that situation when one RU requests the path by sending the "path request message" to several IMs on which the RU intends to operate the train. It does not make much sense to adapt the IT systems in non-EU countries for a scenario such as this, which cannot occur.

The “Train preparation” section (TAF TSI, chapter 4.2.3) specifies the messages which must be exchanged between IM and RU during the train preparation phase until the departure of the train: Train ready, train position, train at start, train running information. These messages also reflect the situation within the EU in which a RU can operate the train on different IM networks. The TAF TSI therefore attempts to achieve a unified format for communication, no matter which IM and RU the communication takes place between. On the other hand, within the non-EU OTIF countries, the simple scenario of “exchange of vehicles” does not assume another RU operating on the national railway infrastructure, so such communication might be handled internally within the national railway companies and such provisions do not need to be applied.

Another example is one of the databases, which is prescribed by TAF TSI - the so-called “Infrastructure restriction notice database”. This database (managed by each IM) should serve the different RUs when they plan to request a path on that IM network (the database is also a tool to open the market). Because within the non-EU OTIF countries, no other RUs are supposed to operate/contract the path - except the national carrier - this database seems to make no sense. (This database has been deleted in the revised TAF TSI)

Another thing which can be derived from these different principles for organising international rail freight transport is the non-existence of IM and RU as such. TAF TSI prescribes messages which have to be sent out by IM and messages which have to be sent out by RU. The non-EU OTIF countries have national railway companies which have the status of both IM and RU under one roof. Although it can be assumed that these divisions (IM, RU) are technically separated, the official precondition of separation (as it is in the EU) is not applicable in the non-EU OTIF countries. Therefore, perhaps the question of responsibility could be raised, as in the TAF TSI there are e.g. databases which have to be managed either by the IM or by the RU and these entities do not exist at present.

These examples demonstrate that the TAF TSI assumes a liberalised railway market and this liberalisation leads to the exchange of information in accordance with harmonised procedures and data formats. Owing to the different ways in which international rail freight traffic is organised in the non-EU OTIF contracting states, not all the provisions are suitable for transposition into OTIF law.

2.4.Different geographical areas with different volumes of traffic with EU

Chapter 2.2 explained the principles for organising international rail freight traffic in the EU in comparison to the non-EU OTIF countries. Nevertheless, not only does international rail freight traffic take place separately within these areas but also between them. The question of how OTIF should deal

with TAF TSI should also therefore be considered in respect to the geographical context of the non-EU OTIF countries, especially in relation to the EU.

Below is the list of non-EU OTIF countries that apply APTU (Uniform Rules concerning the Validation of Technical Standards and the Adoption of Uniform Technical Prescriptions applicable to Railway Material intended to be used in International Traffic). These countries would then theoretically apply the transposed UTP TAF for international rail freight traffic. This list is likely to be changed in the future, but for the purpose of this analysis we can take the situation we have today:

- Albania
- Algeria
- Armenia
- Bosnia and Herzegovina
- Liechtenstein
- The former Yugoslav Republic of Macedonia
- Monaco
- Montenegro
- Morocco
- Norway
- Serbia
- Switzerland
- Syria
- Tunisia
- Turkey
- Ukraine

Different geographical areas can be observed. For some regions it might be of interest to join the "TAF TSI area" (in terms of the volume of freight transport with the EU), whereas for others it might perhaps not be of so much interest.

1. **North Africa (Algeria, Morocco, Tunisia)** –International rail freight traffic takes place between these countries. The region has no international rail freight traffic with the EU due to the geographical situation (because of the sea).
2. **Balkan region + Turkey and Ukraine** (Albania, Bosnia and Herzegovina, Macedonia, Montenegro, Serbia, Turkey, Ukraine) – This region is geographically close to the EU and there is significant rail freight traffic from/to the EU where the TAF TSI concept will be soon applied.

For this region therefore, joining the TAF TSI area becomes of much more interest. The first steps in terms of linking this region to the TAF TSI have already been taken (more information in the chapter "The Situation at present").

3. **Middle East (Armenia, Iran and Syria)** – The number of freight trains from/to the EU and these countries is not significant.

It is particularly between the region marked as 2 and the EU where there is a significant number of trains which cross the EU/non-EU OTIF interface. For these countries it is therefore more interesting to join the "TAF TSI area" in order to ensure the continuous "interoperability" of information for trains operating in both regions.

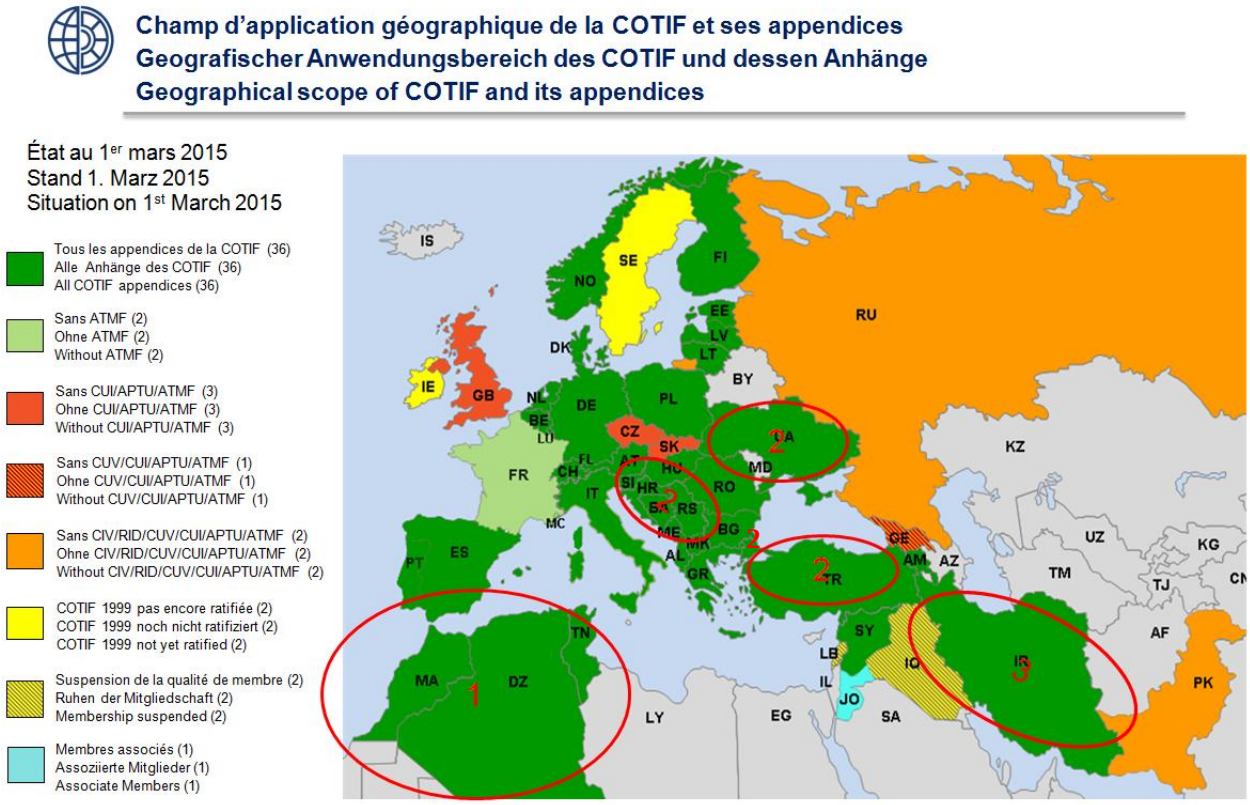


Figure 7: Geographical scope of COTIF and its appendices and defined regions

2.5.Using the "TAF TSI concept" does not have the same effect everywhere

This chapter is very closely connected to the previous one. Generally the success of the TAF TSI concept depends on how many countries use it, or how large a geographical area is covered by the TAF TSI concept. It can be assumed that the EU Member states constitute a large geographical area and that most of the traffic takes place among them. This is also supported by the fact that EU railway stakeholders

have to implement TAF TSI. For these reasons, the result is a very compact area in which only one information standard should soon be used.

On the other hand, we can take the theoretical example of Iran. If Iran were to implement the UTP TAF, then the information exchange according to UTP TAF could only take place with Turkey and Armenia (which apply APTU). Other countries adjacent to Iran (Azerbaijan, Turkmenistan, Afghanistan, Pakistan, Iraq) which are either not members of OTIF or do not apply APTU would be excluded from this information exchange based on the UTP TAF because they would most probably not apply these provision (UTP TAF). Whether or not neighbouring countries apply (or do not apply) the same standards for exchanging information has a major influence on using the system. In this respect, Iran's situation is not the same as for a country situated in the middle of Europe, where soon, only the standard according to TAF TSI will be used.

Some of the above countries are also logically more oriented to Russia (e.g. Ukraine, Armenia). Standards for this 1520 mm width gauge railway network are set in the OSJD. Information exchanges between the railway structures of countries with this network are carried out automatically by a general message system called ASOUP, which was accepted by the members of OSJD. With the help of ASOUP, the basic messages are exchanged (consignment note data, train list data, time of border crossing). The fact that there are other principles for the international exchange of information in addition to the TAF TSI concept should be noted and taken into consideration.

On the basis of the above arguments, it can broadly be said that the farther the country using the TAF TSI concept is from the EU, the less the exchange of information will take place in accordance with the TAF TSI concept (volume of messages). This raises the question of whether it makes sense to transpose TAF TSI into an OTIF regulation and "force" non-EU OTIF countries, such as Iran, to use the TAF TSI concept for international traffic without regard to regional conditions. This question is also very sensitive in terms of the costs involved in implementing the TAF TSI, which is dealt with in the next chapter.

2.6.Economic view on realisation

The EU issued the TAF TSI as Commission Regulation (EC) No 62/2006 (replaced with the revised TAF TSI in force Regulation No.1305/2014). This regulation does not have to be transposed into national law systems but the railway stakeholders concerned (freight RUs, IMs, etc. within the EU) have to align their systems in accordance with the TAF TSI provisions. This results in the general problem in implementing the TAF TSI, i.e. the relatively high cost of implementation.

To get an idea about the approximate costs, we can take the example of TAF TSI implementation in the Czech Republic. The two most expensive implementations were made at the Czech IM – SŽDC and Czech national freight RU - ČD CARGO. The total cost of TAF TSI implementation was as follows:

- Czech national RU - ČD CARGO: 172 582 704 Kč (approximately 7 670 000 CHF)[5]
- Czech IM – SŽDC: 72 360 000 Kč (approximately 3 216 500 CHF)[6]

Nevertheless the above costs include both, the renewal of the entire IT systems and adjusting the systems in accordance with TAF TSI. Therefore it may be difficult to split cost related only to TAF TSI.

ERA figures from other railway stakeholders show that use of the Common Interface together with some minor modification of their IT systems allows to issue TAF compliant messages with an estimated cost around 300 000 € for an implementation project along 4 years, what means an average investments of 80.000 €/year.

Beside these two major implementation projects in Czech Republic, many private freight RUs in the Czech Republic also have to implement the TAF TSI. These smaller projects involve smaller investments, e.g. the second biggest freight RU in the Czech Republic, AWT, implemented the TAF TSI at a cost of 6 000 000 Kč (approximately 266 000 CHF)[7]. Generally, the various TAF TSI stakeholders lack accessible information regarding the implementation cost. This is also influenced by the fact that implementation has not yet been carried out by many TAF TSI stakeholders. The above information must be considered as incomplete and should serve only as a very rough idea.

Of course the implementation costs vary and depend on the complexity and obsolescence of respective IT systems. Some stakeholders need to develop partially new IT systems. Not only these main factors, but also many other aspects can have an effect on the final costs of implementing the TAF TSI.

The obligation to implement the TAF TSI within the EU Member States is financially supported by the different EU funds (e.g. CEF funds covering TAF). This financial support often covers a very significant part of the costs (in the Czech case up to 50 %).

OTIF should keep in mind that the possible transposition of the TAF TSI into OTIF regulations would impose considerable investments for the practical implementation of the TAF concept. Interviews with various people involved in TAF TSI also give the impression that for the non-EU OTIF contracting states

[5] *Implementace integrovaného provozně-obchodního informačního systému ČD Cargo, a.s. CD CARGO [online]. https://www.cd.cz/cd-cargo/projekty/-11959/*

[6] *Implementace TSI-TAF do informačních systémů SŽDC* [online]. http://www.szdc.cz/modernizace-drahy/prehled-staveb/op-doprava/tsi-taf.html

[7] *IMPLEMENTACE INFORMAČNÍHO SYSTÉMU PRO PODPORU ŽELEZNIČNÍ NÁKLADNÍ DOPRAVY DLE TSI-TAF* [online]. http://www.awt.eu/cs/o-nas/projekty-eu/implementace-informacniho-systemu-pro-podporu-zeleznicni

the implementation costs of TAF TSI are high. Another issue is that there would be no financial support for non-EU OTIF contracting states or more precisely for their national railway companies which should apply the UTP TAF to international rail freight traffic.

On the other hand, it may be that adopting the TAF concept, especially for certain applications developed on the basis of TAF TSI (e.g. Common Interface), will become less expensive in the future. Due to the economies of scale and fully developed solutions, the initial costs may be lower in the future for EU users than they are now.

The issue of cost could also be considered from the opposite perspective; in other words, what would be the cost of not implementing the TAF TSI in the non-EU OTIF CS, or implementing other, non-compatible IT systems. IT renewal investments will have to be made one day in non-EU CS anyway. From this point of view, adopting a Europe-wide recognised IT standard for information exchange in rail freight traffic would certainly bring added value.

Unfortunately it is not in the capacity of OTIF to carry out a cost benefit analysis of the broadening the TAF TSI concept into non-EU OTIF countries. On the other hand the next chapter shows that some parts of TAF TSI were also implemented voluntary outside the EU (e.g. Balkan region). This indicates a positive business case of TAF TSI outside the EU as well.

2.7.The situation at present

There are at present a few projects on the exchange of information between EU and non-EU OTIF countries. These projects are generally based on voluntary activities by railway stakeholders and the efforts can be seen particularly in non-EU OTIF countries which are geographically close to the EU and which therefore have a significant volume of rail freight traffic with EU countries.

Several national railway companies within the non-EU OTIF Contracting states have the processes described in TAF TSI already in place. There should already be a path allocation process (TAF TSI – Path allocation request), train composition information exchange (TAF TSI – Train Preparation), tracking of the movement of the train (TAF TSI – Train running information) and an estimated time of arrival of consignment (TAF TSI – Shipment ETI/ETA) processes performed between different departments to be assimilated to Infrastructure Manager role and Railway undertaking role – even with an integrated RU.

The first example is in the Balkan countries and countries of Eastern Europe. A good example is Serbia, which uses international platforms for information exchange; PCS (Path coordination system) from RNE (RailNetEurope) and ISR (International Service Reliability) from RAILDATA (more details about these IT platforms can be found in Annex 1). The PCS RNE is also used in countries such as Macedonia, Ukraine, and Russia. These states use the system for international trains going to/from the EU area.

We can also outline the example of Ukraine. This country is very interesting in terms of its position - bordering EU states (Poland, Slovakia, Hungary, Romania) with the 1435 mm gauge, and countries including the 1520 mm gauge (Russia, Moldova, Belarus). The following table shows the summary of data exchange with neighbouring countries and includes some basic details.

Country	Shipping forwarder	Signing	Form	Data exchange file	Service
Russian Federation	OAO RZD	31.12.2004	EDIFACT	IFTMIN Consignment note (SMGS) 4770(ППВ)	Industrial
Republic Belarus	BC	16.02.2006	EDIFACT	IFTMIN Consignment note (SMGS) 4770(ППВ)	Industrial
Poland	PKP Cargo	20.09.2007	EW-XML	EW-XML Consignment note (SMGS, CIM, CIM/SMGS) IFCSUM (transfer slip)	Test
	LHS	12.10.2012	EW-XML	EW-XML Consignment note (SMGS, CIM, CIM/SMGS) 616 (Cars and goods notice)	Preparation
Hungary	Rail Cargo Hungary	05.06.2008	EW-XML	EW-XML Consignment note (SMGS, CIM, CIM/SMGS) A30 (transfer slip)	Experimental
Slovakia	ZSSK Cargo	09.12.2008	EW-XML	EW-XML Consignment note (SMGS, CIM, CIM/SMGS) A30 (transfer slip), СТНЛ (совмещенный ТГНЛ)	Experimental
Romania	CFR Marfa	24.12.2012	EW-XML	EW-XML Consignment note (SMGS, CIM, CIM/SMGS) 616 (Cars and goods notice)	Preparation

Kazakhstan – Russia - Ukraine	KTZ – OAO RZD	22.11.2008	EDIFACT	IFTMIN Consignment note (SMGS) 4770(ППВ)	Contract

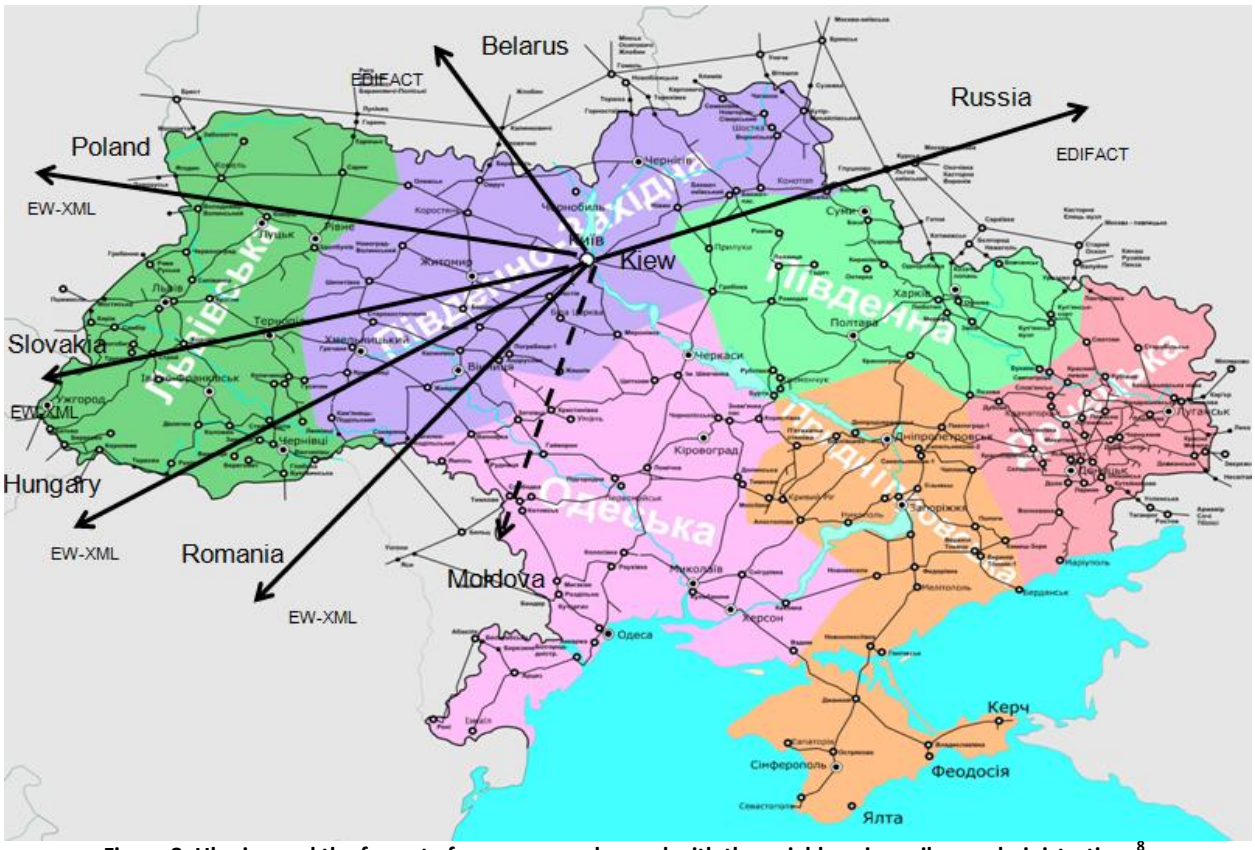


Figure 8: Ukraine and the format of messages exchanged with the neighbouring railway administrations[8]

Figure 8 illustrates that different information is exchanged using different standards between Ukrainian Railways and neighbouring railways. In these cases only basic information is exchanged, such as:

- Exchange of information included in consignment note (CIM, SMGS, CIM/SMGS)
- Exchange of transfer slip information concerning wagons, containers and goods
- Exchange of data concerning train
- Exchange of electronic consignment note for empty wagons

The simplified information exchange only takes place between the two respective countries but interoperability of information is not ensured as in the TAF TSI concept (e.g. the customer always has the information on where his train is operating, no matter in which country).

[8] Commercial department UZ (Ukrainian railways)

2.8.TAF TSI Technical appendices – a very specific situation

The core text of Regulation 62/2006/EC consists of 72 pages, and there are also two amendments (Commission Regulation No 328/2012, Commission Regulation No 280/2013). The first amendment No 328/2012 introduced few changes to the Regulation No 62/2006 (modifying several articles, replacing the chapter 7 and technical appendixes). The second amendment No 280/2013 changed the technical appendixes to TAF TSI. Today there is a new, revised TAF TSI in force, which consists of 50 pages (the core TAF TSI text).

Nevertheless the regulation itself includes references to several technical appendices. These specify the functional requirements which must be used during the development and deployment of TAF TSI as a basis for the technical architecture of the computerised system as specified in TAF TSI.

These appendices are subject to continuous development in the TAF Specific change management process described in chapter 7.2.2 of Commission Regulation (EU) No 328/2012 (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2012:106:FULL&from=EN). This means in reality that ERA continuously changes the content of the technical appendices and issues new, amended appendices.

In addition to this, the ERA webpage, where the TAF TSI related documents are available (http://www.era.europa.eu/Document-Register/Pages/CR-TAF-TSI.aspx), also contains TAF TSI data and message models in XML files. This is a crucial part of the TAF TSI, but here we are dealing with the field that is more related to software engineering, which requires a certain knowledge and staff resources.

It would be very challenging for OTIF to keep all these documents up to date, as at present they change continuously as TAF TSI is being developed. This indicates that OTIF should be careful in respect to transposition of these technical appendices. Perhaps it might be more useful just to refer to them instead of transposing them and keeping them up-to-date. It should be also noted that these appendix on ERA webpage are available only in English.

ERA and CER also invited OTIF to become a part of the Joint sector group/Change control management working party, which is in charge of these technical appendixes to TAF TSI. As the OTIF Secretariat does not have the resources to provide specialist support in these (IT) technical appendixes it would make sense, if IT experts from non-EU OTIF countries could join this ERA change control management and bring their concerns and ideas.

This way the non-EU TAF specialist would be given the possibility to influence the continuous development of the technical appendices, which makes for a reasonable justification for not transposing

the technical appendixes of TAF TSI into OTIF regulation and rather keep their development within ERA change control management.

2.9.Inventory of possible ways of how to proceed with TAF TSI

Based on information which has been collected, there might be several ways of how OTIF could proceed with the TAF TSI and they are described as follows:

1) **Do not transpose TAF TSI:**
   a) **Do nothing within OTIF**

      This scenario would mean a passive approach by OTIF concerning this topic. As there is a certain added value in extending the TAF concept towards the non-EU OTIF countries, OTIF should probably concentrate on other scenarios.

   b) **Promote the use of TAF TSI on a voluntary basis**

      OTIF could proceed with a voluntary scheme for the application of TAF TSI in the non-EU OTIF CS. This means that the TAF TSI regulation would be available as an open source document on the ERA website and those who would like to join the TAF TSI could use it. Today it can be seen that this scenario is already being partially implemented and works well (e.g. Balkan region). It would also give countries more freedom to decide on their own whether to apply the TAF concept and if so, the extent to which they might wish to do so. In this case, OTIF's task would consist mostly of broadening awareness of the TAF TSI in the non-EU OTIF CS.

   c) **Voluntary basis + application guide issued by OTIF**

      OTIF could also propose voluntary application of the TAF TSI, but at the same time develop an application guide. This application guide should help countries to understand the TAF TSI concept better and should try to convince non-EU OTIF CS to adopt the TAF TSI specifications.

2) **Transpose TAF TSI into an OTIF regulation**
   a) **Full transposition of the TAF TSI, including its technical appendices, into OTIF law (UTP)**

      This scenario is anticipated by APTU Article 8 § 2, in conjunction with the UTP GEN-B. This solution would avoid other, incompatible IT systems being implemented in the non-EU CS. On the other hand, taking into account the findings of the study, it is questionable whether this is the best way to proceed with TAF TSI.

   b) **Partial transposition**

      Taking into account the findings of this study, partial transposition could also be considered as a possible solution. This would mean that the core requirements of the TAF TSI would be

transposed into OTIF law, but would refer to the technical details (appendices to TAF TSI) published centrally on the website of the European Railway Agency. Perhaps withdrawing some prescribed messages which might not be useful for non-EU OTIF CS could also be considered in this scenario.

For the latter two options, transposition could be effected in such a way that the requirements are voluntary or mandatory in non-EU OTIF Member States. RS particularly supported this option at WG TECH 23.

Conclusion

The TAF TSI is a very interesting concept and once it is implemented it will certainly be of benefit to the interoperability of freight trains. Nevertheless, it is not easy to make a specific recommendation for how OTIF should proceed with the TAF TSI. **The main findings of the study are as follows:**

- The provisions of the TAF TSI assume a liberalised railway market which requires the exchange of information in accordance with harmonised procedures and data formats. On the other hand, international rail freight traffic among the non-EU OTIF contracting states is organised on the "exchange of vehicles" principle, which requires less exchange of information (than specified in the TAF TSI) and does not assume the liberalised railway market. Not all TAF TSI specifications are therefore suitable for transposition into OTIF law.
- Another finding of the study is the relatively high cost of implementation for non-EU OTIF countries and also the non-existence of financial support for them (which is not the case in the EU, where TAF TSI implementation is co-funded by EU funds). Where only a limited number of neighbouring countries apply the "TAF TSI concept", it is questionable whether countries such as, for example, Iran would be able to make use of the TAF TSI concept. On the other hand, there are also certain investment costs if the TAF TSI concept is not implemented, but another IT system. From this perspective, it may also be interesting for non-EU States to take over a Europe-wide, recognised IT standard for the exchange of information in rail freight traffic. Some parts of TAF TSI were also implemented voluntary outside the EU (e.g. Balkan region). This indicates a positive business case of TAF TSI outside the EU as well.
- Due to different transport requirements and differing organisation of the railways, different regions may need different approaches in terms of international information exchange. The TAF TSI concept is not the only possible platform dealing with the exchange of information. There is no evidence suggesting that the TAF solution is the best option for the exchange of information in the Euro-Asia region. OTIF should therefore be careful before giving preference to the "TAF TSI concept" by transposing it into OTIF law.
- A legal basis for the transposition of TAF TSI into UTP TAF is set out in APTU Article 8 § 2 in connection with the UTP GEN-B. However, transposition of the TAF TSI into OTIF law would not be straightforward, as the core TAF TSI regulation itself refers to several appendices that are published and regularly updated on the website of the European Railway Agency, including the data and message model in XML files. This combination of law and IT specifications makes the situation very specific and particularly tricky to transpose into international OTIF law.
- Today we can also see examples of the voluntary use of the TAF TSI data model, e.g. in Serbia, Ukraine or Russia, whose railway companies realise the need to exchange information for freight

traffic and which have already applied some of the IT modules based on TAF TSI (RNE, RAILDATA), which help them to exchange information for trains operating from/to the EU. Such platforms are very useful and suitable for international traffic outside the EU as well. They are available to the non-EU OTIF contracting states and can handle basic information and ensure the interoperability of the following information, e.g.:

- Electronic consignment note
- Tracking of trains/wagons
- Estimated time of arrival of consignment

These platforms, which are summarised in Annex 1, could be of added value for non-EU OTIF CS.

The findings of this study do not draw a conclusion on how OTIF should proceed with TAF TSI, as such a conclusion should be drawn by OTIF's Member States. Possible ways on how to proceed have been suggested (in chapter 2.9, Inventory of possible ways on how to proceed with TAF TSI) and can be summarised as follows:

1) Do not transpose TAF TSI:
   a) Do nothing within OTIF
   b) Promote the use of TAF TSI solutions on a voluntary basis
   c) Voluntary scheme + application guide issued by OTIF
2) Transpose TAF TSI into an OTIF regulation
   a) Full transposition of the TAF TSI into OTIF law (UTP), including its technical appendices.
   b) Partial transposition, meaning that the core requirements of the TAF TSI would be transposed into OTIF law, but would refer to the technical details as published centrally on the website of the European Railway Agency.

For the latter two options, the TAF TSI could be transposed in such a way that the requirements are either voluntary or mandatory in non-EU OTIF Member States. The arguments set out in this study suggest making any transposed requirements voluntary.

Annex 4 lists comments from ERA and CER, and also their views on the question of how should OTIF proceed with TAF TSI.

Annex 1: List of IT products/applications needed for implementation of TAF TSI with the particular focus on non EU OTIF countries

This annex summarises all the main IT products/platforms on the market which are needed to implement TAF TSI. On each product, there are a few words about its availability for non-EU OTIF countries, fees for usage as well as links to more information about each product.

In general, it can be said that the technical solution of extending the TAF TSI concept outside the EU should not be a problem, as the products are also available to countries/railway stakeholders outside the EU.

The implementation process of TAF TSI is generally described and divided into the following three parts:

- **Adjusting the national IMs' and RUs' IT systems in line with TAF TSI**
- **Installation of the common interface**
- **Implementation of the prescribed supporting databases**

For each part (except for adjusting the national IMs' and RUs' IT systems in line with TAF TSI), a list of IT products is provided.

1. Adjusting the national IMs' and RUs' IT systems in line with TAF TSI

The RUs and IMs in each country have their own IT systems (e.g. for tracking wagons, maintenance of the fleet, internal business production system, consignment note system, infrastructure information system, etc.). Each of these systems generates different messages. Therefore, in the first step towards implementing the TAF TSI, these systems need to be aligned according to TAF TSI. This means aligning the processes and content of the messages generated by the systems in accordance with TAF TSI, which defines the following message modules:

- Consignment note data
- Path request
- Train preparation
- Train running forecast
- Service disruption information
- Train location
- Shipment estimated time of interchange/arrival
- Wagon movement
- Interchange reporting

- Data exchange for quality improvement

This first step of the implementation process has to be undertaken by the sector. Adaptation of the systems is carried out mostly by the internal IT departments or by external companies, which develop the IT systems for IMs, RUs and other stakeholders involved in TAF TSI.

In the non-EU countries the state-owned railway companies include the various stakeholders (e.g.: IMs, RUs, wagon keepers, etc.) under one roof. Nevertheless, it can be assumed that technically, these entities are different and that communication between them has to be ensured as well as it is in the liberalised railway market within the EU, which consists of many IMs, RUs and wagon keepers.

The alignment of IT systems goes hand in hand with the installation of the common interface.

Nevertheless, in the main document it was said that not all messages defined in the TAF TSI are suitable for the non-EU OTIF area. This should be kept in mind.

2. Installation of the common interface

The common interface is mandatory and has to be installed by every IM, RU and all other stakeholders involved in TAF TSI (e.g. all centrally stored supporting databases). Using the common interface will ensure that all the systems which are needed to implement the TAF TSI can communicate with each other through standardised message formats. Installation of the common interface in non-EU railway companies is essential in order to connect some of the IT platforms referred to below.

2.1. Common Interface from CCG-UIC

The Common Components Group (CCG) is a special group of the International Union of Railways (UIC). This group was charged with the development, maintenance and on-going operation of the Reference Files system and the **Common Interface**.

The CCG UIC common interface was issued on 2 January 2012 and has already been implemented by different stakeholders.

There are some obvious advantages in using the common interface:

- The CI is already required under EU Regulations (which is of interest to Balkan countries which may soon become members of the EU)
- Railway companies can exchange the data in TAF/TAP-TSI format, without changing their existing legacy system (this is the philosophy of TAF TSI which might also be appreciated by those non-EU OTIF countries that are considering using the platform based on the TAF TSI)

- Deployment - The Common Components are platform and language neutral – no need to retrofit existing applications
- Communication - Stakeholders can use the Common Interface for their current Data Exchange and EDI needs over open internet
- Maintenance - the metadata are automatically updated, reducing versioning costs on your property
- Translation - no need to change existing messaging applications
- Security - Authentication, messages are only exchanged with the intended stakeholder
- Data Quality - Messages are checked for consistency before they reach their destination, reduced human intervention, messages are 100% compliant with the TAF-TSI specifications
- Data Security - All data are encrypted using state-of-the-art Public Key Infrastructure (PKI)

Availability to non-EU countries:

The Common Interface is also available for non-EU OTIF countries to use. Stakeholders are invited to request the licence from the CCG-UIC.

Fees for usage:

One off registration fee – 10 000 €

Yearly maintenance fee – 1 200 €

More information:
http://www.uic.org/spip.php?article3206

3. Implementation of the prescribed supporting databases

In addition to adjusting the legacy systems so that they can generate the prescribed TAF TSI messages and implementing the common interface, the supporting databases have to be installed within different stakeholders involved in TAF TSI. Beside these databases there are also some international platforms which help to distribute the messages internationally and which were developed in accordance with TAF TSI. They are also included in this part and could be very interesting for non-EU OTIF countries in terms of voluntary participation in the "TAF TSI area".

3.1.Infrastructure Restriction Notice Database

The IM must maintain the Infrastructure Restriction Notice Database containing all restrictions on its network. This database is developed internally within each IM.

In the main document it is stated that this database does not make much sense outside the EU due to the "exchange of vehicles" principle, which assumes that other RUs do not operate on the national railway networks.

3.2.Reference files

For the operation of freight trains in the TAF TSI area the reference files (Company ID, Location ID, etc.) must be available and accessible to all service providers (IMs, RUs, logistic providers and fleet managers, etc.).

Reference files from CCG-UIC

Reference files developed by CCG-UIC are centrally stored databases containing Company ID and Location ID. This database is accessible via the common interface to every stakeholder involved in TAF TSI. In the future the reference files will be hosted by RailNetEurope (http://www.rne.eu/).

Availability to non-EU countries:

All users (legal entity) have to register and pay a registration fee. There is a significant issue in terms of inputting local data into the database (location, infrastructure), so contact between the non-EU OTIF countries that consider applying the TAF TSI and CCG-UIC/RailNetEurope should be established for more information.

Fees for usage:

The registration fee is 3,000 €. The estimated number of users is based on the assumption that by 2015 all TAF TSI actors have to use the reference file. For data downloads and all other services a yearly user fee is calculated. Different clusters of users are defined:

- 900 €/Year freight RU with more than 1000 million t-km/y and passenger RU operating more than 500 million p-km/y
- 900 €/Year Rail Service Providers and Wagon Keepers/ECM; they have to pay a higher fee because they will not be maintaining the reference data in this data base

- RU => 300 €/Year all others
- => 0 € IM; as IM will mainly be responsible for inputting the mandatory "primary location" codes into the system. **All "newcomers" will be in this cluster for the first two years.**

There is no differentiation between company codes and location codes. The delivery of the location and company codes to the entity in charge of hosting them should not suppose a big effort in terms of cost, because they are built-up based on existing standards (f.i. ISO 3166).

More information:

http://www.uic.org/spip.php?article3207

3.3.Rolling Stock Reference Database

The keeper of the rolling stock is responsible for storing the rolling stock data in a Rolling Stock Reference Database.

RSRD²

RSRD² is the electronic data exchange platform for exchanging freight wagon related data developed by UIP. This product complies with the requirements of RSRD defined in TAF TSI and provides added value information needed for the sector's purposes or resulting from other legal requirements, e.g. ECM information, mileage performance needed for maintenance, etc.

Availability to non-EU countries:

RSRD² is open to any keeper or RU, regardless of whether EU or non-EU.

Fees for usage:

The database is accessible free of charge, although wagon keepers must pay a fee of 2 € per wagon per year. RSRD² is a non-profit organisation. Therefore, if the number of wagons in RSRD² increases significantly, the user fee will be reduced accordingly (example: currently 120 k wagons: 2 € → future 250 k wagons: 1 €). RUs may interrogate wagon data free of charge, but keepers expect mileage data free of charge in return.

3.4.Wagon and Intermodal Unit Operational Database (WIMO)

This database is used to store and provide the data elements needed for operational purposes and for tracking wagons.

ISR from RAILDATA

ISR (International Service Reliability) is a common tool used by large European cargo railway undertakings to centralise and exchange information about freight wagons movements in international traffic through a central platform. It makes it possible to track both loaded and empty freight wagons and consignments across significant part of Europe. Besides information about the current status and position of wagons, it also provides wagon status history and freight traffic flows. The system also provides estimated times of arrival based on statistics of previous similar consignments. Another new function is the wagon mileage calculation for freight wagons, using different available sources to estimate the number of km travelled.

The ISR complies fully with WIMO requirements as well as other processes of the TAF TSI: wagon movements, ETI/ETA shipments, interchange reporting.

Availability to non-EU countries:

RAILDATA is open to new users, including those from non-EU OTIF countries. A company which wishes to become a member must provide RAILDATA with a written request to participate. → Membership is confirmed by a decision of the RAILDATA General Assembly.

Fees for usage:

Not known.

More information:

Webpage: http://www.raildata.coop/

System animation: http://www.raildata.coop/publicore/index.htm

Presentation: http://www.raildata.coop/RAILDATA_Event_20131211.pdf

3.5.Trip plan for wagon/intermodal unit

The trip plan for wagon/intermodal unit is stored in a database at each LRU, so there are a lot of products at each LRU.

Train Information System (TIS) from RNE

This central platform for monitoring trains supports the function of dynamic route planning for the whole international path. More information is given below.

3.6.Other TAF TSI supporting platforms

In addition to the above-mentioned databases there are applications which include or support several TAF TSI processes at once. The following applications serve as international message platforms/brokers to simplify international data exchange and were developed according to the TAF TSI.

Train Information System (TIS) from RNE

RNE is an association of European rail IMs which develops international platforms for data exchange in accordance with TAF TSI.

TIS RNE is an application that supports international train management by delivering real-time data concerning international passenger and freight trains. The relevant data are processed directly from the IM's systems. The main goals of the TIS are to help RUs and terminals with their own production systems and to support IMs in the field of train running management.

TIS RNE supports the following TAF TSI functionalities: train running forecast, service disruption information, train location, data exchange for quality improvement.

Availability to non-EU countries:

The RNE is available to all new users, including those from non-EU countries. Some non-EU countries (e.g. Serbia, Bosnia and Herzegovina) are already members of TIS RNE.

A prerequisite is that the country's IM has to become a member of RNE (1000 EUR/IM/YEAR) and provide information on locations and then send the data to the TIS RNE.

Fees for usage:

The operational costs for TIS are around 300 000 EUR/year. These costs are financed by IM. Each IM pays 6500 EUR for initial setup and then a fee of 900 EUR/month. New RUs pay 6500 EUR for initial setup and can then use the service for free.

More information:

http://tis.rne.eu/

Path Coordination System (PCS) from RNE

PCS RNE is an international path coordination system for path applicants, which optimises international path coordination by ensuring harmonised path requests and offers between all involved parties.

PCS RNE supports the following TAF TSI functionalities: path request at short notice, train preparation.

Availability to non-EU countries:

The RNE is available to all new users, including those from non-EU countries. Some non-EU countries (e.g. Serbia, Bosnia and Herzegovina) are already members of PCS RNE.

Fees for usage:

The IM has to be a member of RNE and pays 1000 EUR/IM/YEAR. RUs may use PCS free of charge.

More information:

http://pcs.rne.eu/

Note: Use of these two systems (TIS, PCS) meets the entire IM – RU communication requirements prescribed in the TAF TSI (containing the following functionalities: path request at short notice, train preparation, train running forecast, service disruption information and train location)

ORFEUS from RAILDATA

ORFEUS (Open Railway Freight EDI User System) ensures the exchange of railway CIM consignment note data between the co-operating railway undertakings, using a Central Data System.

This application fully covers the TAF TSI Wagon/Consignment order process.

RAILDATA is trying to extend the service towards CIM/SMGS. Implementation of the electronic CIM/SMGS consignment note is part of the e-RailFreight project.

Availability to non-EU countries:

RAILDATA is open to new users. A company which wishes to become a member must provide RAILDATA with a written request to participate. → Membership is confirmed by a decision of the RAILDATA General Assembly.

Fees for usage:

Not known.

More information:

Webpage: http://www.raildata.coop/ORFEUS.htm

Animation: http://www.raildata.coop/publicore/index.htm

Presentation: http://www.raildata.coop/RAILDATA_Event_20131211.pdf

3.7.Overview table

The table below shows all 16 functional areas prescribed by TAF TSI and assigns each functionality a specific product/platform which fully support(s) the respective functionality in international rail freight traffic.

TAF TSI functionality	Company/ Organisation	Product	Information/Webpage/Presentation
RU/IM communication			
Path request at short notice	RNE	RNE PCS	http://pcs.rne.eu/index.php/pcs-animation.html
Train Preparation	RNE	RNE PCS	http://pcs.rne.eu/index.php/pcs-animation.html
Train Running Forecast	RNE	RNE TIS	http://tis.rne.eu/index.php/tis_animation.html
Service disruption information	RNE	RNE TIS	http://tis.rne.eu/index.php/tis_animation.html
Train location	RNE	RNE TIS	http://tis.rne.eu/index.php/tis_animation.html
Data exchange for quality improvement	RNE	RNE TIS	http://tis.rne.eu/index.php/tis_animation.html
RU/RU communication			
Consignment note data	RAILDATA	ORFEUS	http://www.raildata.coop/publicore/index.htm
Shipment of ETI/ETA	RAILDATA	ISR	http://www.raildata.coop/publicore/index.htm
Exchange reporting	RAILDATA	ISR	http://www.raildata.coop/publicore/index.htm
Wagon movement	RAILDATA	ISR	http://www.raildata.coop/publicore/index.htm
Databases which have to be implemented			
Infrastructure restriction notice database	-	-	IRNDB has to be ensured by each IM
Rolling stock reference database	RSRD[2]	RSRD[2]	-
Wagon and intermodal unit operational database	RAILDATA	ISR	http://www.raildata.coop/publicore/index.htm
Trip plan for wagon/intermodal unit	RAILDATA	ISR	http://www.raildata.coop/publicore/index.htm
Reference files	CCG - UIC	Reference files	Will be hosted by RNE in the future
Common interface			
Common interface	CCG - UIC	Common interface	-

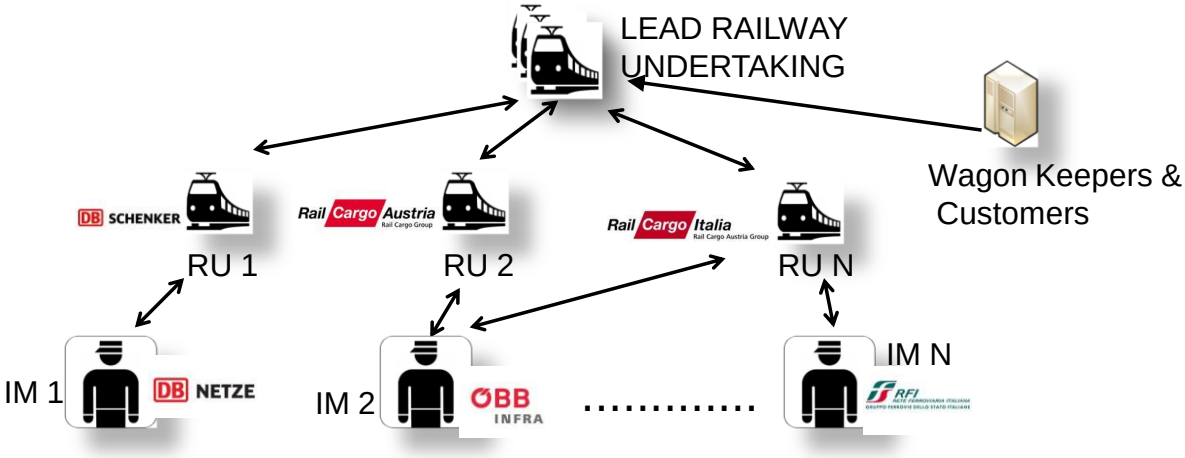
Annex 2: Messages prescribed by TAF TSI

This annex summarises the functionalities and messages prescribed by TAF TSI as shortly described in chapter 1.3.1 of this document.

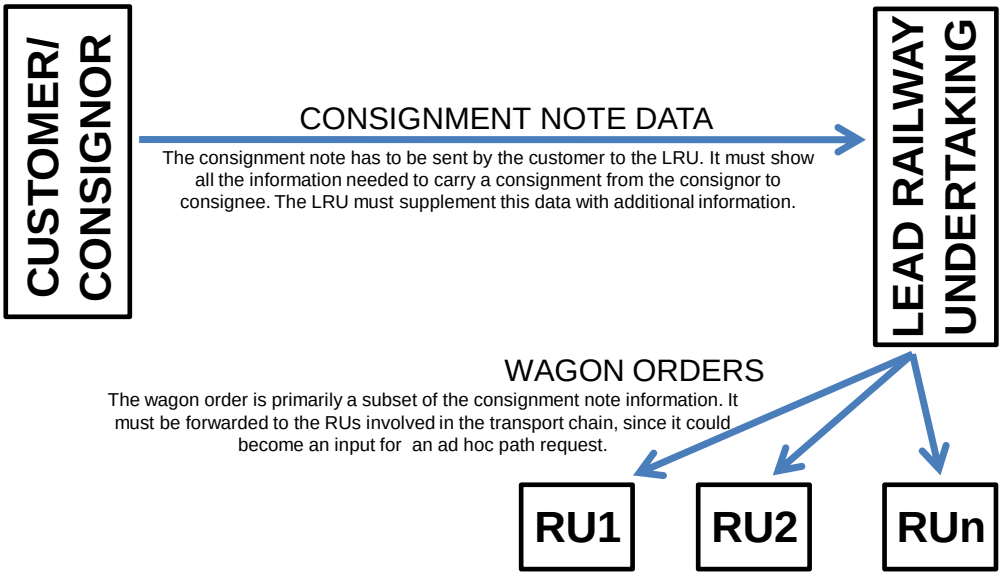
TAF TSI - Communication

Functionalities:

- LRU – RU: Consignment note data, exchange of information concerning ETI/ETA calculation, Interchange reporting and wagon movement
- RU – IM: Path request on short notice, Train preparation, Train running forecast, Service disruption information and Train location



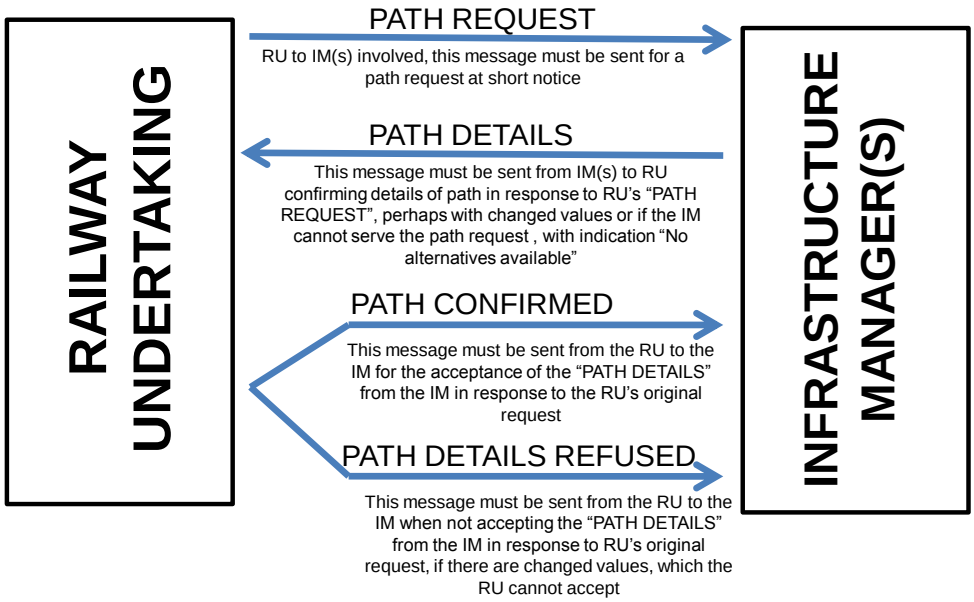
Consignment note data



RU/IM Communication

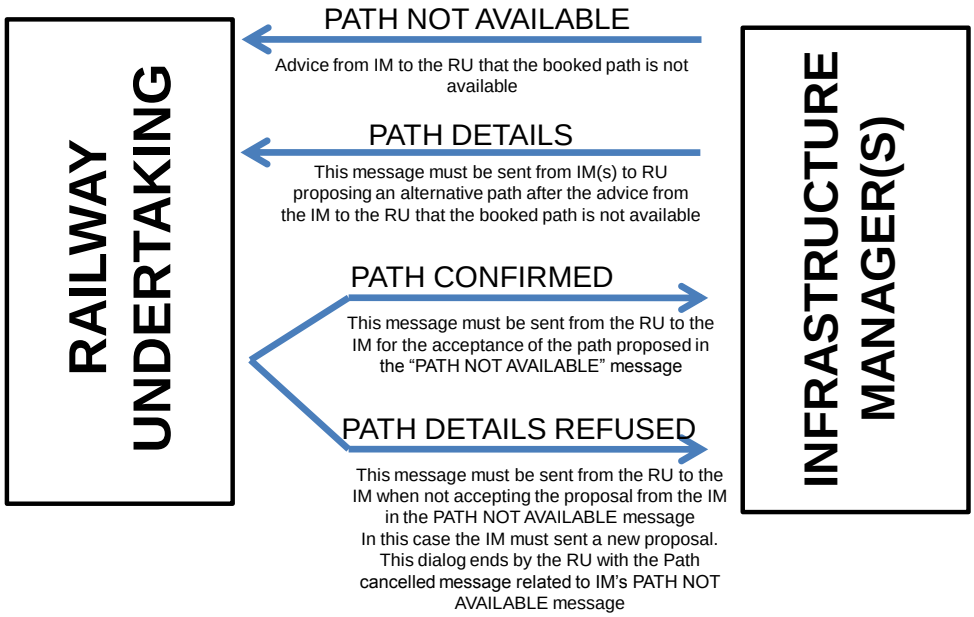
- Path request on short notice
- Train preparation
- Train running forecast
- Service disruption information
- Train location

Path request on short notice

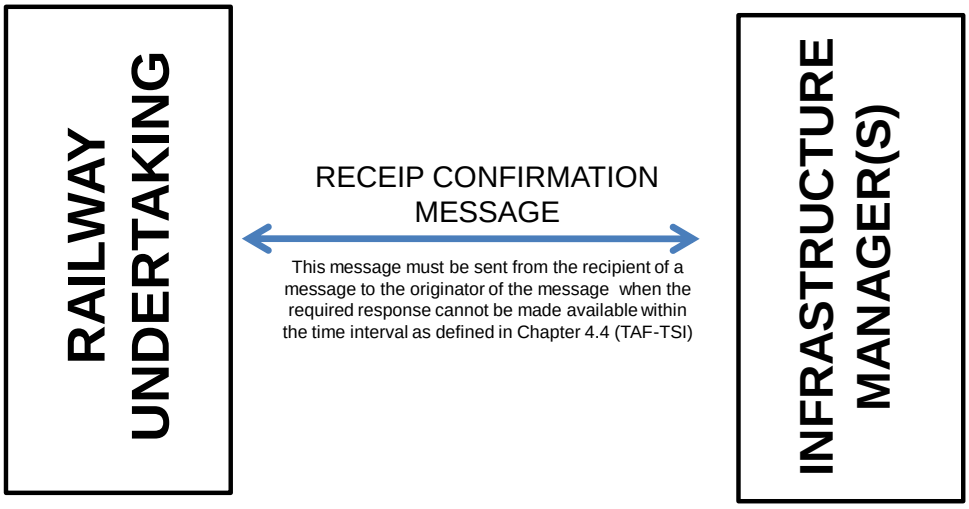


Path cancellation by RU

Path cancellation by IM



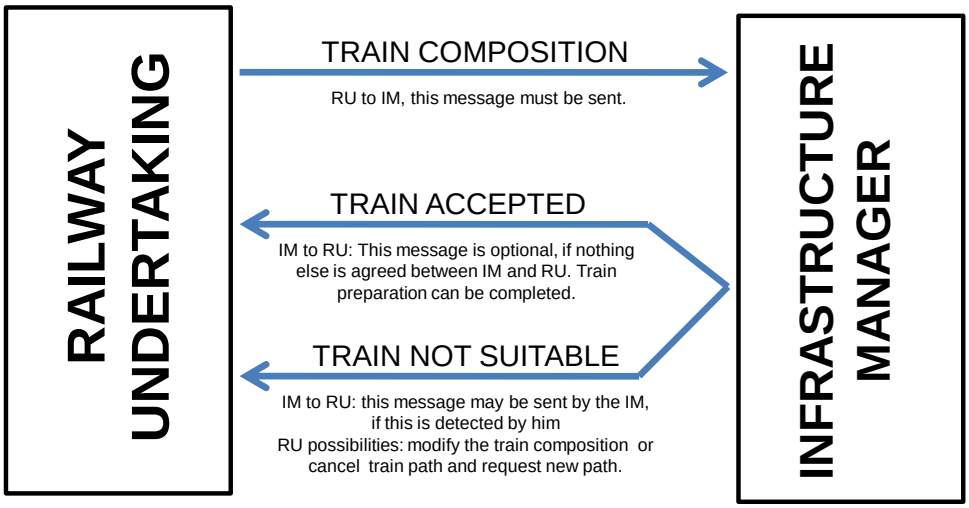
Receipt confirmation



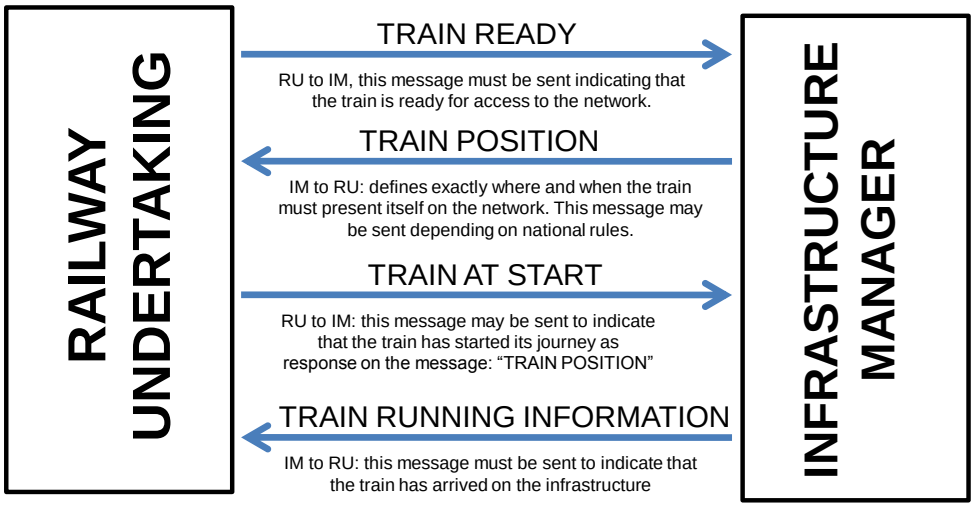
Train preparation

- Here are specified messages which must be exchanged during the train preparation phase until the start of the train
- For the preparation of the train, the RU must have access to:
  - Infrastructure restriction notices
  - Technical wagon data (Rolling stock reference database)
  - Dangerous goods reference file
  - Current , updated information status on the wagon (The Wagon and Intermodal Unit Operation Database)

Train preparation I



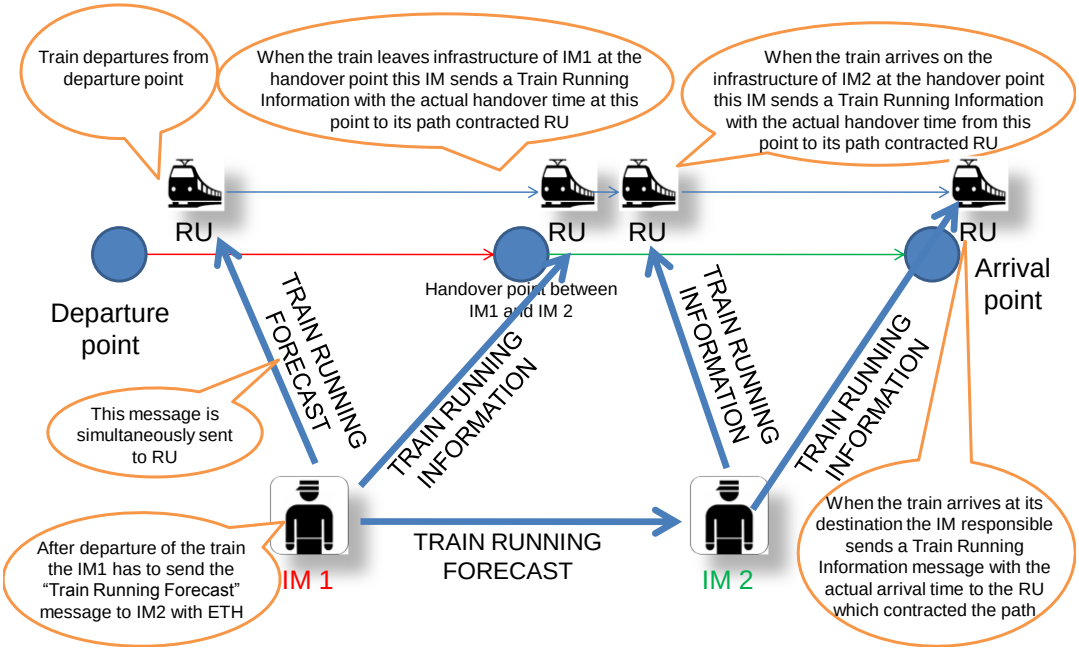
Train preparation II



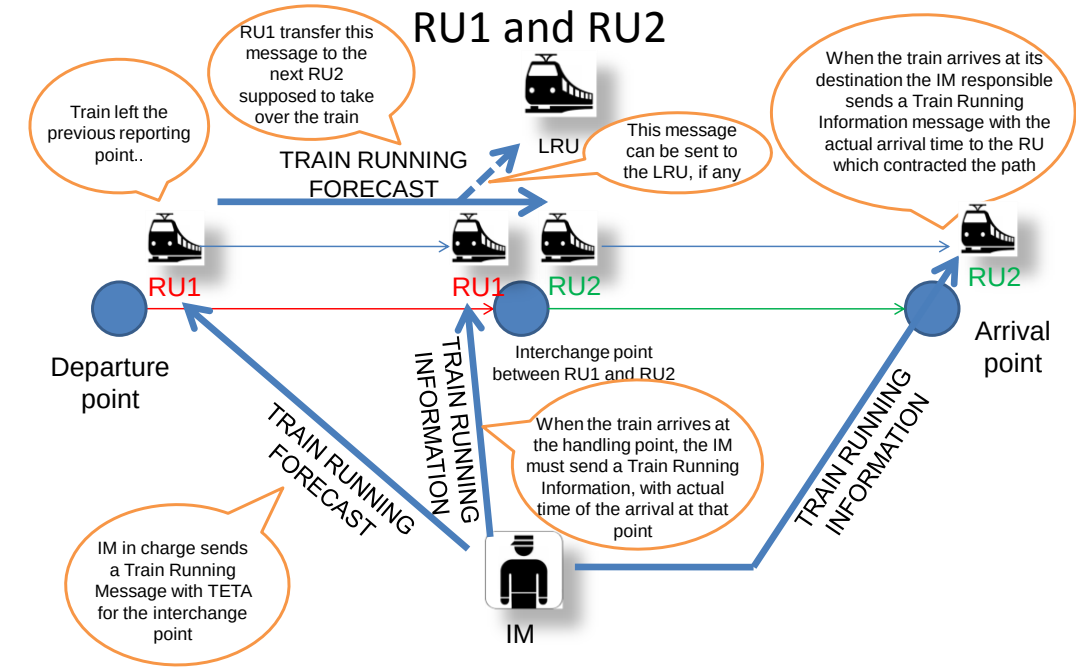
Train running forecast

- This section specified the messages which must be exchanged during the normal running of the train without any interruption
- 4 scenarios ..
  - Train approaching a handover point between IM 1 and IM 2
  - Train approaching an interchange point between RU 1 and the next RU 2
  - Train approaching a handling point of an RU
  - Train arrival at destination

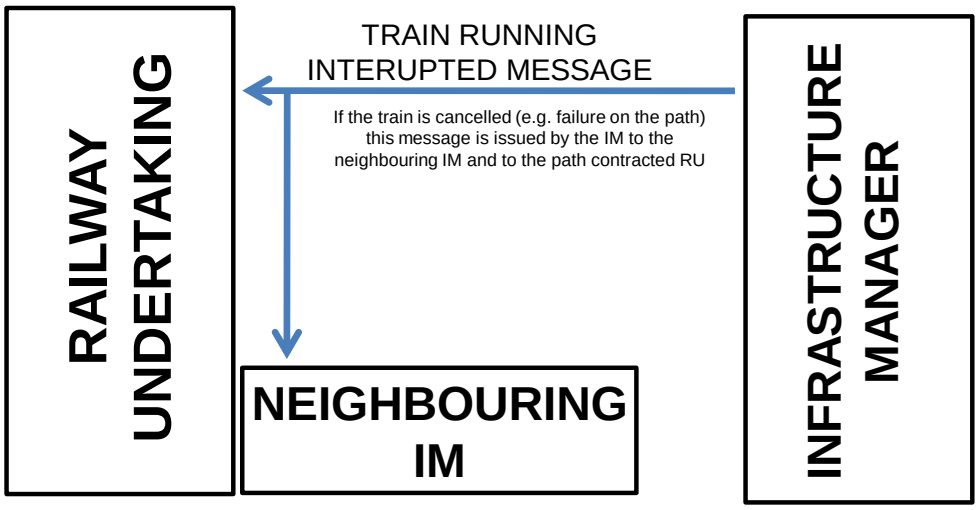
Train approaching a handover point between IM1 and his neighbour IM2



Train approaching an interchange point between RU1 and RU2



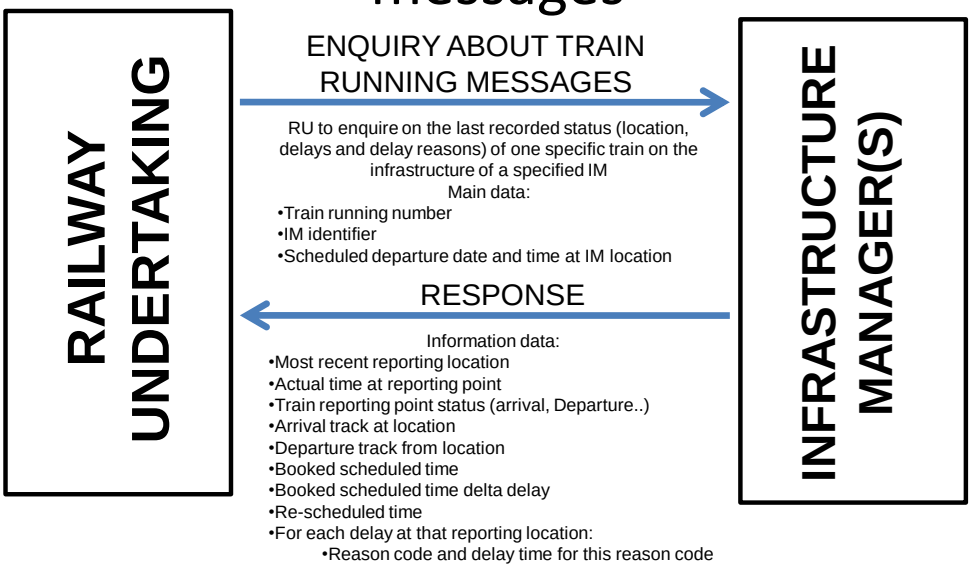
Service disruption Information



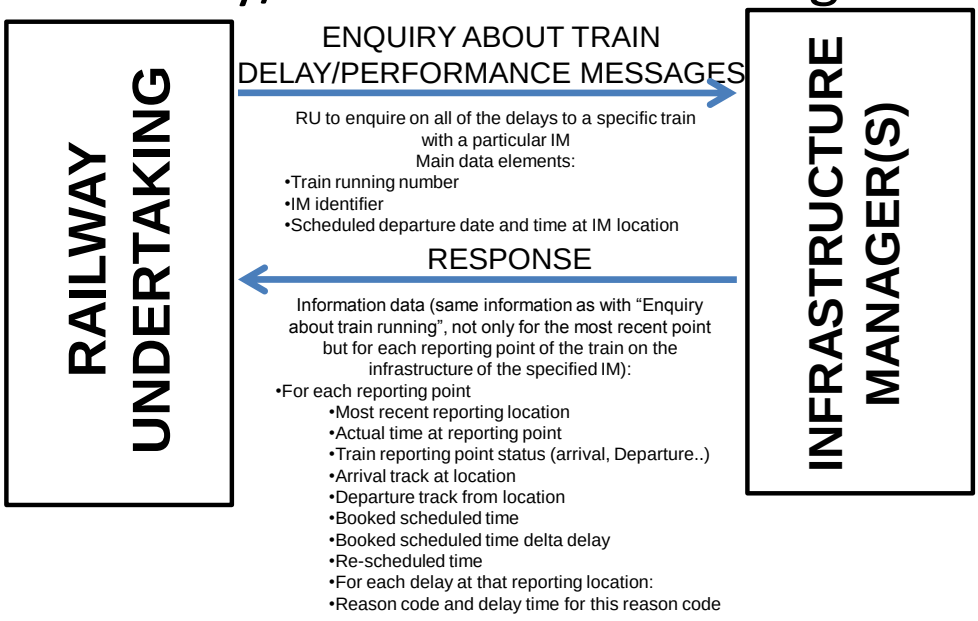
Train location

- This section specifies the tracing possibility to get information about train location. The RU may send an enquiry to the IM about its trains at any time. The RU may enquire about:
  - The running of the train (last recorded location, delays, delay reason),
  - A train's performance (delays, delays reasons, delays location),
  - All identifiers of a specified train,
  - Train forecast at a specified location,
  - All train running forecast for a specific location.
- The access to this information must be independent from the communication relation RU/IM during the train running, which means that the RU must have a single access adress to this information. The information is based mainly on the stored message exchange.

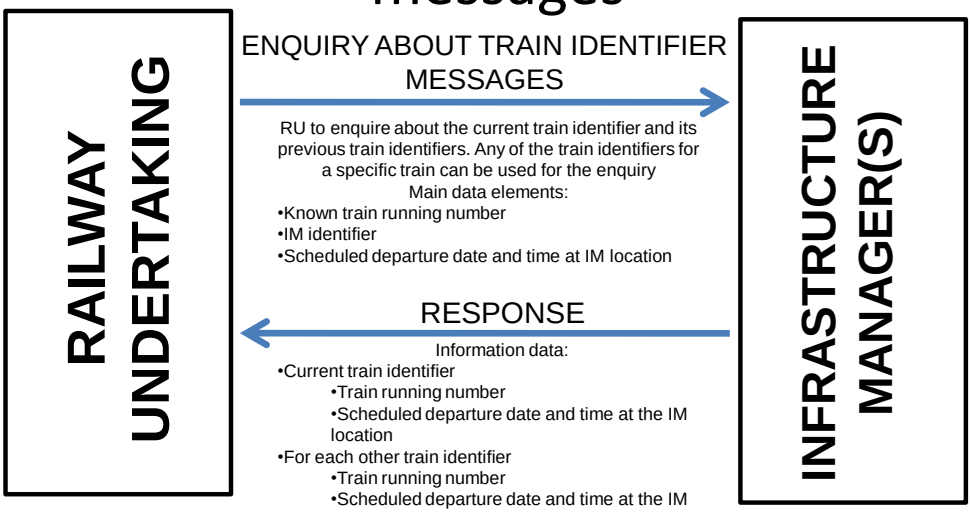
Enquiry about the train running messages



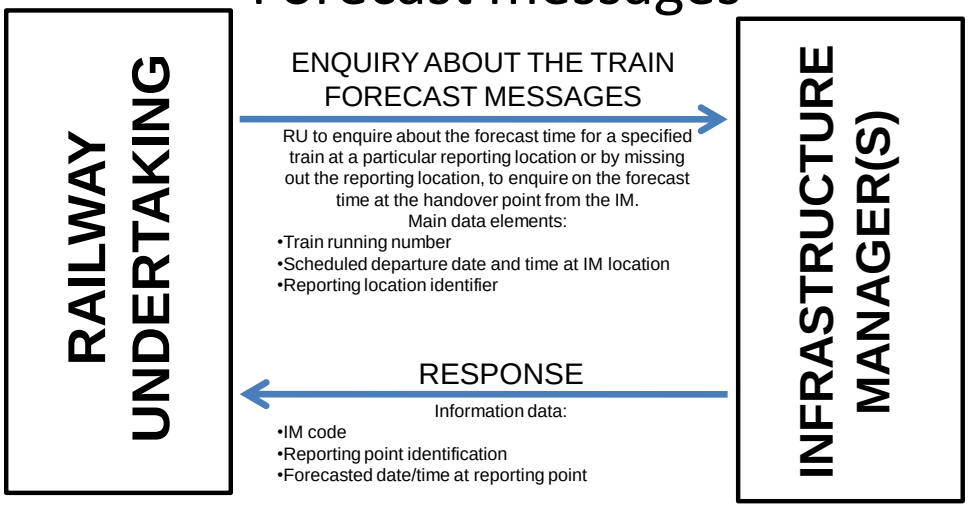
Enquiry about the Train Delay/Performance messages



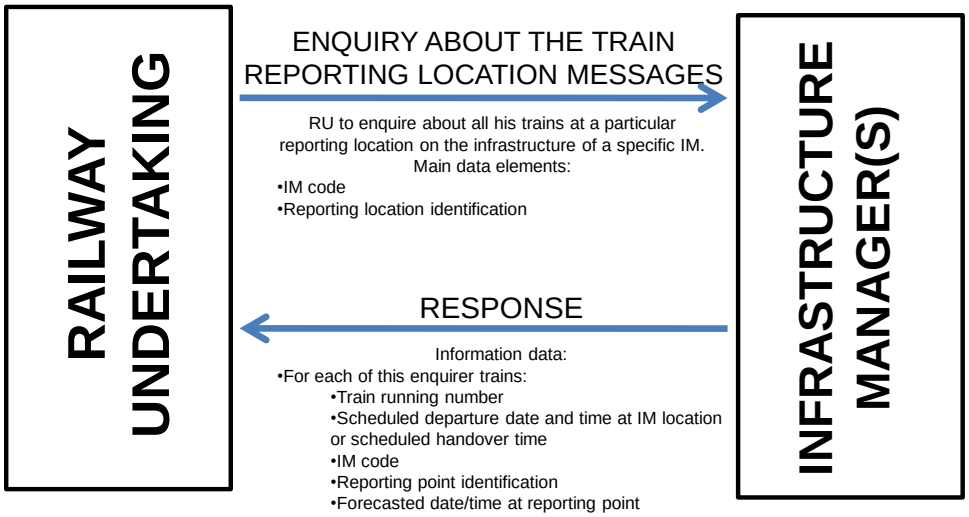
Enquiry about the Train Identifier messages



Enquiry to IM about the Train Forecast messages



Enquiry to IM about Trains at Reporting location messages



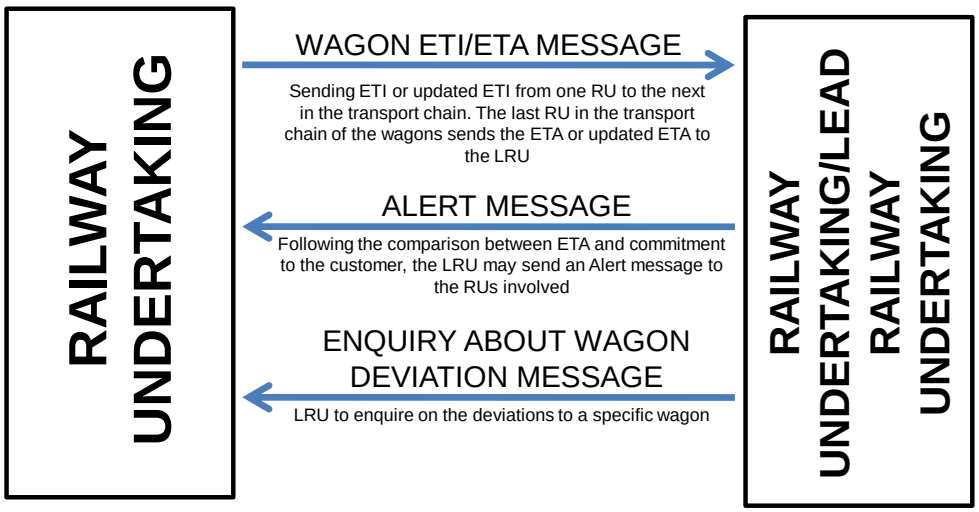
RU/RU (LRU) Communication

- Shipment ETI/ETA
- Wagon movement
- Interchange reporting

Shipment of ETI/ETA

- For a customer the most important information is always the estimated time of arrival (ETA) for his shipment. The wagon related ETA as well ETI is also the basic information in the communication between LRU and RU. This information is the main instrument for the LRU to monitor the physical transport of a shipment and to check it against the commitment to the customer.

Shipment of ETI/ETA

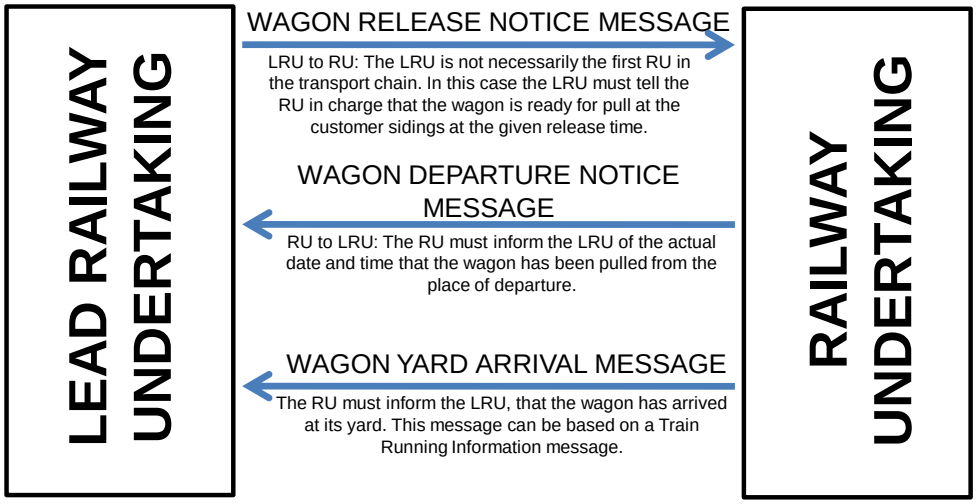


Wagon movement

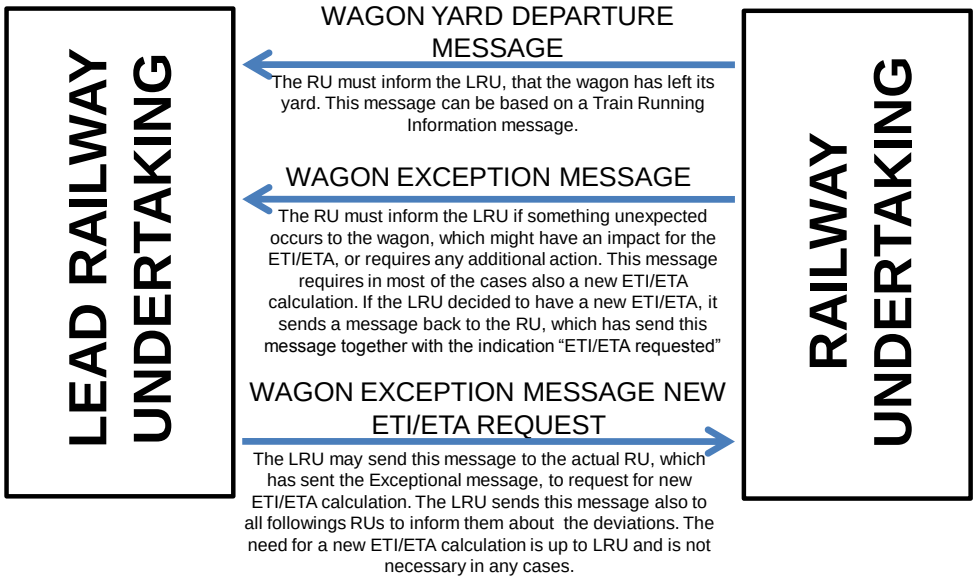
- For the reporting of the movement of a wagon, the following data must be stored and electronically accessible. They must be also exchanged within message on contractual base to authorised parties.
  - Wagon release notice
  - Wagon departure notice
  - Wagon yard arrival
  - Wagon yard departure
  - Wagon exceptions message
  - Wagon arrival notice
  - Wagon delivery notice
  - Wagon delivery confirmation
  - Wagon interchange reporting

These data must be stored in the Wagon and Intermodal Unit Operational Database

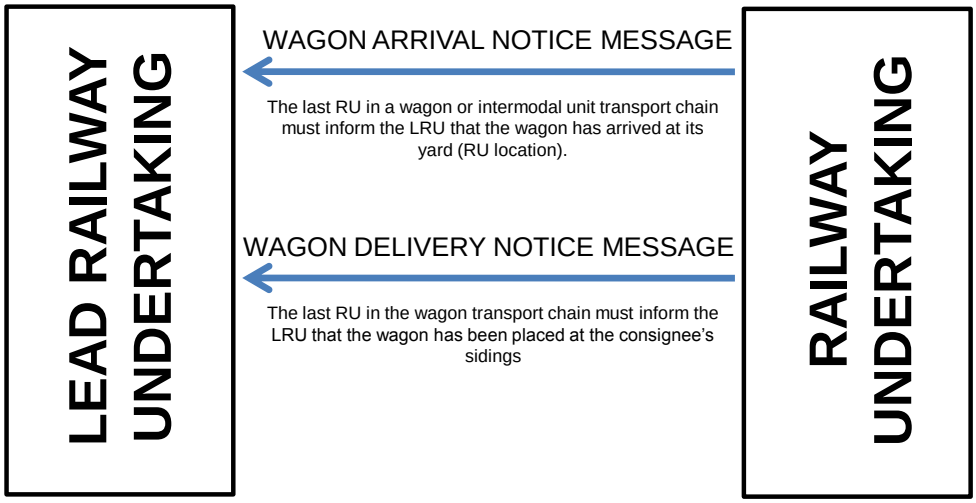
Wagon movement



Wagon movement

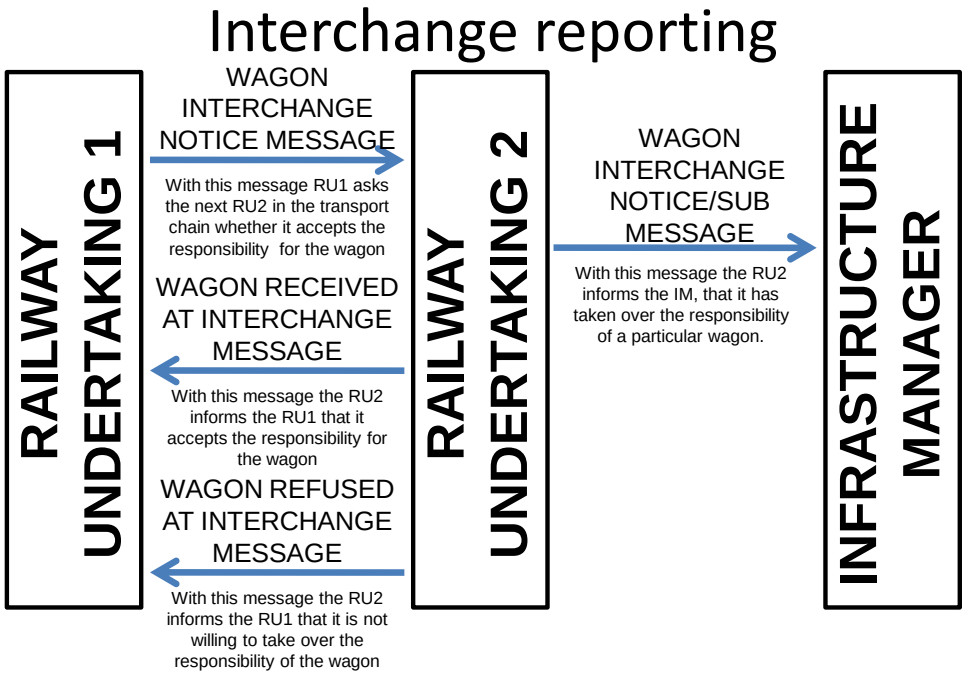


Wagon movement



Interchange reporting

- The interchange reporting describes the messages attached to the transfer of responsibility for a wagon between two RUs, which occurs at interchange points. It also commands the new RU to make an ETI calculation and to follow process of shipment ETI/ETA.
- The following messages must be exchanged:
  - Wagon interchange notice
  - Wagon interchange notice/sub
  - Wagon received at interchange
  - Wagon refused at interchange
- These data must be stored in the Wagon and Intermodal Unit Operational Database



Annex 3: List of interviewed persons for the purpose of the study

Mickael Varga (ERA)

Alexander Martinez (RAILDATA)

Harald Reisinger (RNE)

Seid Maglajlic (RNE)

Josef Stahl (RNE)

Thomas Heydenreich ($RSRD^2$)

Julius Prenosil (CD CARGO)

Ludek Ehrenberger (CD CARGO)

Miroslav Haltuf (OLTIS)

Petr Kroca (OLTIS)

Stephan Breu (CCG - UIC)

Bruno Gugelmann (SBB AG, Shunting-yard, CH)

Peter Jäggy (FTE Europe)

Milan Popovic (Representative of RS)

Eric Evtimov (CIT)

Annex 4: Comments on the version 0.1 of the study

Comments from CER (attachment to email received 16.02.2015):

CER
The Voice of European Railways

CER COMMENTS TO THE OTIF STUDY ON TAF TSI

CER would like to congratulate OTIF for the work done as it is an interesting summary of the current situation of TAF and how it could be applied by non-EU OTIF States. The report considers different options related to the eventual transposition of TAF TSI into the OTIF regulation. Although the report does not take in account the new amendment of TAF TSI (1305/2014) that introduces some functional modifications, those modifications have no impact on the aim of the analysis. CER considers that we should not lose this opportunity and we should find the easiest and smartest way to extend regulation to non-EU member states. There is a significant number of freight trains between EU countries and Balkan region, Turkey and Ukraine, therefore it has sense to join the "TAF TSI community" for this geographical area.

The OTIF study is a very good and detailed analysis of the impact of TAF TSI for Railways which are not part of the regulation. Beside all this detailed remarks we have to stay focused of the objectives and benefits EU and EU Member States want to achieve with TAF TSI and the whole bundle of TSI regulations. The objective is to create a Single European Railway Area (SERA) and to achieve a transport process that is as economically viable as possible. The RUs, IMs, Wagon Keepers, Intermodal Operators and other involved Transport Service Providers have to do huge investments in the next years to implement TAF and the other TSI regulations. From a perspective of IM and RU the implementation of the complete bundle of TSI regulations is necessary to achieve the objectives and to generate the benefits of SERA. They have to invest in IT Systems, implementation of new business and operational processes and change management. This means in essence, that all business and operational processes will be adjusted to TAF and the other TSI regulations and there is no efficient way to handle non TSI compliant business.

Some of the statements made in the OTIF study could be put in perspective, such as the followings:

- TAF messages are not only useful in case of open access (e.g. only one RU with different (n) IMs). They are also useful in cooperation (n RUs with n IMs) and also for national traffic (n RUs with only one IM). As some non-EU OTIF States have opened or will shortly open their domestic traffic, TAF messages are relevant at least for them;
- IM and RU are not necessary shared companies by EU law, only accounting/financial matters and essential services must be split;
- Complete implementation is planned in EU for 2021 due to TrID. Implementation without TrID is planned for 2018.

The analysis states that the common use of TAF by OTIF (at least EU or non-EU European OTIF States) will simplify the processes and data exchange at mid/long term. CER agrees with the statement although it could also be addressed that:

- the implementation of the Train Identification concept will solve some issues especially in operation,
- currently «sector messages» are based on TAF format and extend the scope of uniform messages.

COMMUNITY OF EUROPEAN RAILWAY AND INFRASTRUCTURE COMPANIES - COMMUNAUTÉ EUROPÉENNE DU RAIL ET DES COMPAGNIES D'INFRASTRUCTURE - GEMEINSCHAFT DER EUROPÄISCHEN BAHNEN UND INFRASTRUKTURGESELLSCHAFTEN

CER aisbl Avenue des Arts, 53 B-1000 Bruxelles Tel: +32 2 213 08 70 Fax: +32 2 512 52 31 contact@cer.be www.cer.be

Based on the concept that the purpose of TAF TSI is to ensure the efficient interchange of information for the freight services and on the consideration that: the organisation of the railways is different in the various geographical areas; the location of some non-EU OTIF countries does not allow freight services with EU countries; and, the implementation of any new IT system requires investment cost, the options to be taken into account would be:

- Voluntary basis plus application guide issued by OTIF
- Partial transposition
- Full transposition

As mentioned before, the TAF TSI is only one but an essential part of a bundle of TSI regulations. In the OTIF regulation, TAF TSI should be treated in the same way as the other TSI regulations. From the proposed options, CER considers that option 2a would be the valid one (Transpose TAF TSI into an OTIF regulation), that is, full transposition of the TAF TSI into OTIF Law (UTP), including its technical appendices.

To find feasible and efficient solutions for the Non EU Railway / non-EU OTIF States railways to be part of SERA and meet the requirements of TAF TSI, companies providing IT Services would make feasible that these railways can do business in EU in a TAF compliant way. These IT services have to bridge the message and communication gap between Non EU and EU railways. Non EU railways can avoid investments in their own IT landscape by using these IT services. To finance the development of such kind of IT services the CEF cohesion funds could be used. To discuss the requirements for these kind of IT services and to estimate the effort, the results of the detailed analysis are very helpful. However, there are two aspects missing in the study:

- there is no evidence if the link between IMs systems and these tools could make the adoption of TSI easier/cheaper, and
- the other relevant point is to understand which messages foreseen in TAF are already mapped somehow in OTIF non-EU countries. For example, is train running followed? Are there any mandatory elements in the message missing in their actual data exchange? Which ones?

From the study, CER has the impression that non-EU OTIF States, which have no obligation by law to implement TAF, may wait for a clarification of the situation. It seems consequently a little bit early to transpose TAF into UTP. Therefore, the proposal would be a step by step approach:

- short/medium term (two to three years scope) would recommend the implementation of TAF on a voluntary basis by non-EU OTIF IMs and RUs willing to be proactive (after internal analysis, CBA, etc.). The TAF relevant documents might be available through the ERA and/or JSG websites;
- medium term (three to four years scope) would consider the relevance to transpose TAF to UTP and not to refer directly to ERA regulation;

As a proposal from now on, OTIF could be invited to JSG/SMO as observer to better support TAF implementation for voluntary non-EU OTIF States.

Comments from ERA (email received 09.02.2015):

Hampl Jan

Von:	GUTIERREZ Rodrigo (ERA) [Rodrigo.GUTIERREZ@era.europa.eu]
Gesendet:	Montag, 9. Februar 2015 14:01
An:	Leermakers Bas; Hampl Jan
Cc:	Patrizio Grillo; Ainhoa.SAN-MARTIN@ec.europa.eu; Libor.Lochman@cer.be; Joachim.Kroll@rne.eu; Gilles Peterhans; Harald Reisinger; GIGANTINO Anna; SCHIRMER Andreas (ERA); KAUPAT Christoph (ERA); VARGA Mickael (ERA)
Betreff:	RE: Consultation on draft OTIF study on TAF TSI
Wichtigkeit:	Hoch

For the attention of: OTIF
With copy to: EC, CER, UIP, RNE

Dear Bas and Mr. Hampl,

First of all we thank you for requesting us to provide you our feedback on the draft OTIF study on TAF TSI drafted by Mr. Mr. Hampl. Following your consultation request, find below our comments to the document submitted:

- In general terms, we are not quite sure whether the document reflects the content of the new TAF TSI regulation (EU 1305/2014) in force since December 2014. For instance, the document refers to the former Infrastructure Restriction Notice Database, which has been removed from the new regulation in force. Another example, the new TAF TSI brings a new flow of information from the Railways Undertakings to the end customers of the system (shippers, forwarders and customers of Railway Undertakings in general), in such a way that they can be informed of the train running information (forecast of the movement of the train), the estimated Time of Arrival (ETA) for their goods to the final destination, including yards and intermodal terminals, and whether there are disruptions. This information brings added value to the "exchange of vehicles" principle used by the non-EU OTIF community, and it can be used by integrated companies, as the non-EU OTIF national railway companies, which have the status of both IM and RU under one roof, to improve their international traffic services and therefore to provide better services and to bring added value to their potential customers.

- Regarding the information quoted in the report about the Reference Files, we kindly inform you that in the future and due to a decision adopted by the European rail sector, such Reference Files will be hosted by RNE (Infrastructure Manager's cluster). Moreover, the delivery of the location and company codes to the entity in charge of hosting them should not suppose a big effort in terms of cost, because they are built-up based on existing standards (f.i. ISO 3166).

- Concerning the integrated non-EU OTIF national railway companies, with a high level of confidence, we can ensure that most of these companies have the processes described in TAF TSI already in place. Therefore, there should be already a path allocation process (TAF TSI-Path Request) , train composition information exchange (TAF TSI-Train Preparation), tracking of the movement of the train (TAF TSI-Train running information) and an estimated time of arrival of consignment (TAF TSI Shipment ETI/ETA) processes performed between different departments to be assimilated to Infrastructure Manager role and Railway Undertaking role – even within an integrated RU. Indeed, the most costly in terms of deployment of TAF TSI is the customization of the processes, and TAF TSI does not impose such a big change to the companies (it is the reason of having the so called Common Interface). Moreover, the report stresses the cost for a company who may have changed completely its own IT system to provide TAF compliant messages without using the Common Interface, while we have some figures from other companies, showing that the use of the Common Interface together with some minor modifications of their IT systems allows to issue TAF compliant messages with an estimated cost around 300.000 Euros for a implementation project along 4 years, what means an average investment of 80.000 Euros/year . These figures showed that the investment needed to exchange TAF messages is very low compare to the investment needed to comply with other TSIs in force in

the EU area. Moreover, in your study the return-on-investment is not clearly taken into account for the time being.

- An additional added value for non-EU OTIF national railway companies is based on the fact that the new TAF TSI already allows the exchange of electronic consignment note with CIM/SMGS data. This achievement has been reached in collaboration with CIT (International Rail Transport Committee) and it allows all the countries involved in the Eurasian transport chain to exchange an unique and common message containing all the information needed by the customs and forwarders for Consignment Note across the Euro-Asia region. This new feature of TAF TSI will definitely lower the transactional costs.

- Concerning transposition of TAF TSI into OTIF law (UTP), it is evident that it brings clear benefits for those who are already candidates to join the EU in the coming years. Indeed, EU candidates and non EU candidates as Russia, are already using some IT tools (RNE, RAILDATA) implementing TAF TSI functionality, for instance Serbia, Ukraine or Russia. In addition, for those who are in a different geographical areas, TAF TSI brings as well evident benefits:

    - An unique Electronic Consignment note will bring a reduction in terms of transactional costs for those countries involved in the Eurasian transport chain and for the countries involved in the foreseen traffic to North African Mediterranean countries (see figures of traffic in tons forecasted for Mediterranean and Trans-European Networks for Transport -> 4.000.000 tons by 2011 through Gibraltar strait - Seventh Framework Programme for Research and Technological Development (FP7)) and Middle East area countries connected through rail links to Europe.
    - Beyond this, it brings also an standard to be used for rail mode exchange of information among these countries of the Euro-Asia region for international traffic as the report highlights.
    - The coordination among these OTIF countries for international path allocation will be simplified. In fact, currently the RNE tool PCS implementing TAF TSI function "Path Request" is not just used for path allocation in the countries where the market liberalization has been adopted, it is also in use by some integrated companies to coordinate the annual path allocation for international traffic within the framework of the FTE conference held every year in Ljubljana.
    - As additional benefit, It brings a better estimation of the estimated time of arrival to customers sidings combining the information regarding the tracking of the movement of trains and the train composition, thus the wagon movement. It can be achieve through the use of the TAF TSI functionalities "Train Running Forecast" , "Train Preparation", "Shipment ETI/ETA" and WIMO database. This last one may be a centralized or decentralized database, indeed, in some countries such a centralized similar database is already in place serving more than one country (SMGS environment), then a mapping table will be enough to exchange data with TAF format to track the position of the goods.

- Regarding the adoption of the regulation by OTIF non-EU members countries and the management of the technical documents attached to the regulation, ERA can invite OTIF to become full member in the Change Control Management Working Party in charge of this activity. In this way, OTIF may monitor the evolvement of these technical documents and may bring the concerns of the OTIF non-EU members countries who may have decided to adopt TAF TSI. The documents can be pointed on OTIF website to ERA website.

- Whether the transposition of the TAF TSI regulation and the technical documents is decided, the non-EU OTIF members should be taken into account in the provisions of the already in force TAF TSI Implementation Master Plan (published in January 2013).

To conclude, we thank you for the effort made to draft this report and for mentioning the ERA contribution through the interviews undertaken by Mr. Hampl.

We are at your disposal for further questions and comments. Please, do not hesitate to contact us.

Kind regards, Un saludo cordial, Bien cordialement, Mit freundlichen Grüßen, Grazie mille, Muito obrigado, Z pozdrowieniami, Üdvözlettel, S pozdravem

Rodrigo Gutiérrez Domínguez
Project Officer for Telematic Applications
Interoperability Unit

European Railway Agency
120 Rue Marc Lefrancq - BP 20392
FR-59307 Valenciennes Cedex
E-mail: rodrigo.gutierrez@era.europa.eu
Web: www.era.europa.eu
Tel +33(0)327096764
Fax +33 327 096 643
GPS N 50,36510° / E 3,52704°

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