



EU Rail Vehicle & Infrastructure Databases Study

Final Report

Version 1j



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1. Glossary

Name/Entity	Full name	Description/Definition
AEIF	European Association for Railway Interoperability	Multi-stakeholder industry organisation which drafted many of the original specifications
AFER	Authoritatea Feroviara Romana	The Romanian Railway Authority includes Safety Authority; Notified Body and Licensing authorities
CCM	Change Control Modification	A formal process for managing system changes
CER	Community of European Railways and infrastructure companies	
CIM Uniform Rules	Uniform Rules Concerning the Contract of International Carriage of Goods by Rail (CIM)	Standard contractual terms for the movement of freight by rail on international journeys (Appendix B to COTIF)
CIT	International Rail Transport Committee	Railway undertaking trade association which defines the formats and procedures for transactions
CN	Consignment Note	National consignment notes, or international notes using the formats defined by the CIT and OSJD
Common Interface		Software developed to allow for a common method of interconnection for TAF TSI users and interface to legacy systems and to each other
COTIF	Convention concerning International Carriage by Rail	
CUV Uniform Rules	Uniform Rules concerning Contracts of Use of Vehicles in International Rail Traffic	Standard contractual terms for the use of rail vehicles (Appendix D to COTIF). Provides the framework for the GCU
ECM	Entity in Charge of Maintenance	The entity defined in Regulation (EU) No 445/2011 of 10 May 2011
ERATV	European register of	The ERA type file



Name/Entity	Full name	Description/Definition
	authorised vehicle types	
ERTMS	European Rail Traffic Management System	Specification and software for a common definition of traffic management
GCU	General Conditions of Use	Vehicle usage contract drawn up by UIC, ERFA and the UIP
H 30	Shorthand for HERMES message 30	The HERMES interchange message
HERMES (Message)		Rail-related message sent in format defined in UIC leaflets
HERMES (VPN)		VPN used for transmission of rail-related messages based on UIC message leaflets
HIT Rail bv		Company operating the Hermes VPN
IRNDB	Infrastructure Restriction Notice DataBase	
NSA	National Safety Authority	
NVR	National Vehicle Register	
OPE-TSI		Operations and traffic management TSI
OSJD	Organisation for the Cooperation of Railways	Warsaw based organisation which provides the framework for railway cooperation in the former Eastern Bloc
Pathing		The process of planning train journeys over a network so that time conflicts at network locations are minimised
RAILDATA		International Organisation of Cargo Railway Undertakings for Development and Production of Central Information and Data Exchange Systems for European Freight Rail Transport.
REX	Return on Experience	Section in the report giving the results of existing experience with systems implementing similar functions to those of TAF and similar TSIs
RINF/register of infrastructure	Register of INFrastructure	Specification for a common reference file for European Infrastructure
RISC	Railway	



Name/Entity	Full name	Description/Definition
	Interoperability and Safety Committee	
RNE	RailNetEurope	Consortium of European infrastructure managers developing shared IT systems for rail operations
RSRD	Rolling Stock Reference Database	
SEDP	Strategic European Deployment Plan	Plan for implementation of the TAF TSI
SME	Small and Medium Enterprise	
SOA	Services Oriented Architecture	Modern concept for architecting IT systems to fit the service required to execute and business process
State-of-the-art		Refers to system architectures which are technically up to date
TAF TSI	Telematic Application - Freight	
TAP TSI	Telematic Application - Passenger	
Train composition		The actual vehicles forming a train listed contiguously from the leading or trailing end
TSI	Technical Specification for Interoperability	
TTID	Train Transport Identifier	Proposal from WG10 for unique train identifier
UIC	Union internationale des chemins de fer	International industry association of railway companies and other organisations engaged in the railway industry
URVIS	Unique Rail Vehicle Identification System	The identification system to be used to identify rail vehicles for the purpose of the Luxembourg Rail Protocol to the 2001 Cape Town Convention on International Interests in Mobile Equipment
VKM	Vehicle Keeper Marking	
VPN	Virtual Private Network	A data communication network which supplies secure data communications



Name/Entity	Full name	Description/Definition
VVR	Virtual Vehicle Register	Central index of assigned vehicle numbers to National Vehicle Registers (NVRs)
WIMO	Wagon and Intermodal Unit Operational database	As defined in the TAF TSI
XML	Extensible Markup Language	Now the established standard for message interchange



2. Introduction

This document represents the Final Report of the Consultants appointed by the European Commission under contract: MOVE/MAR/2010/D2/214-1/S12.579462/ERVID

The contents of the report cover the work done during each of the four phases of the study and are as agreed with the European Commission at the study inception stage, updated as required as the study progressed.

During the first phase of the study, which was concerned with data gathering, the consultants' work included determining the views of stakeholders in the European railway industry. This was done by questionnaire and by interview on the basis of strict confidentiality. Therefore this report contains no names of stakeholder personnel or the names of any organisations that responded to questionnaires or were interviewed; only the type of respondent stakeholder is given (railway undertaking, vehicle keeper, infrastructure manager, etc.).

Where reference is made to use of HERMES or HERMES messages in the report, this should be understood as referring to data exchange in accordance with UIC leaflets. The HERMES VPN communications network is a network operated on behalf of the railway community by HIT Rail b.v. Inc to facilitate message exchange between UIC and other members.



3. Management summary

This is supplied separately in Document EU Final Report – Management Summary V1



4. Background to the study

This section of the report considers the background in which the study contract was let.

The consultancy study is separately contracted by the European Commission, but is linked to the mandate of a Task Force established by the European Commission following the fifty-first meeting of the Rail Interoperability and Safety Committee (RISC). Member States agreed to set up this task force to examine current developments and future needs for telematics applications in the railway sector, in particular in the context of meeting the legal requirements for stakeholders.

4.1 Summary of the policy context

4.1.1 Scope

At the time of writing, substantial progress has been made in defining data exchange requirements for freight purposes. Progress in the passenger areas is less advanced and is more oriented towards linking passenger centred activities (such as fares and reservations). In so far as the requirements for passenger trains and rolling stock are concerned, it is assumed they will follow the freight path.

4.1.2 Background

In the words of Regulation (EC) No 62/2006 (the “TAF TSI”)¹ “efficient interconnection of the information and communication systems of the different infrastructure managers and operators is considered to be important.” The regulation goes on to comment that the national origin of (freight) systems “hampers continuity”. Accordingly, the Regulation sets out a structure of mandatory messages and databases for freight. Other technical specifications for interoperability, other EU law and international conventions (such as the requirements of the RID) create other obligations to exchange data. Amongst these is the “Traffic Operation and Management TSI” of 2006² which creates an operations framework.

The requirements defined in the TAF TSI were refined by SEDP groups to produce sets of messages. Further studies were undertaken to investigate the most sensible way of implementing the requirements.

4.1.3 The problem

Before taking any decision on the technical aspect of a realtime data exchange system, there is a need for a detailed overview on data requirements which arise from the European Railway Regulatory Framework, including Safety and Interoperability Directives (and the related secondary legislation e.g. technical specifications for interoperability), on market needs for real time data exchange, and on existing IT applications in operation or being developed in Europe.

¹ Commission Regulation (EC) No 62/2006 of 23 December 2005 concerning the technical specification for interoperability relating to the telematic applications for freight subsystem of the trans-European conventional rail system; OJEC L 13, 18.1.2006, p. 1–72

² Commission Decision 2006/920/EC of 11 August 2006 concerning the technical specification of interoperability relating to the subsystem ‘Traffic Operation and Management’ of the trans-European conventional rail system OJEU L359 18 12. 2006 p. 1-160.



The study will determine if these applications make it possible to fulfil the requirements. The study will then recommend a realtime data exchange system from the technical, governance and financial aspects. Finally, the study will examine the technical and economic feasibility of it.

This study will be carried out in parallel to the work of a Task Force which will consist of two parts:

Part A: to identify possible needs for telematics applications which will allow stakeholders to source the data necessary to discharge their legal obligations under the Interoperability and

Safety Directives, which are not yet covered by works and systems already mandated by existing EU legislation.

Part B: assist the Commission in launching further activities which involve putting in place business and governance structures for the development and maintenance of telematics.

4.1.4 The way forward

The Rail Interoperability and Safety Committee (RISC) accordingly set up a task force composed of representatives from stakeholders “to examine current developments and future needs for telematics applications in the railway sector”. In addition, the Commission engaged the consultants to undertake the study with a narrower focus to review progress, to identify gaps in the requirements as stated and to make proposals for the structure of the databases. The relevant Terms of Reference are shown in Annex 4

4.1.5 The study

European Commission objectives for the study are to obtain information on the IT in use in the European rail industry, and guidance on the available options for facilitating the efficient provision of information between the different stakeholders in the rail sector. Information exchange is seen by the Commission as a key factor in ensuring the quality of international rail services, most notably international freight services. Improving the competitiveness of the rail sector is seen by the Commission as essential in facilitating improvements in the sustainability of transport activities throughout the European Union.

The consultants’ recommendations will be used to determine what further legislative action is needed to drive this provision of information forward. This has to take place within the industry framework of competing companies in the rail freight sector, who are protective of their competitive positions, and reluctant to divulge data that could be useful to competitors.

As perceived by the consultants, the objective of the study is to propose a system which is comprehensive and logical, one which makes sense in railway terms and provides as much return as possible for stakeholders in a commercial market.



4.2 Industry background

This section of the report considers issues concerning stakeholders.

4.2.1 The structure of the industry

The European railway industry has changed considerably since Directive 91/440/EC³ established the principle of splitting the unitary railways of Member States into infrastructure providers and railway undertakings. The previous structure of a single state-owned (or state-sponsored) railway within each Member State covering all aspects of railway management and operations has been replaced by a series of individual companies, some remaining state-owned, some privately owned, each one carrying on certain roles within the industry.

In some Member States a series of subsidiary companies within a single holding company, usually state-owned, has been set up to comply with 91/440, such as Deutsche Bahn AG or SNCB-NMBS, whilst in other Member States, the railway has been wholly or partly sold to private interests, the United Kingdom is a good example of this. In other Member States, open-access to infrastructure has been introduced and new players have entered the industry in competition with the state-owned incumbents. So far, no Member State has introduced competition for infrastructure provision, the main competitive thrust has been in freight services, although competition to provide passenger services under contract, (franchises), has been introduced in many Member States. Most Member States subsidise passenger services to some extent, whilst some have transferred responsibility for local services to regional governmental bodies.

Since 91/440 started the disaggregation of the state-owned incumbents, the railway industry now consists of a series of: -

- ▶ infrastructure managers – companies that maintain and manage railway infrastructure and earn revenues from selling access to that infrastructure to railway undertakings. Infrastructure managers are not generally subject to competition.
- ▶ railway undertakings – companies that operate and manage passenger or freight train operations for reward. Access to infrastructure is gained by requesting paths on the network and paying access charges as the trains are run. Freight undertakings operate in an open market and compete for business
- ▶ vehicle keepers – companies that own fleets of vehicles and exploit them economically either by using them as a railway undertaking, or hiring them out to other railway undertakings.
- ▶ entities in charge of maintenance (ECMs) – a relatively new entity in the legislation, being the organisation charged with the maintenance and repair of vehicles. There is an open market for companies to compete for vehicle maintenance and repair contracts as ECMs
- ▶ regulatory bodies – national organisations responsible for regulation of the industry. In the instances where these bodies have a safety role and have a need to access and use the data referred to in the legislation. Examples would be approvals in the case of the NVR data and incidents maintenance data following accidents.

It is important to note that a company can have several of the above roles, and indeed many rail operators, particularly freight operators, are railway undertakings, vehicle keepers, and ECMs.

³ Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways; OJEC L 237, 24.8.1991, p. 25–28



4.2.2 High level issues

Stakeholders principal concerns are that requirements for IT developments should produce an economic return. Stakeholders are therefore looking for proposals which are logical, which build on existing developments and for certainty rather than change in requirements.

Each of the above entities has its own requirement for information, for supply and receipt, and processing and use. In the new industry structure, a large amount of essential information therefore needs to be regularly passed between independent organisations as data flows. Many of these data flows were once internalised in IT systems developed by the unitary railways. Many legacy systems remain in use, with the new companies having access to what was once a single common system in the precursor unitary railway.

4.2.3 Stakeholders expectations

Individual stakeholders have individual concerns. These affect the features they want to see in the system as a whole, the protection they require and their concerns about the economics of the system.

Some big railway undertakings want systems which will allow them to go wholly electronic and therefore make considerable savings both in ground staff and administration. There are still unresolved problems of principle (for example with paper documents accompanying consignments) but the gaps in the TAF TSI and other legislation mean that it has not been possible for railway undertakings to see a way through to becoming wholly electronic. This must surely be a major factor in the limited progress they have made in building systems to exchange data.

Railway undertakings are under renewed pressure to compete in the freight market so railway undertakings expect that IT applications will be effective and efficient and will be good value for money. It is important therefore that both the conception of the structure and the systems for exchanging data as well as the detail design within stakeholders' own businesses is optimal. The consultants have therefore tried to produce proposals which are proportionate, which solve the problem and which produce an economic return.

Railway undertakings are sensitive about commercial data. There have to be some trade-offs between requirements for data (particularly for safety related processes and confidentiality). In the relationship with keepers, the consultants have struck what they think to be the right balance.

Wagon keepers need real-time information to manage their fleets.

Wagon keepers have a contractual relationship with railway undertakings which places the responsibility for repair and corrective maintenance on railway undertakings but the cost on the keeper. Linked to this is the role of the entity charged with maintenance. A prime concern of all three players is prompt and accurate data for them to be able to discharge their responsibilities.

Infrastructure managers have technical problems in that there is a mismatch between the type of systems required for infrastructure audit and renewal and that required for railway operations. Infrastructure managers therefore require proposals to recognise and resolve that problem.

Regulatory bodies have legitimate interest in seeing that IT systems are not used in an anti-competitive manner. This will extend to ensuring that data exchange is open to all on equivalent terms and that obligations to provide data are applied fairly. Regulatory bodies may have to consider the size and resources of small and medium enterprises in making their judgements.

4.3 IT background

Most players operate IT systems to support various aspects of their business, the



nature of the IT system depending on the business of the player, with railway undertakings having different systems to those of infrastructure managers, although with the industry having emerged from unitary, mostly state-owned, railways, there is some degree of overlap in systems functionality; some depending on historical IT developments within individual Member States. Co-operative endeavours have been encouraged by EU Directives and the major infrastructure managers have responded by forming the RailNetEurope consortium to develop path planning and train circulation management systems covering their routes. The resulting systems, Pathfinder, and EUROPTIRAILS, (now called Train Information System - TIS) are now in widespread use. Other consortia have been formed for the handling of freight traffic, such as X-Rail.

A particularly important development in the context of the study is the HERMES system. Correctly defined, the term HERMES refers to a data network owned by the incumbent railways and the communications protocols and management systems required to run it. The term however has been extended to include the design of the messages which pass over this network. It is important to make the distinction between the messages and the network, because they are not linked logically, the network could carry any messages and the "HERMES" messages could pass over any network. The consultants understand that whilst having a communications infrastructure is necessary to join the HERMES community, there is no intellectual property in the content and structure of the messages.

In this study, the network is of no particular interest but the messages are of great interest. The messages are to a standard format which means that the systems of the various railway undertakings can speak to each other although the systems themselves may be constructed on quite different principles. In the freight area the messages fall into two broad categories, firstly messages which make existing processes more efficient and secondly messages which extend the ability of the railway community to offer new services, services which could not be offered without IT.

In the first group comes the interchange message. The interchange message contains all the data for a train being interchanged including train data, wagon technical data for all the wagons in the train, wagon consignment data for all the wagons in the train and container data. If the message is sent promptly the receiving railway undertaking receives all the data necessary to run the train and does not need to employ staff to collect data from the wagon side. This is still the most used message.

The other messages which have been defined in the freight area provide details of the performance of vehicles, details of incidents en-route, allow for wagon search, provide details of despatch and arrival and updates on frontiers being crossed. These messages therefore have the potential to allow railways to offer services that are quite impossible to offer in other ways.

In current operations, messages have been defined to predict and update handover between infrastructure managers.



In some cases messages will have to be amended – to be sent direct to the keeper rather than via the “registering railway” for certain wagon defects for example.

In the second group, more recently, the e-RailFreight system has been specified. This system is intended to allow consignment note information to be shared. Consignment note information is more sensitive than data such as wagon characteristics (painted on the side of the wagon) and criteria have had to be set for the rights to write, read and amend data. Whilst the structure of the system and the nature of the messages have been defined, the system has not yet got beyond pilot projects. Staged implementation over the next few years is anticipated.

IT systems in the European railway industry have been developed over many decades, with one organisation stating that whilst one of its systems is over 40 years old, it remains essential to the operation of the railway it manages. Other organisations report use of much newer systems, but overall, the majority of systems can be considered to be in the legacy class. Developing links between such a variety and age of systems could prove problematic. At the same time, the IT industry has developed new concepts such as “Cloud Computing”, whilst use of the internet, and the web-enabling of systems is now commonplace.



5. Data gathering

The first phase in the consultants' work was to gather data. Data gathering involved two separate work streams:

- ▶ Determining the requirements contained in legislation and related rail industry conventions such as COTIF and GCU which are relevant to the study, i.e. would be expected to require the use of IT or telematics for compliance. Some requirements mandate IT such as most of those contained in the TAF and TAP TSIs.
- ▶ Obtaining information from stakeholders on their IT systems, their experience using the systems, and how closely they matched IT best practice. In addition, their views were sought on the policy and strategic issues facing the industry relevant to the task of the consultants. The information was obtained from stakeholders through the issue of a questionnaire, plus follow-up interviews where the target organisation agreed.

Below is described in 5.1 the analysis of the legislation, in 5.2 the analysis of registers. The requirements have then been drawn together in 5.3 to show the overall data to be exchanged between parties and central registers and databases.

5.4 lists the relevant IT systems as discovered from the analysis of questionnaires and interviews and finally 5.5 summarises the feedback received as regards the return on experience (REX).

5.1 Extraction of legislative and other related standards

The requirements in the relevant legislation were obtained by extensive study of the documents listed as in-scope at the inception of the study. These include: -

- ▶ First, Second and Third Railway Packages
- ▶ Draft Directive for Single European Railway Area (replaces First Railway Package)
- ▶ High Speed TSIs
- ▶ Energy TSI
- ▶ Conventional TSIs in force
 - Telematic Application Freight-TSI (TAF TSI)
 - Noise,
 - Energy
 - Control, command and signalling,
 - Rolling stock – freight wagons,
 - Operation and traffic management,
 - Safety & Maintenance
 - Telematic Application Passenger-TSI (TAP TSI);
- ▶ Conventional TSIs in draft at project inception
 - technical specification for interoperability relating to the 'infrastructure' subsystem of the trans-European conventional rail system (RINF-TSI) 4
- ▶ COTIF (including the CUV);
- ▶ GCU (not statutory, but custom and practice)

In addition, although not listed as in-scope at the start of the project, the draft Regulation for the Certification of Entities in charge of maintenance was studied. This was adopted during the study period.⁵

The identified requirements were then extracted and analysed for their IT relevance. Much of the documentation was found to be lengthy and irrelevant to the study, the Freight Rolling Stock TSI, for instance is several hundred pages, but the requirement

⁴ Commission Decision 2011/275/EU of 26 April 2011 OJEU L126 14 05. 2011 p. 53-120

⁵ Commission Regulation (EU) No 445/2011 of 10 May 2011 OJEU L122 11 05. 2011 p. 22-46



relating to IT is contained on less than a single page. The rule for determining whether a clause was a requirement related to the study was to assess whether it involved processing, exchange or the storing of data, and whether it was mandatory, by inspection for use of the words “must” or “shall”. The following clause, extracted from the OPE-TSI is a good example of an obligatory requirement:

Train Composition requirements **must** take into account the following elements:

- the vehicles
- all vehicles in the train **must** be in compliance with all the requirements applicable on the routes over which the train will run;
- all vehicles on the train **must** be fit to run at the maximum speed at which the train is scheduled to run;
- all vehicles on the train **must** be currently within their specified maintenance interval and will remain so for the duration (in terms of both time and distance) of the journey being undertaken;

The requirements relevant to the study consist of those that mandate the use of telematics, (as in the TAF and TAP TSIs), plus other requirements for information exchange between industry bodies. In addition, the consultants extracted other requirements where they appeared relevant to the study.

The full list of extracted requirement texts is in Annex 5, however an overview and commentary on the findings is provided below.

5.1.1 Requirements in the First Railway Package

Directive 2001/14/EC⁶ contains many requirements relevant to the study: -

Network Statements introduced

Obligation on IMs to cooperate in allocating infrastructure capacity

Obligation on IMs to achieve efficient operation of train services involving two or more IMs

Obligation on IMs to respond to requests for paths at short notice (Ad Hoc) – taken forward for freight paths in the TAF TSI and for passenger paths in the TAP TSI

Obligation on railway undertakings to ensure that all the vehicles conveyed on their trains are approved for use, and fit to travel. (formalised in the OPE-TSI and also the TAF TSI)

Article 3 Paragraphs 2-4 (Network Statement): -

“2. The network statement shall set out the nature of the infrastructure which is available to railway undertakings. It shall contain information setting out the conditions for access to the relevant railway infrastructure. The content of the network statement is laid down in Annex I.

3. The network statement shall be kept up to date and modified as necessary.

4. The network statement shall be published no less than four months in advance of the deadline for requests for infrastructure capacity.

Annex I is vague on the detail of the infrastructure characteristics data required to be held in the Network Statement: -

“The network statement referred to in Article 3 shall contain the following information:

A section setting out the nature of the infrastructure which is available to railway undertakings and the conditions of access to it.

Article 4 Paragraph 4 (Establishing determining and collecting charges): -

⁶ Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification; OJEC L 75, 15.3.2001, p. 29–46



Apart from charges, the article contains the clause below, which mandates IMs to cooperate in relation to trains passing over two or more IMs networks, and also, presumably as part of this cooperation, a duty to aim to guarantee international railfreight competitiveness and efficient use of the TEN.

“3. Infrastructure managers shall cooperate to achieve the efficient operation of train services which cross more than one infrastructure network. They shall in particular aim to guarantee the optimum competitiveness of international rail freight and ensure the efficient utilisation of the Trans-European Rail Freight Network. They may establish such joint organisations as are appropriate to enable this to take place. Any cooperation or joint organisation shall be bound by the rules set out in this Directive.”

Article 15 (Cooperation in the allocation of infrastructure capacity on more than one network)

Infrastructure managers shall cooperate to enable the efficient creation and allocation of infrastructure capacity which crosses more than one network. They shall organise international train paths, in particular within the framework of the Trans-European Rail Freight Network. They shall establish such procedures as are appropriate to enable this to take place. These procedures shall be bound by the rules set out in this Directive.

Article 23 (Ad hoc requests)

The infrastructure manager shall respond to ad hoc requests for individual train paths as quickly as possible, and in any event, within five working days. Information supplied on available spare capacity shall be made available to all applicants who may wish to use this capacity.

Article 32 (Safety certification)

Para 3, third subparagraph “The railway undertaking shall also prove that the rolling stock making up the trains has been approved by the public authority or by the infrastructure manager and checked in accordance with the operating rules applicable to the infrastructure used. The safety certificate shall be issued by whichever body is designated for the purpose by the Member State in which the infrastructure used is situated.”

Directive 2001/16/EC⁷ also contains requirements relevant to the study: -

Article 1 – establishes a work program for a package of TSIs supporting interoperability of the subsystems listed in Annexe II. These are considered separately below.

Article 24 – mandates Member States to establish registers of rolling stock and of infrastructure: -

“1. The Member States shall ensure that registers of infrastructure and of rolling stock are published and updated annually. Those registers shall indicate the main features of each subsystem or part subsystem involved (e.g. the basic parameters) and their correlation with the features laid down by the applicable TSIs. To that end, each TSI shall indicate precisely which information must be included in the registers of infrastructure and of rolling stock”

Despite a subsequent amending directive, (2004/50/EC)⁸, and amending Decision

⁷ Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system; OJ L 110, 20.4.2001, p. 1–27

⁸ Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and



2011/107/EU⁹, the above mandate remains unchanged, namely each Member State is to maintain its own registers, and both publish them annually and update them annually. It should be noted that some newly introduced NVRs are updated much more frequently as good practice, and to suit the circumstances of individual Member States.

A “recast” of the First Railway Package is in hand by the Commission. Its primary purpose is to simplify and consolidate the existing legislation and to tackle key problem areas which have been identified over the last ten years.

A draft of the Directive has been studied. The examination showed, however, that there is little of relevance to the study in the current draft as there are no references to IT systems or telematics within it.

The only requirement considered to be relevant is that the Network Statements of each IM would have to be published in an electronic format on the ERA website, and the content of the statements would be enhanced. At present, network statements are available from the IMs either as hard-copy documents, or as series of pdf files. The proposed directive would therefore require all IMs to make network statements available in electronic form. At the present time, it is understood no IM has a database of network information from which the network statement is derived.

5.1.2 Requirements in the Second Railway Package

Directive 2004/49/EC¹⁰ (The Safety Directive), and its amending Directive 2008/110/EC¹¹ contain requirements relevant to the study. Two key bodies involved in the operation and maintenance of rolling stock are defined in the latter directive in the amendment to Article 3 of 2004/39/EC: -

2. the following points shall be added to Article 3:

‘(s) “keeper” means the person or entity that, being the owner of a vehicle or having the right to use it, exploits the vehicle as a means of transport and is registered as such in the National Vehicle Register (NVR) provided for in Article 33 of Directive 2008/57/EC¹² of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (recast) (*), (hereinafter referred to as the “Railway Interoperability Directive”);

(t) “entity in charge of maintenance” means an entity in charge of maintenance of a vehicle, and registered as such in the NVR;

New article 14a (Maintenance of vehicles)

Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system; OJEC L 164, 30.4.2004, p. 114–163

⁹ Commission Decision 2011/107/EU of 10 February 2011 amending Decision 2007/756/EC adopting a common specification of the national vehicle register (notified under document C(2011) 665) OJEU L 43, 17.2.2011, p. 33–54

¹⁰ Directive 2004/49/EC of the European Parliament and of the Council of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive); OJEC L 164, 30.4.2004, p. 44–113

¹¹ Directive 2008/110/EC of the European Parliament and of the Council of 16 December 2008 amending Directive 2004/49/EC on safety on the Community's railways (Railway Safety Directive); OJEC L 345, 23.12.2008, p. 62–67

¹² Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast); OJEC L 191, 18.7.2008, p. 1–45



1. Each vehicle, before it is placed in service or used on the network, shall have an entity in charge of maintenance assigned to it and this entity shall be registered in the NVR in accordance with Article 33 of the Railway Interoperability Directive.

2. A railway undertaking, an infrastructure manager or a keeper may be an entity in charge of maintenance.

3. Without prejudice to the responsibility of the railway undertakings and infrastructure managers for the safe operation of a train as provided for in Article 4, the entity shall ensure that the vehicles for which it is in charge of maintenance are in a safe state of running by means of a system of maintenance. To this end, the entity in charge of maintenance shall ensure that vehicles are maintained in accordance with:

(a) the maintenance file of each vehicle;

(b) the requirements in force including maintenance rules and TSI provisions.

The entity in charge of maintenance shall carry out the maintenance itself or make use of contracted maintenance workshops.

Paragraph 5 of Article 14a tasks the ERA with preparing recommendations for certification of ECMs in readiness for a Regulation implementing such certification. A draft Regulation prepared by the ERA is now ready for adoption, (see section below on ECM Certification), but the original implementation date of 24 December 2010 passed without its adoption, although it is expected soon.

Directive 2004/50/EC supports Technical Specifications for Interoperability by amending both the High Speed and Conventional Directives (96/48/EC¹³ and 2001/16/EC). The relevant text has been omitted here, but TSI content is defined: -each TSI shall:

(a) indicate its intended scope (part of network or rolling stock referred to in Annex I, subsystem or part of subsystem referred to in Annex II);

(b) lay down essential requirements for each subsystem concerned and its interfaces vis-à-vis other subsystems;

(c) establish the functional and technical specifications to be met by the subsystem and its interfaces vis-à-vis other subsystems. If need be, these specifications may vary according to the use of the subsystem, for example according to the categories of line and/or rolling stock provided for in Annex I;

(d) determine the interoperability constituents and interfaces which must be covered by European specifications, including European standards, which are necessary to achieve interoperability within the trans-European high speed rail system;

(e) state, in each case under consideration, which procedures are to be used in order to assess the conformity or the suitability for use of the interoperability constituents, on the one hand, or the EC verification of the subsystems, on the other hand. These procedures shall be based on the modules defined in Decision 93/465/EEC;

(f) indicate the strategy for implementing the TSIs. In particular, it is necessary to specify the stages to be completed in order to make a gradual transition from the existing situation to the final situation in which compliance with the TSIs shall be the norm;

(g) indicate, for the staff concerned, the professional competences and health and safety conditions at work required for the operation and maintenance of the subsystem, as well as for the implementation of the TSIs.'

¹³ Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system; OJEC L 235, 17.9.1996, p. 6–24



In addition to the above, the Directive further clarifies the requirements of the rolling stock and infrastructure registers. The registers of rolling stock in each Member State are to be called National Vehicle Registers, but the requirement for them to be published and updated annually remains

Directive 2004/51/EC¹⁴ contains no requirements relevant to the study. This Directive modifies 91/440 and grants open access to freight railways over the Trans-European Rail Freight Network.

Regulation (EC) 881/2004¹⁵ (and its amending Regulation 1335/2008¹⁶) establishes the European Railway Agency. Although there are no requirements directly relevant to the study, it should be noted that a number of duties placed on the Agency are related to the study work.

Chapter 3 Interoperability - places a number of duties on the Agency

Article 12 - Agency to provide technical support for the development of interoperability: -

“The Agency shall contribute to the development and implementation of rail interoperability in accordance with the principles and definitions laid down in Directives 96/48/EC and 2001/16/EC”.

Chapter 3a - Maintenance of Vehicles concerns the establishment by the Agency of a system of certification for entities in charge of maintenance

Chapter 3c - Registers and Agency’s public database provides for the Agency to establish common specifications for: -

National Vehicle Registers (NVRs) maintained in Member States

European register of authorised vehicle types (ERATV). The establishment and maintenance of this register is made the responsibility of the Agency.

Register of infrastructure (Member States to designate the responsible entity, probably the IM in almost all instances)

5.1.3 Requirements in the Third Railway Package

There is nothing of relevance to this study in this package

5.1.4 Requirements within the TSIs

TSIs as their name implies, all relate to the development of European railway interoperability, and were introduced in the Second Railway Package in Directive 2004/50/EC. Below are brief notes on each TSI and its relevance to the study: -

High Speed TSIs

There is nothing of relevance to the study in these TSIs. Certain data elements specific to high speed must be recorded in the registers of infrastructure, and registers of rolling stock. The consultants assume that this latter is by type in the ERATV, not the NVRs.

Telematic Application Freight

¹⁴ Directive 2004/51/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 91/440/EEC on the development of the Community's railways; OJEC L 164, 30.4.2004, p. 164–172

¹⁵ Regulation (EC) No 881/2004 of the European Parliament and of the Council of 29 April 2004 establishing a European Railway Agency (Agency Regulation); OJEC L 164, 30.4.2004, p. 1–43

¹⁶ Regulation (EC) No 1335/2008 of the European Parliament and of the Council of 16 December 2008 amending Regulation (EC) No 881/2004 establishing a European Railway Agency (Agency Regulation); OJEC L 354, 31.12.2008, p. 51–59



Establishes an IT-based system for mandatory use by all IMs and RUs involved in rail freight services. The system revolves around peer-to-peer messaging using a suite of standard messages, between the parties involved, sent via a common interface. Wagon, train, and IMU event data are to be extracted from the messages in the common interface, and recorded in a central database containing the operational data for wagon and intermodal units (WIMO).

In addition to the WIMO database containing operational data, each of the wagon keepers is tasked with establishing and maintaining Rolling Stock Reference databases, (RSRDs) and making this data available to others such as RUs.

Dating from December 2005, the TAF TSI does not expressly deal with the data needs of wagon keepers, the assumption being that the data in the WIMO would be available for them and be suitable for their needs. The data needs of Entities in charge of maintenance are not considered at all, as these were not yet defined by Directive, but again, the assumption is that the WIMO data will be available to them. No specifications of data extract routines from the WIMO for either parties are defined.

Telematic Application Passenger

The draft Regulation for the TAP TSI was adopted whilst the study was in progress. (Regulation 454/2011).

The TSI establishes a similar IT system for organisations involved in rail passenger services. The messages related to train paths and train running are similar to those of the TAF TSI.

There is no requirement for detailed train composition information to be exchanged, but the aggregate train parameters (length, weight, axle load, etc) must be stated when requesting an ad-hoc path. In addition, there if the IM can accept the timetable in lieu of exchange of Train Ready messages from the RU. The messages concerned with train preparation and operation are far simpler than the TAF TSI.

Operations (Traffic Operation and Management)

This contains a large number of requirements relevant to the study, most of them in the form of duties and tasks to be undertaken by infrastructure managers, and by railway undertakings when engaged in train operations.

The TSI mandates that IMs must be supplied with information related to vehicles, but does not specify how this might be done, for instance for dangerous goods: -

4.2.3.4.3. Dangerous goods

The Railway Undertaking must define the procedures to supervise the transport of dangerous goods.

These procedures must include:

- existing European standards as specified in EC Directive 96/49/EEC¹⁷ (as amended) for identifying dangerous goods on board a train
- advice to the driver of the presence and position of dangerous goods on the train
- information the Infrastructure Manager requires for transport of dangerous goods

One requirement that appears somewhat unclear in its role and application concerns the Harmonised Train Composition document (last sentence of 4.2.2.5 Train Composition): -

The train composition must be described in an harmonised train composition document (see Annex U)

¹⁷ Council Directive 96/49/EC of 23 July 1996 on the approximation of the laws of the Member States with regard to the transport of dangerous goods by rail; OJEC L 235, 17.9.1996, p. 25–30



Study of Annex U shows it marked as an “Open Point”. It is, however, well known that most railway undertakings provide the driver with a document containing the composition of the train and data regarding the authorised and actual load, plus other information like dangerous goods. Some of these documents are produced by the operations IT systems of the RU and are complex documents, whilst others are written out manually on a blank form. The consultants assume that this “harmonised train document” is intended to be a replacement for all the differing documents now in use as described. Train composition rules vary between Member States which may explain the reason for Annex U still being open, however this is not directly an IT systems problem.

Freight Rolling Stock (Conventional lines)

This TSI is mostly concerned with the design and construction of freight rolling stock to achieve interoperability, with annexes ranging from A to ZZ. The TSI does not apply to existing rolling stock in use at the date the TSI comes into force, (unless modified after the implementation date), thus excluding most of the European wagon fleet.

All applicable wagons with data mandated in Annexe H, must be entered into the “Rolling Stock Register” but this register is not defined, however clause 4.2.8 Maintenance File has this reference :

“The Rolling Stock Register, kept by each Member State, shall state the entity responsible for the maintenance of the Rolling Stock and the management of the Maintenance File

The assumption therefore has to be that all references in this TSI to Rolling Stock Register are referring to the National Vehicle Register in the relevant Member State. However, it is clear that references in the TSI to Rolling Stock Register do not account for its splitting into an NVR containing no technical information, and the ERATV, where this information is held by wagon type. The ERA has therefore posted some clauses referring to Register of Rolling Stock for repeal under the ERATV proposals, as they deal with technical information.

A key requirement, notwithstanding its limited applicability, is the mandate for a maintenance file to be created and maintained for each vehicle. This file is in effect a catalogue of the processes to be used to maintain the wagon. It is important to note that there is no requirement to store the condition of individual vehicles. It should be noted that this TSI essentially repeats the requirements of new article 14a of the Safety Directive, (see 2008/110/EC), however the FRS TSI then mandates that maintenance information must be made available to all RUs that need it. It might be thought that there is therefore no requirement to make information available for existing rolling stock, but this is not so, because the ERA-prepared draft Decision for ECM Certification includes a mandate for the exchange of maintenance-related information between the parties, (ECMs, keepers, RUs).

No IT or telematic systems are mandated, but some of the processes, particularly regarding maintenance information and its availability would be difficult to undertake economically without IT support.

Noise

Applicable only to new rolling stock from date of introduction, or existing rolling stock that is upgraded or modified after that date

There is nothing of any real significance to the study in this TSI.

In terms of vehicle data, it mandates that certain measured noise levels shall be recorded in “the Rolling Stock Register”, although this is not defined. This clause is however, posted for repeal by the ERA in Annex 2 of their report on the ERATV¹⁸.

¹⁸ EUROPEAN REGISTER OF AUTHORISED TYPES OF VEHICLES



The assumption must be, therefore, that the information will be held in the ERATV by type, not individual wagon number in the NVR.

Command, Control, Signalling

There is nothing of clear relevance to the study in this TSI; however the vehicle CCS capability data in the technical information as well as the planned train technical data is very important for ERTMS train initialisation. ERTMS position reports would also assist in the efficient tracking of trains and reporting to RUs

Energy (OHL equipment)

There is nothing of significance to the study in the TSI.

In terms of the design and characteristics of the OHL equipment, the TSI mandates that some of it be included in the Register of Infrastructure from whence it could be used in the future to check the suitability of a train to proceed based on the consisted vehicles.

Infrastructure

This TSI defines the infrastructure values necessary for interoperability, with a section containing the special features of various Member State networks.

The main item of relevance to the study is the list of data elements to be included in the infrastructure registers to be created and maintained by each of the IMs within the European Union. (Annex D). Whilst a database is not mandated in the relevant Directive for the register, if there becomes a requirement for automated checks for suitability of vehicles on the infrastructure, a structured database will be essential. This subject has now been addressed by the ERA in their recent recommendations for the infrastructure registers, and a data schema has been prepared and the Regulation will mandate presentation as digital maps: -

“3.1.Railway network structure for the register

4. The presentation of the register shall be in terms of digital maps and digital table fields at macro- and micro-level latest at the end of the transition period. “

In addition, the ERA has prepared a list of amendments required to previous legislation where data for inclusion into the register is specified, as they will be contained in this TSI.

The coding used for the locations at the start or end locations of individual tracks, or operational locations, is defined as: -

“Geographical coordinates according to the standard World Geodetic System (WGS) and km or mile related to line identification at the beginning of a track section in normal running direction. In case both directions are possible, any extreme might be „Start“.”

Operational locations such as yards and stations on the network are additionally defined using a recently developed code: -

“Code developed for TAF TSI by SEDP as given in CEN CWA15541:May2006. It is composed of two letters for the Country Code and fourteen numbers for the Location Code”

The data specification contains no elements to indicate that one or both ends of a line have a link to another infrastructure register. Most of these boundaries are the frontier points between Member States.

There appears to therefore be no role envisaged for the well-established ENEE database of locations.

The TSI has now been adopted under Decision 2011/633/EC of 15th September

(ERATV) reference IU-ERATV-20101213-FinalReport on the ERA website

<http://www.era.europa.eu/Document-Register/Documents/IU-Recommendation%20on%20specification%20of%20ERATV%20-%20accompanying%20report.pdf>



2011, following the ERA recommendation.

5.1.5 ECM Certification

Regulation [EU] No 445/2011 for ECM certification was adopted on 10 May 2011 whilst this report was in preparation

This contains many requirements relevant to the study.

The Regulation mandates ECM certification for freight vehicles only; ECMs for other vehicles are optional.

As well as producing the Regulation content, the ERA has also issued a report on certification, (Final Report dated 29 June 2010¹⁹), which contains a number of statements of relevance to the study: -

Residual risks

The Agency point out that of the maintenance levels defined in Annex 2 of the draft Regulation, (see table below), Maintenance Level 1 includes inspections and monitoring activities undertaken before the departure of a train, and which in practice are undertaken by RUs or IMs who have resources on-site for forming and preparing trains and part of train preparation is to inspect vehicles for suitability to travel. The consultants assume that IMS are included in train preparation and inspection to cover those IMs that prepare trains for engineering work on the infrastructure. Some IMs contract out all engineering train activity to RUs, and are not involved in train preparation.

The Agency point out that it would be nonsensical if ECMs rather than RUs, had to mobilise resources all over Europe to perform such activities. Therefore Maintenance Level 1 is excluded from the scope of ECM maintenance activity and remains with the RUs and IMs.

Therefore the certification procedure will exclude any Maintenance Level 1 activities undertaken by the ECM. Many RUs owning their own wagon fleets, (i.e. are keepers), and having the appropriate engineering resources, are also ECM for those fleets. Certification will also exclude Level 5, which covers modifications and heavy repairs such as overhauls.

This table shows the maintenance levels, whether the vehicle is available commercially or not, and the party controlling the wagon at the defined level.

Level	Description	Commercial Use	Organisation controlling the wagon
1	Inspections and monitoring undertaken before the departure of a train or en route.	Yes	RU
2	Inspections, checks, tests, fast exchanges of replaceable units and preventative and corrective operations of limited duration between two scheduled journeys.	Yes	ECM in cooperation with RU
3	Operations carried out mainly in specialised facilities of a maintenance	No	ECM

¹⁹ Report on the development of CERTIFICATION OF ENTITY IN CHARGE OF MAINTENANCE reference ERA/REP/SAF/xx-2010 on the ERA website <http://www.era.europa.eu/Document-Register/Documents/2010-06-25-draft-legal-text-after-consultation-of-ECM-Recommendation-with-Annexes.pdf>



	centre or workshop. It includes interventions of preventative and corrective maintenance and scheduled exchanges of components.		
4	Major maintenance operations, generally called overhauls (of modular subsystems or of the complete vehicle).	No	ECM
5	Refurbishment, modifications, very heavy repairs, renewal or upgrading, except where they are the subject to authorisation under the Railway Interoperability Directive.	No	Other in cooperation with ECM and keeper

The Agency’s Final Report²⁰ also addresses the requirement in the OPE-TSI section 4.2.2.5 Train Preparation (see report Annexe 3, Interfaces, Para 3. CR TSI OPE): -

“The requirements addressed to the vehicles have been considered in the proposed regulation on ECM certification:

1) *‘The vehicles have to be fit to run’.*

This is achieved through the pre-departure inspection performed by and under the responsibility of the RU according to section 5.1.1.1 of this document, whereas (4)* (*in the **recital***) and art 5 (2) of the proposed regulation.”

(* study of the draft document shows that the reference to “whereas (4)”, should be to “whereas (5)”

Recital 5 (whereas....)

(5) Inspections and monitoring undertaken before the departure of a train or en route are generally performed by operational staff of the railway undertakings or infrastructure managers, following the process described in their safety management system in accordance with Article 4(3) of Directive 2004/49/EC.

Article 5.2....

All parties involved in the maintenance process shall exchange relevant information about maintenance in accordance with the criteria listed in sections I.7 and I.8 of Annex III.

and also, for safety-related matters: -

Article 5.5

All contracting parties shall exchange information on safety-related malfunctions, accidents, incidents, near-misses and other dangerous occurrences as well as on any possible restriction on the use of freight wagons.

Article 5.2 of the draft regulation mandates the parties involved in the maintenance process to exchange relevant information about maintenance in accordance with the criteria listed in sections I.7 and I.8 of Annex III. There is therefore a clear duty for RUs, IMs, (if involved in train preparation), and ECMs to exchange data, and with many so many RUs and ECMs potentially involved, the use of IT interfaces suggests itself.

“2) *‘The vehicles have to be within their specified maintenance interval and ...’.*This is achieved through the transmission on <of> (sic) information on return to

²⁰ <http://www.era.europa.eu/Document-Register/Pages/Report-from-Task-Force-on-Maintenance.aspx>
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operation according to section 5.2.2 of this document, art 5(4) and annex I, FMM.6 of the proposed regulation.”

The transmission of information is therefore mandated in the draft Regulation between ECM and RU but not the method of its achievement. With most parties likely to be using IT systems to support their activities, the implication is clear that this transfer would be an ideal candidate for an IT systems interface

Exchange of information

In this section, the Agency point out that relations between ECM and RUs/IMs, are not direct for most of the time. Contact is usually via the wagon keepers, as contracts of use are with them, not the ECM. These contracts can be specific to the parties, or, more usually, based on the GCU. The Agency also point out that keepers can be ECMs themselves, or contract out maintenance to external ECMs. The Agency have therefore avoided specifying a mandatory business model based on a triangular relationship between the parties, (ECM, RU/IM, WK), and restrict the Regulation to specifying the obligations of RU/IMs, and ECMs towards each other. As an example, the Agency point out that RU/IMs may request maintenance-related information as part of their data needs for operational purposes, and ECMs for the other part need information on wagon work performed, such as kms-run, overloading, defects detected during operations etc

Clearly for those RUs or IMs that own and maintain their own fleets, relations will be much more direct, although even then, traditional company structures normally involve separate departments for engineering and for operations. However, large, well-established RUs (or IMs), in such circumstances have normally installed IT systems to support engineering and operations, with interfaces between them to exchange data, and in some cases, have a single system to support both.



5.1.6 The General Contract of Use (GCU)

The GCU contains requirements of relevance to the study. Many of them merely support EU legislation and TSI requirements.

The General Conditions for Use are a convention, (or framework contract), for use by Railway Undertakings and Wagon keepers to govern the use of wagons, and essentially replaces the previous rules under the RIV. Commercial terms for use of wagons are excluded. The UIC, UIP and ERFA cooperated in develop the GCU which came into use on 1 July 2006. Use of the contract template is voluntary, it is not mandated by any EC legislation, but to date, there are over 640 signatories to the GCU terms, covering around 90% of freight wagons circulating in Europe.

The GCU bureau maintains a database of wagons within the GCU, and this can be publicly accessed via their website. Key is the wagon number, from which it is possible to obtain brief details of the wagon keeper, (name, contact name, and telephone number). In addition, the response gives access to a pdf file describing the keeper in more detail.

The GCU defines “use” of a wagon: -

“1.3 Use of a wagon includes the loaded run and the empty run, as well as cases in which the wagon is in the custody of a signatory RU

1.4 Use and custody begin when the wagon is accepted by the RU and end with the handover of the wagon to the keeper or to some other authorised party, for example another signatory RU, the contractual consignee of the goods carried or the operator of private sidings authorised to take delivery of the wagon.”

Therefore use includes custody such as when an RU is moving a wagon for part of its journey to destination, for example, SBB moving a wagon on a Hamburg-Milan trip from Basle to Chiasso.

In the GCU, the keeper has the duties of the ECM even though this may be a separate organisation under contract to the keeper: -

7.2 The keeper must furnish proof to user RUs on request that the maintenance of his wagons is compliant with the legislation in force. For the purposes of this contract and vis-à-vis the other signatories, the keeper is considered to be, and have the responsibilities of, the entity in charge of maintenance for the wagon.

Therefore ECMs have no role in the GCU; the GCU is restricted to keepers and to railway undertakings acting as such.

Article 9 (Keepers right of deployment) is of interest when considering wagon maintenance as the implication is that calling wagons in for maintenance, i.e. taking them out of commercial use, is only allowed to keepers. The exception for safety reasons is not defined, but could be a regulatory body where are wagon has been involved in an unexplained incident, and the wagon is suspected as contributing to the incident. Whether an ECM could “play the safety card” is open to question.

9.2 Except when justified for reasons of safety, only the keeper shall be authorised to issue instructions to RUs regarding the use of his wagons.

Article 12 (Handling of Wagons) confirms the ERA view in their Final Report on ECM Certification, concerning wagon inspections when preparing trains, (Maintenance Level 1), being the duty of RUs, not ECMs and takes this further in placing the costs of doing so on the RUs: -

Each RU shall handle wagons with care and due diligence and shall carry out the inspections laid down in Appendix 9. Similarly, it shall carry out in particular all the safety-related inspections needed on wagons, irrespective of their keeper. The costs relating to these routine inspections shall not be separately invoiced to the keeper.

Article 15 (Information to the supplied to the keeper) also confirms the ERA draft



regulation for ECM Certification (Article 5, para 2) on the requirement for all parties to exchange information relevant to maintenance. However, the GCU would seem to expect all such information to be exchanged between keeper and RU, and excludes ECMs from the process, whereas the draft regulation specifically allows ECMs to request information from RUs, and if such requests are made, the RU is obliged to supply the information.

“15.1 The user RU shall provide the keeper with all the information necessary for operation and maintenance of the wagons.

15.2 The RUs shall provide the keepers of the wagons they use with information from their operating and data recording systems on the kilometric performance actually carried out by the wagons.”

It is clear that with over 640 signatories to the GCU, and 90% of the European wagon fleet covered as of April 2010, (equal to over 700,000 wagons in total), that such information exchanges would benefit from IT support.

Article 18 (Ascertainment of damage), Para 18.5 mandates immediate advice from RU to keeper when an incident occurs to a wagon. The existing HERMES Incident-en-route message is designed for this event, but is not currently sent to keepers. Its obvious availability to meet this requirement is very clear, as little or no development would be needed.

18.5 When a wagon sustains damage or loss of a part and is unable to run or be used as a result, the RU shall also inform the keeper immediately, providing the following information as a minimum:

- ▶ *the wagon number*
- ▶ *the status of the wagon (loaded or empty)*
- ▶ *the date and place it was withdrawn from service*
- ▶ *reason for withdrawal from service*
- ▶ *details of the department to contact*
- ▶ *probable duration of wagon unavailability (up to 6 working days; more than 6 working days).*

Article 19 (Handling of Damage), concerns to repairs. Certain repairs, traditionally called “in-traffic repairs” may be carried out by the RU without keeper involvement unless they exceed €750. Para 19.5 places a duty on the RU to inform the keeper of the work carried out

Appendix 9 (Conditions for the technical transfer inspection of wagons), contains Clause 4 Quality Management System (QMS), in which an inspection regime is defined to guarantee quality at wagon interchanges, (level of defects etc). In para 4.8 Analysis of results, wagon irregularities are analysed and a measurement called Cumulative Defect Value is calculated. Paragraph 4.8.3 mandates that the results are sent at monthly intervals to the RU carrying out inspections at interchange points. The medium for exchanging information is not mandated, but the following text suggests electronic means is preferred: -

“The information described in Annexes 6 and 7 can be exchanged in a variety of ways and by electronic means in particular.”



Appendix 10 (Corrective and Preventative maintenance). This is of interest as it describes the principle of preventative maintenance: -

“When overhauls are carried out, the keeper must ensure that wagons are restored to a condition making them fit for normal service, in terms of load safety and conservation, until the next scheduled overhaul.

This overhaul must form an integral part of a time-based or performance-based maintenance system.”

In Section 1 Overhaul Periodicity, time-based and performance-based maintenance is briefly described and reference is made to UIC Leaflet 579-1 which explains both systems in more detail.

1.1 In a time-based maintenance system, overhauls are carried out after a set period defined in UIC Leaflet 579-1. With this system, the period between overhauls corresponds to the validity period indicated on the maintenance plate. The maximum validity period on the maintenance plate must not exceed the value indicated in point 1.3.

1.2 In a performance-based maintenance system, overhauls are carried out when the wagon reaches a performance limit expressed in tonne-kilometres and defined in UIC Leaflet 579-1.

The validity period on the maintenance plate must not exceed the value indicated in point 1.3.

Clause 1.2 refers to the maintenance plate on the wagon side, so even if wagon maintenance is based on tonne-kms, the maintenance plate for such wagons must still contain a value calculated as per paragraph 1.3. Therefore a “first-hit” principle is applied in that the maintenance plate will contain a date when the wagon must undergo maintenance, or when a defined tonne-kms value (held by the keeper), is reached. This tonnes-kms value is not painted onto the maintenance plate. In practice, keepers assess the rate of use and convert the tonne-km figure to a period of time.

5.1.7 Requirements in the CIM Uniform Rules (Appendix B to COTIF 1999)

The CIM (Uniform Rules Concerning the Contract of International Carriage of Goods by Rail), is Appendix B to the Convention.

Article 6 Contact of Carriage, para 9 permits the consignment note to be established electronically as electronic data that can be transformed into written and legible symbols: -

The consignment note and its duplicate may be established in the form of electronic data registration which can be transformed into legible written symbols. The procedure used for the registration and treatment of data must be equivalent from the functional point of view, particularly so far as concerns the evidential value of the consignment note represented by those data.

Evidential value is described in Article 12 stating that: -

The consignment note shall be prima facie evidence of the conclusion and the conditions of the contract of carriage and the taking over of the goods by the carrier.

The conclusion to be drawn from this is that any electronic process that creates an electronic consignment note (CIM) must reflect the process for registration and treatment of data as carried out for hard-copy, (paper) consignment notes. Proposals are being made to break away from this subservient approach and



establish electronic consignment as the default presumption.

5.1.8 Requirements in the CUV Uniform Rules (Appendix D to COTIF 1999)

The CUV (Uniform Rules concerning Contracts of Use of Vehicles in International Rail Traffic) is Appendix D to the Convention, and thus statute law in all the states of the EU with railways. It sets the framework for contracts of use and thus for the GCU.

Article 3 Para 1, defines the minimum information to be provided on the wagon side, with Para 2 permitting electronic means of “completing” the information. The assumption is that the information may be made available electronically in addition to the physical lettering on the wagon side, but the exact technology is not stated.

“The signs and inscriptions provided for in § 1 may be completed by means of electronic identification”.

As might be expected, the CUV has the character of statute law, whereas the GCU provides much more detail on the duties and other obligations of the parties to wagon use.

Requirements in the ATMF of the COTIF 1999

The ATMF (Uniform Rules concerning the Technical Admission of Railway Material used in International Traffic) is Appendix G to the Convention. The processes laid down in the ATMF conflict with those of the EU and EU Member States have therefore made reservations against it. The ATMF has therefore not been considered in the study.

5.1.9 Conclusions- findings of the analysis of the legal text.

The following are the main needs for information exchange

- ▶ Electronic network statements
- ▶ Harmonised train composition
- ▶ TAF TSI:
 - central reference files locations and companies
 - rolling stock operational databases RSRD
 - wagon and intermodal databases WIMO
 - interfaces between RU IM as shown in ref 5.3
- ▶ TAP TSI:
 - Interfaces between RU and IM as defined in TAF TSI
 - Common interfaces for timetable, fares, reservations, ticketing, PRM and further ones to be defined under the Full Service Model.
- ▶ Register of Infrastructure
- ▶ Register of rolling stock National Vehicle Registers
- ▶ European Register of Authorised Vehicle Types
- ▶ ECM with ‘to be defined’ specific interchanges

5.1.10 Overview of market needs

This section deals with market needs for real time data exchange. It needs to be clarified firstly that the market for data exchange is all-embracing; the word “market” does not limit it to the exchange of commercial data. In this way



stakeholders require to exchange all types of data. Section 7.2.1 (below) explains these requirements in detail. This section provides an overview and summary and puts the requirements into context. These market requirements are assumed to be over and above those required by law.

Between the industry and its customers there is a clear requirement firstly to have an effective shop window with details of the services offered. This requires the railway community to exchange details of services and equipment they provide for “through” traffic. Since the majority of freight traffic is negotiated, this need not provide a “buy now” option. This requirement to provide an effective shop window is largely neglected. An execution service is however required for customers to consign freight (and buy tickets). This requirement is only met in limited cases. Customers need to be advised of the progress of the goods in real time, again only fulfilled in part. Certain international groupings (such as RAILDATA and Orfeus) do allow a more comprehensive service but at the expense of not exchanging data with non-members.

Within the industry itself, liberalisation has created more interfaces. In addition to the interfaces between infrastructure and operations, some railway undertakings have hived-off activities such as wagon management or maintenance activities. Interfaces which were previously virtual or internal have therefore become real and external. Interfaces within the industry are required to provide accurate, prompt and complete data for operations purposes (the characteristics of trains, for example), to provide data to allow receipts to be collected and shared and to support various technical functions such as the maintenance of vehicles.

5.2 Analysis of the Registers

The following are the key registers called for within the legislation.

The requirements include the information to be stored in these registers in some detail, but due to their length, the data tables specified in the relevant legislation for each register/database have been omitted

5.2.1 National Vehicle Registers (NVR)

5.2.1.1 Legislation

Article 33 of Directive 2008/57/EC calls for each Member State to keep a register of the vehicles authorised in their territory – these registers to be known as the National Vehicle Register (NVR). Commission Decision 2011/107/EU amends original Commission Decision 2007/756/EC and describes the common specification for NVRs

5.2.1.2 Purpose/overview

The purpose of the NVR is to record details of all vehicles authorised for placing into service in the particular Member State, all NVRs then being able to be interrogated via the VVR.

5.2.1.3 Access

The NVRs of Member States are registers with access rights defined in Dir. 2008/57/EC Article 33 Paragraph 1 (c).

(c) it <the NVR>shall be accessible to the safety authorities and investigating bodies designated in Articles 16 and 21 of Directive 2004/49/EC; it shall also be made accessible, in response to any legitimate request, to the regulatory bodies designated in Article 30 of Directive 2001/14/EC, and to the Agency, the railway undertaking and the infrastructure managers, as well as those persons or organisations registering vehicles or identified in the register.

Access is defined as required by industry players as listed below.



Access required by	Access type
Registration Entity (RE)	Full Read/Write
National Safety Authority (NSA)	Full Read/Write
Railway Undertakings (RU)	Read Only
Other NSA	Read Only
European Rail Agency (ERA)	Read Only
Investigatory/regulatory Bodies (IB/RB)	Read Only
Infrastructure managers	Read Only
Owners	Read Only
Keepers	Read Only
Other/fleet managers	Read Only
Luxembourg Protocol users	Read Only*
Entities-i/c maintenance	Read only

Whilst no arrangements are in place for the Luxembourg Protocol, it would seem logical to presume a right of access since Luxembourg protocol data is on file.

5.2.1.4 Links/Interfaces

Link required to	Responsible organisation	Interface/comments
Virtual Vehicle Register	ERA	Central search engine
European Register of Authorised Types of Vehicles (ERATV)	ERA	ERATV reference (Type coding)
Rolling Stock Reference Database	Keeper	Indicates under specification within TAF TSI – but only generic TAF TSI message
Vehicle Keeper Mark Register (VKMR)	ERA/OTIF	Unclear as to what will link but presumably VKM
Railway Rolling Stock Registry “Luxembourg Protocol”	Registrar	Possible link on vehicle number and owner
OTIF registers*	OTIF	Unclear as to what link should be

- the OTIF register is currently not being taken forward to development

5.2.1.5 Observation

The NVR contains minimal data which is mostly of an administrative nature (other than the restriction information) and in its present format would not support operations/maintenance functions.



Note that not all EU Member States have post codes.

5.2.2 Virtual Vehicle Register (VVR)

5.2.2.1 Legislation

Commission Decision 2011/107/EU amends original Commission Decision 2007/756/EC and describes the common specification for NVRs and goes on to describe how NVR data will be accessible via a central Virtual Vehicle Register (VVR) owned/administered by ERA.

5.2.2.2 Purpose/Overview

The VVR is a simple central search engine used to poll all NVRs, and is not actually a register itself, despite the name.

5.2.2.3 Comments

Decision 2007/756/EC indicates that it should enable exchange of data between NVRs though the consultants' current understanding is that this is not possible.

The VVR has an expectation that all NVRs are available/connected 24/7 though that is unlikely as ensuring that outages are co-ordinated across all Member States is likely to prove difficult.

5.2.3 European Register of Authorised types of vehicle (ERATV)

5.2.3.1 Legislation

Article 34 of Directive 2008/57/EC calls for the ERA to keep a register of types of vehicles authorised by Member States for placing into service on the Community rail network.

The Commission legal act was adopted on ERATV in September 2011.

Recommendation ERA/REC/07-2010/INT²¹ indicates that ERA should use the draft specification for the ERATV to develop the software and carry out a pilot project.

²¹ <http://www.era.europa.eu/Document-Register/Pages/Recommendation-on-specification-of-ERATV.aspx>



5.2.3.2 Purpose/overview

The ERATV will include technical characteristics of the vehicle type with the purpose of:

- ▶ Simplifying the authorisation process where vehicles conform to an authorised type
- ▶ Facilitate cross acceptance
- ▶ Allow access to organisation running a railway related business
- ▶ To allow retrieval of technical characteristics
- ▶ To allow distinction between TSI and non TSI compliant vehicles
- ▶ To allow a comparison of compatibility by a comparison with the Register of Infrastructure data

Type authorisations will be entered by the NSA electronically via the web and ERA will/check publish the types

5.2.3.3 Access

The ERATV is a publicly accessible register

Access required by	Access type
NSA	Full Read/Write
ERA	Full Read/Write
RUs	Read Only
IMs	Read Only
Keepers	Read Only
Owners	Read Only
Manufacturers	Read Only
ECMs	Read Only
NoBos	Read Only
Designated Bodies	Read Only
National Investigatory Bodies	Read Only
Responsible entity	Read Only
EC	Read Only

5.2.3.4 Links/Interfaces

Link required to	Responsibility	Interface/Comments
NVR	RE	ERATV reference (Type)



Link required to	Responsibility	Interface/Comments
RINF/register of infrastructure	IMs	Indicates possible link in the future to all RINF/register of infrastructures – data should recorded in identical format
RSRD	Keeper	Indicates possible link in the future to all RSRD – could be dedicated link or ability to export type data from ERATV
National Technical rules	MS	List of national rules having been adopted

5.2.3.5 Observation

The comments here refer to the ERA recommendation and not on the actual final text adopted by the Commission.

The ERATV will not contain individual vehicle records. Additionally populating the database with existing types is optional, (and to do so would mean a large exercise to gather all the data). This means that for many years to come (the ERA have suggested this could be up to fifty years), a complete picture of vehicle type information will not be available via this register/database. In 2009 there were 653,000 wagons in use in the EU, suggesting several thousand individual type records for the existing vehicles. Furthermore, the coding structure of the ERATV which appears to allow only 9999 types of freight vehicle causes concern about how fine the types will be.

The recommendation of the ERA in relation to existing types is contained in Recital 10 of their Recommendation dated 20 December 2010

(10) For most of the existing vehicles it is not possible to establish a correspondence to a type of vehicle that is authorised according to Article 26 of the Railway Interoperability Directive and therefore registered in ERATV. Possibility of including the technical characteristics of all the vehicles in service in one single database might, however, be beneficial for the railway sector. Therefore, this possibility and its implications should be evaluated.

Experience of previous evaluations and the need for extensive industry consultation suggests that any timeframe for adding existing types is likely to be an extended one, probably taking at least 2-3 years before a decision is reached, then, assuming the decision is taken to add them, a period of gathering and adding the type information, again, likely to take several years.

For these reasons the ERATV in its current form will not support operations or maintenance functions in the near and mid-term.

5.2.4 Register of Infrastructure

5.2.4.1 Legislation

Commission implementing decision 2011/633/EU of 15 September 2011 mandates Member States to publish and update a computerised Register of



Infrastructure describing the main features relating to the sub system in accordance to the common specifications developed by the ERA. The responsibility rests with Member States. Complementary common specifications for access are to be developed in parallel. Member States, with the help of the Agency, should cooperate to ensure that the registers are operational, contain all the data, are interconnected and provide a common interface to the users. The Agency will draft the specifications, governance and implementation plan for the common interface (web app) and interconnection of the registers not later than one year after it comes into force. Data for the Freight Corridors should be available in 3 years and infrastructure placed into service before 2008.57 in 5 years and private sidings 7 years after it comes into force.

5.2.4.2 Purpose/overview

Paragraph 2 states the purpose as to support the design of new rolling stock, to enable notified bodies to check the conformity with fixed installations and key for TSI to ascertain route compatibility for a planned train. Therefore the RINF/register of infrastructure must ensure compatibility between trains and routes and to describe the conformity of new/renewed/upgraded infrastructure. The ERA supplementary report of 31 March 2011²² recommends an interface with the ERATV.

5.2.4.3 Access

Requirements for access are not defined in CR INF TSI – the following table is the consultants’ expectation of the requirements

Access required by	Access type
IM	Full read/write
RUs	Read only
Other	Read only

5.2.4.4 Links/Interfaces

Link required to	Responsibility	Interface/Comments
ERATV	NSA/ERA	Indicates possible link in the future to all RINF/register of infrastructures – data should be recorded in identical format
<i>Infrastructure Restrictions database</i>	<i>IMs</i>	<i>This is an assumed requirement with a link via ‘unique Identifier for a line’ though this not present in RINF/register of infrastructure</i>

²² RAIL SYSTEM REGISTER OF INFRASTRUCTURE reference IU-RINF-101110-Rep 1.0 on the ERA website <http://www.era.europa.eu/Document-Register/Documents/IU-Recommendation%20on%20specification%20of%20RINF-Impact%20Assessment.pdf>



The ERATV ‘possible link’ is described in the ERATV final report

5.2.4.5 Comments

The ERA state unequivocally, in their Impact Assessment of the RINF/register of infrastructure²³ :-

“The primary purpose of RINF is to provide the information base in order to be able to check technical compatibility between fixed installations and rolling stock within the European community”

However, Recommendation 2011/217/EC is weak in describing the exact use/requirements of the RINF/register of infrastructures.

The ERATV specification indicates a possible link in the future though no details are provided. The alignment of data between ERATV and RINF/register of infrastructure is essential to enable comparisons to be made to establish vehicle-infrastructure compatibility.

No indication is given about any link between the RINF/register of infrastructure and Infrastructure Restrictions database – logically it would seem there should be a link or alternatively inclusion of the requirements of the Infra Restrictions within RINF/register of infrastructure itself.

The data schema for all Member States to use when establishing a RINF/register of infrastructure has now been published in ERA Recommendation ERA/REC/04-2011/INT dated 31st March 2011.

5.2.5 Infrastructure Restrictions Notice database (IRNdb)

5.2.5.1 Legislation

Commission Regulation 62/2006 TAF TSI indicates IMs are responsible for the suitability of a path on his infrastructure and the RU is obliged to check train characteristics against characteristics given in the path details.

5.2.5.2 Purpose/overview

The RU must know before preparing a train of any restrictions on the line.

To fulfil this function the IM should maintain an Infrastructure Restriction Notice database and the RU must take into account all restrictions up until the pre-departure period (typically 1 hour prior scheduled departure time)

5.2.5.3 Access

Requirements for access are not defined in the TAF TSI – the following table is assumed requirements

Access required by	Access type
IM	Full read/write
RUs	Read only
Other	Read only

5.2.5.4 Links/Interfaces

²³ IMPACT ASSESSMENT REGISTER OF INFRASTRUCTURE reference EE-1A-RINF-V10 Version 1 dated 31 March 2011 on the ERA website: <http://www.era.europa.eu/Document-Register/Pages/Recommendation-on-specification-of-RINF.aspx>



Link required to	Responsibility	Interface/Comments
<i>Register of Infrastructure</i>	<i>IMs</i>	<i>This is an assumed requirement with a link via 'unique Identifier for a line' though this not present in RINF/register of infrastructure</i>

5.2.5.5 Observations

No interfaces or messages are defined relating to the Infrastructure Restrictions database. This represents a logical gap.

It would make logical sense to combine the Restrictions database with the RINF/register of infrastructure

5.2.6 Notified National Technical Rules

5.2.6.1 Legislation

Article 27 of Directive 2008/57/EC requires the ERA to draw up a recommendation for a reference document to cross reference all national rules applied by Member States for placing vehicles in service. This reference document to be adopted by the Commission

5.2.6.2 Purpose/overview

To facilitate the procedure for authorising the placing in service of vehicles described in Article 25 of 2008/57/EC.

5.2.7 Entities in Charge of Maintenance

5.2.7.1 Legislation

Commission Regulation 445/2011 describes the requirement for a system of certification of Entity in Charge of Maintenance (ECMs).

The regulation further indicates the need for RUs to assure themselves vehicles have a certified ECM before departure of the vehicle

5.2.7.2 Purpose/overview

The above regulation describes the purpose of the certification system as

'to provide a framework for the harmonisation of requirements and methods to assess the ability of entities in charges of maintenance across the Union.'

and

'to provide evidence that an entity in charge of maintenance has established its maintenance system and can meet requirements laid down in this Regulation to ensure the safe state of running of any freight wagon for which it is in charge of maintenance.'

An ECM certificate is valid for 5 years and is valid throughout the Union and should be issued by accredited bodies. The ERA needs to collect information on the nature of certification bodies and the numbers of certificates issued to ECMs.



A period of transition allowing existing practices to be used is in place to allow time for the full certification system to be achieved. Some Member States have signed up to an MoU (May 2009) as to how ECMs will be certified during this period of transition and certificates are being loaded to the ERA website.

Other organisations are 'self declaring' their status as ECMs

From 31/05/2012 certificates should be issued by accredited certification bodies though certificates issued prior to that date as per the MoU or national laws will be recognised for their original validity period.

Also any ECMs registered in NVRs will be required to be certified by 31 May 2013 though self declarations will be allowed

5.2.7.3 Comments

The Regulation describes the certification requirement well but makes no indication of a register, simply indicating that ERA needs to collect information on the nature of certification bodies and the numbers of certificates issued to ECMs. This would seem to be a register in all but name.

Whilst the ERA have published certification to date it is the consultants belief that this should be formalised into a proper register/database to facilitate the ease of assurance to RUs that vehicles have certified ECMs.

Also it is suggested that the ECM value should be included in the keeper databases (RSRD) such that an RU can extract the data at point of operation – certainly in Great Britain the freight community feel that the data should be available in the operational databases not just the NVR.

5.2.8 Vehicle Keeper Marking

5.2.8.1 Legislation

The Traffic Operation and Management TSI (2010/640/EU) at Annex P1 describes the requirement for vehicles to have a Vehicle Keeper Marking (VKM).

5.2.8.2 Purpose/overview

VKMs are a 2 to 5 digit alpha code and are applied for via the national authority and issued by the ERA. The ERA maintains a VKM register²⁴ which is publicly available on the ERA website and updated on real time basis. The VKM is additionally recorded in the NVR.

5.2.9 Driver Licensing

5.2.9.1 Legislation

Driver License Directive 2007/59/EC²⁵ Article 22 requires that the competent authority (NSA) keeps a national register of Driver licenses and supporting certification.

Articles 11/20/23/25 further require the competent authority to keep registers of accredited psychologist/medical doctors, examiners and training centres

²⁴ <http://www.era.europa.eu/Core-Activities/Interoperability/Pages/VehicleKeeperMarking.aspx>

²⁵ Directive 2007/59/EC of the European Parliament and of the Council of 23 October 2007 on the certification of train drivers operating locomotives and trains on the railway system in the Community; OJEC L 315, 3.12.2007, p. 51–78



5.2.9.2 Comments

Other than indicating that drivers will have access to such registers via their national number and indicating that Railway undertakings and Infrastructure managers shall co-operate in the sharing of such information, the Directive is quite weak in describing access requirements.

It is the consultants understanding that ERA have run a working party to discuss data and interfacing/protocol around these registers.

5.2.10 Register of documents on Interoperability

5.2.10.1 Legislation

Article 19 of Regulation 881/2004 requires the ERA to keep a register/public list of the following documents:

- ▶ EC declarations of verification of subsystems
- ▶ EC declarations of conformity of constituents
- ▶ Authorisations for putting into service
- ▶ Registers of infrastructure and rolling stock

5.2.10.2 Comments

ERA is administering these requirements through its ERADIS database although the consultants have not fully analysed the extent or the success of the register.

5.2.11 Conclusions

The following registers are defined in the legislation

- ▶ National Vehicle Register with interfaces to VVR ERATV RSRDs VKMR OTIF
- ▶ Virtual Vehicle Register with interface with NVRs
- ▶ ERATV with interfaces to NVRs RINF/register of infrastructures National Technical Rules
- ▶ RINF/register of infrastructures (per MS) with interfaces to ERATV IRNDB
- ▶ IRNDBs with interfaces to RINF/register of infrastructure
- ▶ NNTR with no interfaces
- ▶ ECM with no interfaces defined
- ▶ VKM with no interfaces defined
- ▶ Driver Licensing with no interfaces defined

5.3 TAF TSI Identified data exchanges

Having determined the requirements from study of the legislation and international conventions, this section of the report considers the data to be exchanged and the messages implied by those requirements.

The structure of the industry and the mandates contained in the legislation, and in the conventions such as COTIF imply the exchange of information between a wide variety of parties. In order to provide some clarity to these exchanges of information, (thirty-five have been identified), the consultants have taken the requirement and identified the parties to each exchange, and its nature, and consolidated them onto a global picture, (or diagram).

5.3.1 Data exchanges diagram

The consultants have prepared two diagrams, showing the data flows and the



entities sending and receiving data, the first is the as-is situation based on the legislative and conventions requirements, the second (see later in the report) shows the proposals of the consultants for handling the data exchanges and entities within the scope of the study, These are, of necessity, fairly large diagrams, and reduced pictures are shown below, but the files are also made available separately for viewing in the relevant application, (MS Visio).

Data exchanges included in the second diagram which are included in the proposals are highlighted in yellow. A table is included to explain each numbered flow and the nature of the recommendation and proposed solution, (if any).

Readers of this report may consider the diagram to be complex, and indeed this is the case, but all the data flows are as defined in the legislative portfolio built up over the last twenty-odd years. Most of these data exchanges are defined as obligatory in the legislation.

5.3.1.1 The “As-is Diagram”

This shows the data flows both obligatory and optional as specified in the various directives and conventions, plus the IT entities that have been mandated in the TSIs that mandate use of IT and telematics. There are, in fact, only two TSIs with such mandates, the TAF and TAP TSIs, the others only place an obligation on players to exchange data, but do not mandate the means of making the exchange.

With TAF TSII the existing Common Interface has been inserted to show those entities expected to use it, however the consultant’s proposals do not envisage use of this interface being obligatory

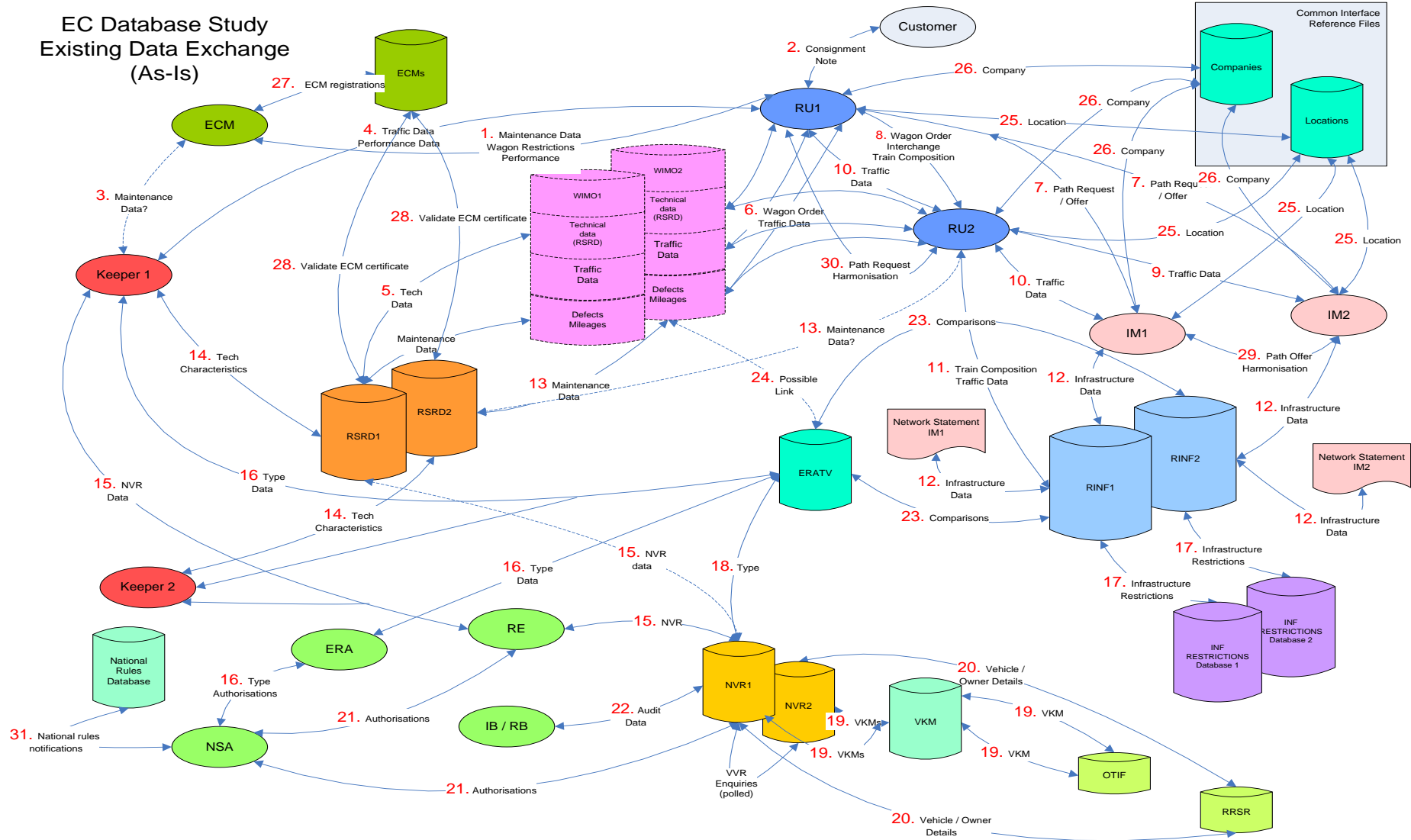


In the diagram, the various databases are shown using the traditional “cylinder”, whilst organisations are shown as coloured ovals. Organisations are colour-distinguished as are the databases.

Stakeholders	Colour
Railway undertaking	- dark blue
Infrastructure manager	- pink
Keeper	- red
ECM	- dark green
Governmental & regulatory	- light green



EC Database Study Existing Data Exchange (As-Is)





5.3.2 Data exchanges table

This table lists and describes the data to be exchanged and the parties involved, the message defined for the exchange,

No	Description	TAF TSI (or other) Message/interface
1	Maintenance Data/Wagon restrictions/Performance As described in the rolling stock – freight wagons TSI, the RU will require maintenance/restriction data to assure themselves of the vehicles fitness to run. Additionally the RU should provide performance data back to ECM/keeper to allow for future maintenance planning 2006/861/EC – Section 4.2.8.1.2	None suitable
2	Consignment note The customer and lead RU will exchange the consignment note detailing information to support complete transportation 62/2006/EC – Section 4.2.1	None LRU completes and processes the CN and enters the relevant data into his system
3	Maintenance data It is anticipated that keepers will require data about maintenance carried out to ensure contracts with ECMs are being fulfilled correctly 445/2011 (ECM Regulation) Article 5/Annex 1	None defined
4	Traffic data/Performance data It is anticipated that RUs should provide data about traffic and vehicle performance back to keepers to support future maintenance planning 445/2011 (ECM Regulation) Article 5/Annex 1	None defined
5	Technical data Technical data is required by the WIMO to support operations 62/2006/EC – Section 4.2.12.2 / Annex A/ Index 2	Definition may need amendment WagonTechData -
6	Wagon order/Traffic data WIMO will require reports of train movements 62/2006/EC – Section 4.2.12.2 / Annex A/ Index 2	Definitions of the following may need amendment TrainRunningForecast TrainRunningInformation TrainRunningInterruption



No	Description	TAF TSI (or other) Message/interface
7	Path requests Message sent from RU to each IM involved requesting train path 62/2006/EC – Section 4.2.2 Annex A/Index 1	Defined in TAF TSI as PathRequest
8	Wagon order/Interchange/Train composition RUs must exchange data at Interchange 62/2006/EC – Section 4.2.2/4.2.3 Annex A/Index 1	Definition of the following may need amendment WagonOrderORU WagonInterchangeNotice TrainComposition
9/ 10	Traffic data Train running information is required to be exchanged between RU and IM 62/2006/EC – Section 4.2.3/4.2.4/4.2.5/4.2.6 Annex A/Index 1	Definitions of the following need amendment TrainRunningForecast TrainRunningInformation TrainRunningInterruption
11	Train composition/Traffic data The RU must check that the infrastructure is compatible with the train/vehicles Annex 1 to Recommendation ERA/REC/04-2011/INT (2.5)	Direct access to RINF/register of infrastructures / IRNDB
12	Infrastructure data IMs must maintain infrastructure data in their RINF/register of infrastructures 2008/578/EC Article 35, 2011/217/EC	Direct access to RINF/register of infrastructures
13	Maintenance data RU to supply maintenance data to RSRD (for keeper/ECM) Not specified but assumed requirement	Direct access to RSRD
14	Technical characteristics Keeper to maintain technical characteristics in RSRD 62/2006/EC – Section 4.2.11.3 / Annex A/Index 2	Direct access to RSRD
15	NVR data NVR data must be supplied by keeper to Registration entity/NVR. RE to enter data to NVR 2008/57/EC Article 33, 2011/107/EU (3.2.3)	Keeper manual (email/fax) advice to RE and then direct access to NVR



No	Description	TAF TSI (or other) Message/interface
16	<p>Type data</p> <p>NSA will submit Type data to ERATV electronically via web. ERA will check/publish data, keepers will enquire on data</p> <p>2008/57/EC Article 34, ERA/REC/07-2010/INT</p>	<p>Direct submission/enquiry via web</p>
17	<p>Infrastructure restrictions</p> <p>Infrastructure restrictions database required by TAF TSI. Data will need to be exchanged with RINF/register of infrastructure to enable RUs to access. More logically the restriction data should be held in the RINF/register of infrastructure</p> <p>62/2006/EC - Section 4.2.11.2 / Annex A / Index 2</p>	<p>Interface to RINF/register of infrastructure</p> <p>or</p> <p>RU accesses Infrastructure RINF/register of infrastructure</p>
18	<p>Type</p> <p>NVR/ERATV interface via type reference</p> <p>2011/107/EU (2.1)</p>	<p>Assumed to be a direct interface</p>
19	<p>VKMs</p> <p>NVR interfaces with OTIF database presumably with VKM</p> <p>2011/107/EU (2.1)</p>	<p>Assumed to be a direct interface</p>
20	<p>Vehicle Owner Details</p> <p>NVR interfaces with RRSR – presumably with Vehicle Number/Owner details</p> <p>2011/107/EU (2.1)</p>	<p>Direct interface presumably</p>
21	<p>Authorisations</p> <p>NSA authorises vehicles for placing into service. Could be either direct access or via RE</p> <p>2011/107/EU (4.2)</p>	<p>Direct access to NVR</p>
22	<p>Audit data</p> <p>Investigatory/regulatory bodies enquires on NVR for audit purposes</p> <p>2011/107/EU (3.3)</p>	<p>Direct access to NVR</p>
23	<p>Comparisons</p> <p>ERATV report indicates possible links to RINF/register of infrastructure in the future to allow comparisons between types/infrastructure</p> <p>ERA/REC/07-2010/INT (10 - Interfaces of ERATV)</p>	<p>None suitable/nothing defined</p>



No	Description	TAF TSI (or other) Message/interface
24	ERATV/RSRD ERATV report indicates possible links to allow export/import of type technical data ERA/REC/07-2010/INT (10 - Interfaces of ERATV)	None suitable/nothing defined
25	Location data TAF TSI requires central reference files to be held detailing company/location data to be accessible by RUs/IMs etc – note awaiting European harmonised standard 62/2006/EC – Section 4.2.11.1	None suitable/nothing defined
26	Company data TAF TSI requires central reference files to be held detailing company/location data to be accessible by RUs/IMs etc – note awaiting European harmonised standard 62/2006/EC – Section 4.2.11.1	None suitable/nothing defined
27	ECM registration All vehicle keepers must declare the ECM for their rolling stock to the NVR ensuring that the ECM is certificated 2007/107/EU	Not defined
28	Validate ECM certification Each RU/IM shall ensure freight wagons before departure have a certificated ECM 445/2011 (ECM Regulation) Article 5	Not defined
29	Path offer harmonisation Harmonisation of path for multi-IM paths. IMs agree handover times and locations	Not defined
30	Path request harmonisation Harmonisation of request for a multi-RU path. RUs involved in the train agree interchange points and times.	Not defined
31	National rules notification Member States advise the database administrator of national rules and updates to the rules	Not defined



No	Description	TAF TSI (or other) Message/interface
32	Index updates RUs to advise index of the RU holding the wagon currently Keepers advise index of changes to keeper and ECM information.	Not defined
33	Notify temporary infrastructure restrictions IMs update their IRNdb with infrastructure restriction changes	Not defined
34	Access temporary infrastructure restrictions RUs and others enquire on infrastructure restrictions in the IRNdb	Not defined
35	HERMES Interchange (H30) RUs require train data to be exchanged at interchange	Existing HERMES interchange message

5.4 IT Systems in operations or under development

This section of the report considers the degree to which systems already existing or being developed fulfil regulatory requirements.

Whilst the systems under development by groups such as RailNetEurope are well known, indeed fully described on their web-sites; individual systems in use by industry stakeholders such as railway undertakings tend to remain unknown because they are internal or their use is limited to a small number of third parties. There was a particular problem in that some railway undertakings in particular, were unwilling to release details of their systems. Therefore the list below is incomplete.

Acronym	Country	Description	Notes
Applause	NL	Operations management	Raillion system from 2006 to replace BRAVO
ARMEN	FR	Temporary speed restriction technical data	
ASTER/ROMAN	FR	Train timetabling and pathing system	
BRAVO	NL	Operations management	Developed in Sweden – see Applause above
BREHAT	FR	GUI front-end to GALITE for train operations data	
CARGOWEB	BE	Traffic monitoring system	
CEVIS	CZ	Train and wagon movement data	



Acronym	Country	Description	Notes
CIS	BE	Consignment Train Operations and accountancy system	
Corazon	CH	Traffic management	New system used by BLS Cargo
Datastream	All	Fleet maintenance & repair management system	COTS product now part of Infor EAM offering
DISCO	FR	Timetabling system	Linked to THOR
DOC explore	FR	Customer interface for operating documentation	
DONNA	NL	Train running system	
ECHO	BE	Wagon database	Run by B Cargo's wagon subsidiary
e-Freight	HG	Vehicle operations management system	Note that this is not the same as the multi-modal e-Freight system
E-LV	FR	Commercial and Consignment note system	Used by SNCF Fret
ENEE	All	European location codes database	Database of European location codes managed by the UIC
FLASH	FR	Infrastructure information for RUs	
GALITE	FR	Train operations and management system	Includes customer version for viewing train movements
GEOGIS	GB	Infrastructure database	legacy
GESICO	FR	Customer interface to DISCO and THOR	
INFRA-ATLAS	NL	Infrastructure register	
IRON	BE	Loco and train crew allocation system	



Acronym	Country	Description	Notes
IRIS	RO	Integrated railway information system	System composed of a number of subsystems covering all aspects of railway management and operations. Not used by non-CFR SA companies. The main subsystems are: - Atlas – train planning/timetabling Cronos – train tracking and management Argus – freight operations RSA – rolling stock maintenance (previously called “Spear”)
ISP/SAP SD	SZ	Commercial and Consignment note system, plus train operations management system	
ISOR RVD	CZ	Train tracking and reporting system	Provided by OLTIS Group as COTS product
ISR	FR	Vehicle operations management system	Combined with RAILDATA
ISR	All	International Service Reliability (Freight wagon tracking system)	Under development by RAILDATA Provides wagon tracking information to members
ITC	PL	Rail vehicles register	
ITPS	GB	Train timetabling and pathing system	New replacement for the TSDB legacy system Implemented 2010
KANGO Kmen	CZ, SZ	Infrastructure database	
KAPELLA	HG	Infrastructure database	
KAPELLA VPE	HG	Train pathing system	
KNV	CZ	Wagon database	
MAMA	AT	Train timetabling and pathing system	
MARGOT	FR	Wagon technical data	
Maximo	GB	Fleet maintenance & repair management system	
NAW	FR	Wagon operational data	



Acronym	Country	Description	Notes
ORFEUS	All	Consignment note information system	Developed by RAILDATA Used for transmission of CIM Note and CUV Note information to the parties involved in the transport
OVGS	NL	Train Composition data	
PCS (Formerly Pathfinder)	All	Path Coordination System	Developed by RailNetEurope System for planning international train paths for contributing IMs and RUs
PdP	IT	Production management	Used by Trenitalia
PIC	IT	Train tracking and reporting system	
PICO	IT	Sales and reservation system	Used by Trenitalia
PIL	IT	Intermodal traffic management	Used by FS Logistica
POS	PL	Infrastructure database	
PULWINFO	--	Containers database	
RAVERS	GB	Rail vehicles register	Legacy
RESEAU	FR	Infrastructure management	
RSMS	IT	Fleet maintenance & repair management system	
RSRD ²	All	Rolling Stock Reference database 2	Rolling stock reference database being developed by UIP for use by its members and any other non-UIP members that are also keepers, such as RUs
SAP PM	SZ	SAP plant maintenance	Component of SAP for plant management. Can be used for vehicle fleets
SEPE	PL	Train monitoring	
SIR	IT	Rail vehicles register and vehicle operations management system	
SIM	IT	Commercial and Consignment note system	



Acronym	Country	Description	Notes
THOR	FR	Timetabling system	Linked to DISCO
TIS (formerly EUROPTIRAILS)	All	Train Information Systems (Train tracking and information supply system)	Developed by RailNetEurope, a consortium of IMs. Information is made available to members, both IMs and RUs.
TOPS	GB	Vehicle operations management system	Legacy system over 40 years old
TROTS	NL	Train monitoring and tracking	
TRUST	GB	Train tracking and reporting system	Also contains train delay attribution component
Use-IT	All	Intermodal unit tracking system	Developed by RAILDATA
VOS	NL	Traffic management	To replace VLK
VUZTECH	CZ	“Foreign” wagon database	
X-Rail	All	Freight wagon tracking system	Under development by X-Rail, a grouping of freight railway undertakings

It is clear that most stakeholders have IT systems to support their main business activities, so, for instance, IMs have systems to support train timetabling and pathing, and railway undertakings have systems to support train and vehicle operations including resource management. In addition industry systems comply with the (very modest) demands made by COTIF legislation. (COTIF essentially presumes paper based systems and simply says if there are electronic processes, then they have to be “functionally equivalent”). It might be observed that COTIF is currently being criticised for not presuming electronic approaches to be the standard ones. The detailed list of compliances was discussed in the interviews and these have been provided to the Commission.

Several systems are in use or under development by industry groupings for use on a shared basis by members. These include such systems as ORFEUS; these systems are, in general, fully described in 5.2 below.

Existing real-time data exchange is centred on the HERMES suite of applications. HERMES applications satisfy many of the basic requirements for the exchange of operations and commercial information. Details of the degree to which requirements are met are shown in a structured way in section 7.2.1.

As an overview, it should be noted however that existing HERMES applications are essentially concerned with real time operations. There are very few applications for “planning” or “authorisation” activities. Furthermore the HERMES applications have a major disadvantage in that they were initially designed for data exchange between integrated railways. They will therefore require revision to meet the requirement for data exchange between the various actors in a single state. These revisions include such simple issues as addressing the message but also more complex issues such as entitlement to data. The consultants believe that nevertheless this is much better than starting to develop applications anew.



5.4.1 Overview of systems technical, financial and governance compliance

It is convenient to consider technical compliance in terms of technical aspects, completeness, accuracy and punctuality.

In technical terms, all these systems have been designed to comply with international rail standards set by the UIC and OSJD (field sizes, coding and conventions on such issues as how to calculate brake force). Standards set by European Norms and in the TSIs largely adopt UIC and OSJD standards. To that extent, systems are all compliant.

In terms of completeness, the existing systems have been designed to comply with international rail standards set by the UIC and OSJD. The UIC and OSJD specifications (under the control of the railway community) tend to be minimalist in terms of mandatory data but define (field size and coding, etc) for a large number of data items for those stakeholders who are able to provide the data. The data requirements in terms of the number of items imposed by the TSI are more demanding (particularly in areas such as path applications, where historically there has been no requirement). Existing systems therefore in general fail to meet the requirements for completeness.

Existing systems leave something to be desired in providing accurate data. Certain fields (such as vehicle number) can always be relied on; others such as destination are more problematic. There are a number of reasons for that, principally each railway undertaking concentrates on collecting what it finds important, destination in another state (for example) may not be one of those. This problem is exacerbated by low standards for validation. The consultants make suggestions for ways to avoid these problems.

Messages have no value if they are not sent on time. Existing data exchange by and large satisfies needs.

No explicit criteria for financial compliance are set down in EU legislation but there are very clearly implicit criteria. Amongst these are that the costs should be supportable and that they should be fairly distributed. The existing message exchange has all been financed by the railway community on the basis of its own appraisal of the investment case. Accordingly it meets the criteria postulated.

Governance of the existing data exchange is informal. It would best be described as cooperative. User groups mostly under the aegis of RAILDATA define the applications but have little control over how they are implemented. The representative groups are only open to UIC members, so whilst it might be argued that credible players will all be members of the UIC, the structure is biased towards incumbents.

5.4.2 Description of Relevant Systems and Projects to the Study

Train Information System (TIS)

This system formerly went under the name EUROPTIRAILS, and is a development by RailNetEurope, (RNE), a grouping of infrastructure managers formed in 2004. The application is partly funded by the European Union. The four main functional groups are:

- ▶ Real-time Information on train running and associated events
- ▶ Data exchange- data is supplied to the member IMs and RU customers
- ▶ Reporting functions
- ▶ European Performance Regime)



TIS supports international train management by delivering real-time train data concerning international passenger and freight trains. TIS therefore allows the complete train running data of an international train to be obtained, regardless of European borders. The relevant train data is supplied directly from the individual infrastructure manager systems via HERMES using the messages contained within UIC Leaflet 407-1. The RNE website page below gives more information.

http://www.rne.eu/index.php/tis_operations.html

Path Co-ordination System (PCS)

This system was formerly called Pathfinder, and was developed by RailNetEurope to support the RNE One Stop Shop (OSS) for international path requests over the routes of the IMs in the RNE group.

PCS is a web-based application provided to IMs, Allocation Bodies (ABs) and railway undertakings and others concerned with train pathing. The system handles the communication and co-ordination processes between the IMs involved in individual path requests and path offers. In addition, it assists railway undertakings and other applicants in their pre-co-ordination tasks related to train path studies and international train path requests. In short, the PCS tool reflects RNE's OSS (One Stop Shop) philosophy of providing support to business processes and daily activities. The main features are:-

- ▶ Documentation of the co-ordination process
- ▶ Train composition data for passenger and freight trains
- ▶ Messaging system
- ▶ "In house" workflow
- ▶ Data import in XML
- ▶ Data export in PDF, XML, HTML
- ▶ Definition of stop points based on UIC ENEE database
- ▶ Multilingual - 16 languages available currently
- ▶ Connection interface for domestic systems available
- ▶ XML-based data exchange possible (PCS Integration Platform)

Path Coordination System (PCS) is being used for approximately 95% of all international path requests in the passenger business. The RNE web page below gives more details of the application.

<http://www.rne.eu/index.php/pcs.html>

International Service Reliability (ISR)

ISR is a system developed by RAILDATA, a UIC grouping of European railway undertakings engaged in freight transport.

ISR is used by European cargo railway undertakings for concentration and exchange of information about movements of wagonload freight in international traffic through a central platform. The data collected by the system makes it possible to track both loaded and empty freight wagons and consignments across a significant part of Europe.

In addition to information about the actual status and position of the wagons, it also permits authorised users to obtain wagon status history or freight traffic flows. Recently a new function to provide estimated time of arrival (ETA) at destination had been made available. The ETAs are, based on statistics of past movements between the origin and destination.



ISR information can be used for many purposes, but the most important are:

- ▶ Provision of customer information
- ▶ Wagon fleet management.

At the present time, the following RUs are users of ISR: -

CD Cargo (CDC, Czech Republic) CFL Cargo (CFL, Luxembourg) DB Schenker Rail Deutschland (Germany) DB Schenker Rail Nederland (Netherlands) Green Cargo (GC, Sweden) Rail Cargo Austria (RCA, Austria) Rail Cargo Hungary (RCH, Hungary) RENFE (Spain) - report planned border crossing only SBB Cargo (Swiss) Slovenske železnice (SZ, Slovenia) SNCB Logistics (SNCB, Belgium) SNCF Fret (SNCF, France) Trenitalia (FS, Italy) ZSSK Cargo (Slovakia)

The RAILDATA webpage gives more detail of the system

<http://www.rAILDATA.coop/About.htm>

ORFEUS

This system exchanges information on the railway CIM notes and also CUV wagon notes, between the railway undertakings participating in ORFEUS. The participating railway undertakings are required to collect and store CIM and CUV data electronically on their own applications, and to then pass it to other participants. The aim of the system is to remove the need for paper consignment notes and wagon notes to be passed with wagons to their destinations. The system uses the HERMES VPN for messaging. The system has had a long gestation, being commenced as the DOCIMEL system in 1985.

The following railway companies currently use the system:

CFL (Luxembourg), Green Cargo (Sweden), Rail Cargo Austria (Austria), DB Schenker Rail Deutschland (Germany), DB Schenker Rail Scandinavia (Denmark) and Nederland, RENFE (Spain), SBB Cargo (Switzerland), SNCB Logistics (Belgium), SNCF Fret (France), Trenitalia Cargo (Italy)

The RAILDATA webpage gives more information

www.raildata.coop/orfeus.htm

Use-IT

Use-IT, (European Systems for European Intermodal Tracking and Tracing) is, as its name suggests, concerned with intermodal traffic. The system is designed to make it possible for customers to trace trains (international combined transport unit trains) in real-time over the internet via a Use-IT web page, or by entry into their own IT tracking systems which are receiving information from Use-IT.

The system consists of three modules

Interfaces to RU systems for receipt of movement information on intermodal services

Interfaces to customer systems for transmission of data on their intermodal unit movements

Web-pages for customer enquiries (customers without their own system)

The following railway companies are members:

BLS (Swiss), CFL (Luxembourg), CP (Portugal), DB Schenker Rail, GySEV,(Hungary), HZ Holding (Croatia), MAV (Hungary), OKP (Poland), Rail Cargo (Austria), RENFE (Spain), SBB Cargo (Switzerland), SNCB Logistics (Belgium), SNCF Fret (France),



Trenitalia Cargo (Italy) ZSR (Slovenia),
The Use-IT webpage gives more information
www.rail-useit.eu/spip.php?article1

RSRD²

RSRD² (Rolling Stock Reference Database²) is a shared system for holding the technical and technically-related information of railway freight rolling stock, and is under development by the UIP. Under the TAF TSI, keepers of rolling stock are required to operate and manage rolling stock reference databases, and to make this information available to others. The new system enables those keepers without a database to use RSRD² on a shared basis. Each user is charged according to a published charging formula. Any railway undertakings that are also keepers may join the group and store information on their vehicles.

Data held for rolling stock is divided into three classes: -

1. Administrative

Wagon number(s)

Owner, keeper, ECM, fleet manager information

Safety certification information (ECM)

Authorisation data (TEN, RIV, GCU, EC verification)

2. Technical

Wagon type

Manufacturer, year of build

Type of components: brake, coupling, buffer

Wagon gauge, weight, speed etc.

3. Maintenance

Maintenance cycles (time period, km)

Special examination (date and description)

Overhaul information (date, tolerance, executer)

ENEE

ENEE is the European Railway Location Database. It draws on information contained in the FGE (General file of locations) and other existing documents (DIUM, LIF stations, etc.). It is intended to be used by existing or future applications in the passenger, freight and infrastructure sectors operating at an international level.

ENEE is UIC Application 70, the codes within ENEE being defined in UIC Leaflet 920-2

X-Rail

At the present time, this is a system intended to be developed by the X-Rail group of RUs. The system is for the support of international wagonload traffic. The intention is that a central X-Rail platform receives train planning and details of actual events from the RUs, which is then processed and aggregated then made available to those same RUs in the form of:-



- ▶ International transport plans
- ▶ Estimated time of latest arrival (ELTA)
- ▶ Delay alerts based on status information from wagon flow
- ▶ KPIs including transit reliability figures

The X-Rail group currently consists of:

CD Cargo, CFR Cargo, DB Schenker, Green Cargo, Rail Cargo Austria, and SBB Cargo.

E-RailFreight

E-RailFreight is essentially about exchanging data from the CIM consignment note (similar proposals are being made for the SMGS consignment note). On many railways domestic traffic is already paperless. The trade associations have defined the principles in terms of the data to be exchanged, the format and the rights over the data without defining how the data is to be processed by each railway undertaking. Well founded studies suggest that there are substantial direct savings and that the removal of paper would free-up other options. There remain substantial problems, not least from moving accompanying documentation.

In March 2008, about twenty railway undertakings committed themselves to implement the technical specifications for moving traffic without paper documentation by July 2009. A project team reporting to a steering committee has been created. The steering committee is composed of representatives from the **CIT** and the **CER** Customs working group) and from the UIC. RAILDATA has been asked to work on the technical specifications, including a message structure the data catalogue and the message flow.

Because the electronic system is required to be functionally equivalent to the paper based consignment note, the project team has been facing challenges. One option, which the project team adopted, was to build a version with a central system to allow a close cooperation with the RAILDATA members within ORFEUS.

The central project team delivered a complete version of the technical specifications in March 2009. At the same time RAILDATA succeeded in creating an electronic consignment note message.

The e-Rail freight project reached an important milestone in November 2011. DB SCHENKER Rail and FRET SNCF will start running bilateral paperless traffic as a regular procedure, with the option of print-outs as a fallback only if absolutely necessary.

The electronic consignment note (ECN) was implemented between France and Germany in 2010, when Fret SNCF began to use the ECN in the same way as DB SCHENKER was already doing.

Green Cargo is currently developing and implementing the ECN, and other partners (Trenitalia, Rail Cargo Austria, etc.) are ready to take the first steps.

In 2012 the project will go further, with strong support from RAILDATA and CIT in Bern, using a subset of ECN for combined traffic operators and an electric version of the CIM/SMGS consignment note for shipments to Asia. Paperless transport by rail from Bordeaux to Beijing will perhaps then be possible.



The study is recommending the TAF TSI 'wagon order' is changed to match the ECN elements. The eRailfreight project will provide the essential definitions needed.

The Raildata ECN can form an intermediate stage for the enhanced wagon messages.

InteGRail

InteGRail was a project delivered under EU research call FP6. It delivered specifications for a system platform which could integrate data from disparate sources and types in the European railway industry to provide new functionality relevant to the current structure of the industry.

"The InteGRail project aims to create a holistic, coherent information system, integrating the major railway sub-systems, in order to achieve higher levels of performance of the railway system in terms of capacity, average speed and punctuality, safety and the optimised usage of resources.

Building on results achieved by previous projects, InteGRail will propose new intelligent procedures and will contribute to the definition of new standards, in accord with EC directives and TSI's"

In order to fulfil its objectives, InteGRail aimed at delivering:

A. Proposals for Standard(s) for data and information models for Railway Operation,

Rolling Stock, Infrastructure and Traffic Management

B. Architecture and information sharing platform for the railway domain, capable of:

1. Provision of information adapted to the needs of the user;
2. Efficiently using of state of the art Information and Communication Technologies (ICT);
3. Communication framework compatible with the innovation of communication technologies or solutions and following the stable migration directions in this field;
4. Example functions or information systems that use the architecture concept (IGRIS), the communication framework (ICOM) and the standardised information model (Railway Domain Ontology, RDO);
5. Demonstration Service to support On-line decision making;
6. Demonstration Service to support Strategic and Tactic decision making.

It was also stated that InteGRail would not replace existing systems, but used in conjunction with them. This implies the development of a system, but at the present time, no system is under development.

The project commenced on 1st January 2005, and closed at the end of 2010.

InteGRail produced two types of results:

- ▶ a *Reference Technology Platform*, as an open railway specification, to become a standard
- ▶ a number of *Application Prototypes* in different railway areas where there is a potential for improvement



The Reference Technology Platform is the core of InteGRail solution and the basis for all InteGRail applications. It is a middleware providing a common interface between applications and the existing network infrastructure. It includes two main layers:

- ▶ the application-to-application layer, which defines how to properly represent, retrieve, process and finally understand information;
- ▶ the high-level communication layers (Intelligent Communication framework – ICOM), which are responsible for transferring information, moving it from an application to another, wherever they are located and independently from the available infrastructure.

The components of the Reference Technology Platform were:

- ▶ Information System Architecture
- ▶ Railway Domain Ontology
- ▶ Distributed Reasoning
- ▶ ICOM – Intelligent Communication Framework
- ▶ The Key Performance Indicator assessment framework

The application prototypes were:

- ▶ The Network Statement Checker
- ▶ The Infrastructure Availability Checker
- ▶ The Event Analyser
- ▶ The Wheel Trend Analyser
- ▶ The Track Trend Analyser
- ▶ The Symptom Agent
- ▶ The Predictive Maintenance Server
- ▶ The Intelligent Depot Tool
- ▶ The Operational Decision Support System
- ▶ The Traffic Re-Scheduler

The elements which are of most relevance to the study are the railway domain ontology (RDO) and the ICOM framework. This is because most of the tools are not directly relevant to the TSI functions although intelligent rail systems will be a key technology to drive further efficiencies.

The study report, in its recommendations, proposed that the future data elements be reconsidered against the RDO to ensure that there is a consistent meaning for all the TSI data elements.

The ICOM framework is quite similar to the Common Interface and could inform the next generation of the CI.

The prototypes are specifically relevant to either IM or RU with the exception of the rail/wheel intelligent application which can be used in the future to provide IM to RU condition data to be used for maintenance and repair planning.



ERTMS

The **European Rail Traffic Management System** (ERTMS) is an initiative backed by the [European Union](#) to enhance cross-border interoperability and [signaling](#) procurement by creating a single Europe-wide standard for train control and command systems.

The two main components of ERTMS are the [European Train Control System](#) (ETCS), a standard for in-cab train control, and [GSM-R](#), the GSM mobile communications standard for railway operations.^[1] The equipment can further be subdivided between on-board and infrastructure equipment.

- ▶ GSM-R based on the GSM standard, but using different frequencies belonging to the railways, along with certain advanced functions. This refers to the radio system used to exchange information (voice and data) between trackside and on-board.
- ▶ The ETCS (European Train Control System). A train-based computer, the Eurocab, compares the speed of the train as transmitted from the track with the maximum permitted speed and slows down the train automatically if the latter is exceeded.

The ETCS therefore forms an integral part, as it were, of the ERTMS. A third “layer” relating to traffic management proper is currently still in the demonstration phase on a North-South corridor of the trans-European network (Rotterdam - Milan) within the framework of the Europtirail pilot project.

The European Commission adopted an ERTMS deployment plan on July 22, 2009 setting out legally-binding deadlines for the implementation of ETCS and GSM-R on key corridors. Coming into force on September 1, it amends the Technical Specifications for Interoperability for Control-Command and Signalling (TSI CCS) and is intended to co-ordinate deployment at a European level and provide railways and manufacturers with the confidence to invest in the technology.

Around 9 000 route-km in six freight corridors must be equipped with ETCS by 2015. The remaining 5 500 km of the corridors must be completed by 2020, along with 10 000 km of links to ports and freight hubs. However, national plans are being put in place going beyond these obligations, and the Commission believes around 40 000 route-km will be equipped by 2020.

There are currently more than 20 national signalling systems in use within the European Union. The Commission sees this as 'a rift in the single market and an obstacle to free movement', but was concerned that in the absence of co-ordinated European plan each state might wait for its neighbours to take the first step. As a result, ETCS now becomes mandatory for EU-funded projects which include new or upgraded CCS, and GSM-R is required when radio communications are upgraded.

The relationship to the work of the study concerns the objectives of ERTMS and the relationship with GSM-R.

1. ERTMS is not only the generic term for the combination of GSM-R and ETCS but also the title for the planned European Rail Traffic Management System. The system has not yet been developed – the RNE TIS system is an early example project delivering train running and related information which are now part of TAP and TAF TSIs. The critical element still to be achieved is the data relationships between ERTMS and the ETCS block control systems implementations known as RBC's. The critical factors are:



- a. The content of the train plan including path details and sufficient data in the train header to ensure that the plan and actual can be managed by the RBC. The coding used must be identical and the specifications which are part of ETCS are not sufficiently precise at this point. ERA should ensure that specification 3.0.0 meets this objective
 - b. The train composition details in TAF and TAP TSI are sufficient to advise the RBC of the locomotive and control system present sufficient to ensure cross validation between the train and its power system. This will entail cross validation between the train number, locomotive number, train control system id and the locomotive subset id.
 - c. There is a vitally important requirement for a feedback message from the train position information to the signaling which is interpreted and passed back to the IM in a way that provides as much information as possible to assist with traffic management. The following elements are recommended
 - i. The train identification (which must also match the GSM-R train number see 2. below)
 - ii. The train position as accurately as possible using the same references as RINF/register of infrastructure (GPS data may also be available in the future)
 - iii. The time in date, hour, minutes and seconds
 - iv. The speed in km/h
 - v. Any signaling information which is relevant for example yellow aspect or slow speed
2. The GSM-R is also of vital importance. It is used to communicate to and from the train.
- a. The GSM-R id is up to 8 numeric and must be identical to the operational id part of the TTID
 - b. The GSM-R specification has messages which are relevant to the study in that it includes coding structures for trains (the TRN – 8 numeric made up of 5 + 3 where 5 matches UIC 419) and for locomotive and coach numbers.

This coding must be compatible with that used ioperationally by both the IM and RU as it is used for direct communication. This affects the implementation of TTID and the Train Composition messages

SESAR

The SESAR project aims to modernise Air Traffic Management (ATM) in Europe and is divided into three phases:

- a. 'Definition phase' started in 2005 and led by the European Organisation for Safety of Air Navigation (Eurocontrol), with co-financing from the European Union (EU) budget through the Trans-European Network — Transport programme. The outcome is the European ATM Master Plan, which defines the content, the development and deployment plans of the next generation of ATM systems.



- b. 'Development phase' (2008-2013) managed by the SESAR Joint Undertaking (2) and leading to the production of new technological systems, components and operational procedures as defined in the European ATM Master Plan.
- c. 'Deployment phase' (2014-2020) to be led by industry and stakeholders, for the large-scale production and implementation of the new air traffic management infrastructure.

The SESAR Joint Undertaking (SESAR JU) was set up in February 2007 (1), located in Brussels, in order to manage the activities of the SESAR (Single European Sky Air Traffic Management Research) project.

The Joint Undertaking is designed as a public-private partnership. The founding members are the European Union represented by the European Commission, and Eurocontrol represented by its Agency. Following a call for expressions of interest, 15 public and private enterprises from the air navigation industry are members of the Joint Undertaking. These include air navigation service providers, ground and aerospace manufacturing industry, aircraft manufacturers, airport authorities and airborne equipment manufacturers.

The key lesson from the SESAR project is the funding of the development and deployment.

The budget for the development phase of the SESAR project is 2.1 billion euro, to be provided in equal parts by the EU, by Eurocontrol and by the participating public and private partners. The EU contribution is funded from the Seventh Research Framework Programme and the Trans-European Networks — Transport programme. Around 90 % of the funding from Eurocontrol and the other stakeholders is in the form of in-kind contributions.

The key challenges for SESAR deployment can be summarised as:

1. Synchronous implementation of technologies, systems and standards across stakeholders and countries;
2. High estimated cost of investments and a gap between the initial capital outlay and the realisation of benefits; and
3. Negative cost-benefit assessment for some stakeholders.

Deployment of SESAR required a new approach to address the initial high capital outlay (offset for some stakeholders by delayed benefits), negative or uncertain cost benefit profiles, synchronisation challenges and equal access for all airspace users to the network. The potential for considerable lobbying by certain stakeholders that were unwilling or unable to make the necessary investments poses a risk to a 'business-as-usual' approach. The key issue being that some key stakeholders do not equip on time, jeopardising the successful realisation of the expected net benefits.

SESAR was included in the review of related projects due to its proven ability to create a PPP (Public Private Partnership) structured to fund development and implementation.

There are some close parallels with TSI IT in that synchronous implementation of systems and standards is highly desirable and the cost benefit assessments vary considerably.



The JU structure provides some guidance to set up the Governance for the running of TAP and TAF TSI, the common components and the central files proposed.

5.4.3 HERMES applications

Below is a list of the full set of Hermes applications. Not all of these are in active use – some have been replaced by Raildata services and some are yet to be implemented or the files are exchanged by e-mail.

PASSENGER APPLICATIONS

01 ELECTRONIC SEAT RESERVATION

General objective:

The present messages deal with seat, sleeper, couchette and motorrail reservations. The enhanced version includes availability.

References:

Leaflet UIC 918-1 Electronic reservation of seats/berths and electronic production of travel documents - exchange of messages

02 EPA SEAT RESERVATION

General objective:

This application has similar objective as application 01, but all the places are hosted in DB reservations system KURS and this application is used to connect remote terminals at EPA partner railways with their international train inventories on the EPA system.

13 INTERNATIONAL PASSENGER TRAFFIC ACCOUNTING

General objective:

Exchange of international monthly accounts.

References:

Leaflet UIC 301-1 - Accountancy regulations for international passenger traffic.

14 ELECTRONIC SEAT RESERVATIONS ACCOUNTS + COMBINED SERVICES ACCOUNTS (travel + reservation)

General objective:

Statement of account, electronic seat reservation and statement of account, combined performances (tickets + reservations).

References:

Leaflet UIC 301-2 - Accountancy regulations applicable to international Reservations traffic.

INFRASTRUCTURE APPLICATIONS

20-0 EUROPTIRAILS

General objective:

Europtirails (now TIS) is a central application, operated by RNE (Rail Net Europe),



consisting of central server in Vienna and Working Stations at each member IM. It supports international rail traffic management, mainly reduce delays on international corridors and enhance IM services for RUs. TIS monitors international trains from origin to destination. Train status information is reported using messages based on UIC 407-1 leaflet. TIS will use a comprehensive set of infrastructure sub-applications 20.1 - 20.8.

20-1 TRAIN RUNNING FORECAST

General objective:

This message is sent from one infrastructure manager to the next infrastructure manager upon departure from or movement past agreed reporting points or prior to reaching the first reporting point if, owing to a delay, the train has reached the bilaterally agreed initial running time.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

20-2 RUNNING ADVICE

General objective:

This message is issued upon:

- ▶ arrival, departure or run-through in agreed reporting points and/or
- ▶ attainment of the agreed initial running time and/or
- ▶ a new divergence between nominal and actual being achieved in excess of the agreed threshold value.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

20-3 FAILURE OF TRAIN

General objective:

This message is issued when a train fails.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

20-4 TRAIN COMPOSITION

General objective:

This message is issued upon departure or run-through in the advance consist message station or upon departure in a subsequent station if train formation or traction type have been changed.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.



20-5 ADDITIONAL DELAY CITING REASON

General objective:

This message is issued to make known the reason for an additional delay in a train's journey.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

20-6 INTERRUPTION OF RUNNING

General objective:

This message is issued when a lengthy unscheduled interruption of running occurs an end to which cannot as yet be foreseen.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

20-7 MONITORING MESSAGE

General objective:

This message is transmitted if a train has not reached or left an agreed reporting point once a specified time has elapsed (scheduled timing adjusted to account for current relative position plus number of minutes to be determined).

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

20-8 CHANGE OF TRAIN SERVICE NUMBER

General objective:

This message is issued if the agreed train service number is deviated from for operational reasons.

References:

Leaflet UIC 407-1 - Standardised data exchange for the execution of train operations, including international punctuality analysis.

FREIGHT APPLICATIONS

30-1 INTERNATIONAL FREIGHT TRAIN CONSIST PREADVICE

General objective

For each train (or group of wagons), crossing a frontier of two adjacent Hermes countries, a train consist preadvice message is sent from the transferor railway to the transferee railway. The message is sent at the moment when the train leaves the last station where it changes its consist, before it crosses the frontier; it can be the frontier station itself. The current version of the application is 1. It has migrated to version 2 in XML.

Functionality

The functionality is split up into two levels:



- ▶ Simple preadvice informs the transferee railway about the consist of the train and about the expected date and time of the frontier crossing.
- ▶ Combined preadvice has the function as the simple preadvice but contains the date and time of the real frontier crossing to the transferee railway.

Interfaces: preadvice messages can serve other applications such as RIV Exchange, ICF wagons monitoring or ISR.

References

- ▶ Leaflet UIC 404-2: Compendium of wagonload consignment data exchange between railways in international traffic
- ▶ Leaflet UIC 475: Rules for the capture, control and transmission of data on the exchange of freight wagons in international traffic
- ▶ Leaflet UIC 912: Library of standard messages for international exchanges of information

30-2 RIV EXCHANGE

General objective

This application is used for exchange of RIV-wagons between two railways, in order to minimise the administrative work and speed up wagon forwarding. The RIV exchange complements the Train preadvice application 30-1. The transferee railway confirms to the transferor railway, that it took over the wagons (at given date and time) and now is responsible for its RIV rental. Remark: RIV = Regolamento Internazionale Veicoli, rules for use and exchange of railway owned freight wagons.

References

See the references for application 30-1.

31 ISR WAGON STATUS REPORTING

General objective

ISR is an initiative of the European cargo railway undertakings for concentration and exchange information about movements of freight wagons (both loaded and empty) in international traffic through a common central platform.

Registered wagon events are:

- ▶ Shipment order (CIM consignment note)
- ▶ Departure from shipping station
- ▶ Arrival to intermediate station (typically marshalling yard)
- ▶ Departure from intermediate station
- ▶ Border crossing (planned)
- ▶ Border crossing (real)
- ▶ Arrival to destination station

38-1 FRONTIER CROSSING

General objective



The purpose of the "frontier crossing" application is to inform the destination railway, the departure railway and the registering railway for a P-wagon that a consignment has crossed the frontier. The railways of the countries on both sides of the frontier are not informed

When wagons cross a particular railway's frontier, this railway receives the preadvice message for which provision has been made by the GRM.

Frontier Crossing messages are complementary to the Consist message.

38-2 WAGON SEARCH

General objective

The purpose of this application is to enable a wagon to be located by means of its number.

Wagon search facilities already exist on a national scale for domestic traffic.

- ▶ the railway making an inquiry sends a quest message to the railway on whose lines the wagon should normally be located (the frontier crossing message helps to identify this railway);
- ▶ the railway receiving the inquiry processes the wagon data on its own system to locate the wagon and sends a reply giving the data available in its system in the form of a standard UIC message designed to cope with all eventualities.

References:

MRC Chapter 3, Memento du groupe de Réalisation Commerciale

38-3 INCIDENTS DURING TRANSIT

General objective

The main purpose of the "Incidents during Traffic" application is to inform the consignor, consignee and the owner of the P-wagon owner, via the railways concerned, that a wagon is stopped, so that they can take the necessary measures to offset the effect of such stoppages:

- ▶ on their commercial and industrial activities (consignor or consignee);
- ▶ on the vehicle fleet.

39-1 GOETHE

General objective

The purpose of this application is to collect information about the utilisation of wagons on foreign networks. It concerns information such as: distances covered, mass transported, number and nature of consignments and maximum speed of sections or zones covered.

References

- ▶ Leaflet UIC 404-3: Regulations concerning the provision of data to registration railways concerning wagons utilisation on foreign networks.
- ▶ Leaflet UIC 912: Library of standard messages for international exchanges of information



40-1 ORFEUS

General objective

ORFEUS = Open Railway Freight EDI User System. The purpose is to exchange consignment or wagon note information for international full-load and intermodal railway transport, where at least two ORFEUS railways are involved. Consignment note (CIM) or wagon note (CUV) data should be sent by the forwarding railway for each transport to all involved railways. The system is making use of message CTD (last version is in XML syntax).

References

- ▶ ORFEUS Global Specifications CDS / NIS
- ▶ ORFEUS CDS Functional specifications
- ▶ ORFEUS Message Guidelines
- ▶ ORFEUS Data Dictionary
- ▶ Raildata web: www.raildata.coop

40-3 BILATERAL CONSIGNMENT DATA EXCHANGE

General objective

The purpose of this application is to hand over data of the consignment note CIM (for loaded wagons) and/or of the wagon data CUV (for empty wagons) to the neighbouring railway undertaking on the route of the wagon. This application uses XML message "Frachtbriefe" defined by RCA.

References:

Frachtbriefe xsd files versions 3.22, 4.13 and 5.00

41 ADVICE OF DESPATCH

General objective

The purpose of the "Advice of Despatch" function is to inform the destination railway and the registering railway of P-wagons about any international or domestic shipment that concerns them. They may in turn and at their discretion pass on this information to the consignee concerned or the registered owner of the P-wagon

42 ADVICE OF ARRIVAL

General objective

The purpose of the "Advice of Arrival" application is to inform the departure railway and the registering railway of P-wagons about any international or domestic shipment that concerns them has been made available to the consignee. They may in turn and at their discretion pass on this information to the consignor concerned or the registered owner of the P-wagon. This application is also called Arrival Notice.

43 USE IT

General objective



This application was designed by the UIC Combined Transport Group (CTG) for monitoring of international container (intermodal) trains. Its aim is to provide information to the intermodal customers and involved railway undertakings through central web site (located at the Raildata site). Each railway undertaking, which actually runs a related train, sends position / status message about the train to Use-IT central server. Users may enter the train data and then consult actual position of the train or its transport history on the central web.

70 ENEE

General objective

The purpose of this application is to normalise the data of and provide the railways with up-to-date information concerning locations, railway stations and frontier points. All the information is maintained by the UIC in the new central ENEE database according to UIC Leaflet 920-2.

References

- ▶ Leaflet UIC 920-2: Standard numerical coding of locations
- ▶ Leaflet UIC 912: Library of standard messages for international exchanges of information

5.5 Feedback from stakeholders

5.5.1 General

When arranging the interviews, stakeholders were promised confidentiality as one of the conditions. Accordingly this section of the report simply summarises the points made.

Interviews were held with 8 IMs 10 RUs 2 NSAs 4 Industry representative bodies and 2 national regulators.

Interviews took place before and after the Interim Report and 5 with RUs and IMs took place at the end of the study after the workshop to present the findings and recommendations.

No stakeholder said his system complied 100% with the relevant TSIs. Instead stakeholders pointed to a substantial measure of compliance and to developments that would increase the level of compliance.

A number of stakeholders pointed out that the relationships within the industry are complex and that data exchange is therefore also complex. Some stakeholders pointed out the need to ensure that any solutions took the needs of small and medium enterprises into account.

All the interviews carried out after the workshop supported strongly the recommendations but with some changes in emphasis and contents of the phasing of implementation.

It was felt that each phase of implementation should begin with pilot proof of concept to convince the players that the interchange is a proven one. The proposed



functional based phasing was supported except for RINF/register of infrastructure when a geographical implementation alongside a functional one is logical.

5.5.2 Cross industry comments

Most stakeholders were guarded in their remarks on potential benefits. Most saw benefits arising from consistency and compatibility. No stakeholder was able to identify a development which would allow him to make substantial and defined savings.

Stakeholders insisted that whilst it was acceptable to legislate on the principles of any system, stakeholders should be free to find their own means of satisfying them. Particular proprietary databases should not be mandated, for example.

A number of stakeholders pointed out that a problem with the existing regulations was that there were no effective sanctions. Implementation timescales therefore tended towards the infinite.

Particular care was taken to explore the responsibilities of railway undertakings and infrastructure managers on hand-over and interchange to understand the role of each of the messages.

There was general support from all stakeholders for more standardisation, of definitions and terminology in particular but also for handover and interchange processes, processes for assessing the suitability of trains and operating processes in general.

One stakeholder pointed to a number of different ways of cutting over a project – cut over of a full system on a limited number of routes, a cut-down system more generally, just freight applications, etc. It considered that it was important to manage expectations so that each stage of the cut-over process was successful and so that there were early benefits. It was clear in addition that the phasing programme must have the buy-in of all the Member States and the stakeholders if cut-over was to be properly coordinated.

One stakeholder suggested that systems should be financed by infrastructure managers in the short term to get them up and running and the cost subsequently recover through infrastructure use charges.

Data sources were discussed with most stakeholders; many stakeholders saw the files that are required to be maintained by the states (NVR, etc.) or centrally (ERATV, etc.) to be the most sensible sources.

Various stakeholders pointed out problems of detail that would require resolution:

A small number of stakeholders reminded the consultants that solutions should also take account of countries outside the EU.

Interviews with one of the Eastern European countries showed a reliance on the Ministry requiring compliance and providing the finance to implement the legislation. The consultants formed the view that European legislation was not fully understood everywhere and that in consequence action that needed to be taken was not in hand everywhere.

5.5.3 Infrastructure managers

An infrastructure manager pointed out that the location system would need to be able to hold details of coaches remaining in a specific platform or a wagon detached for technical reasons;

Infrastructure managers pointed out that there were generally two sets of files and



coding structures for infrastructure; one arising from the operations part of their business to allow timing and pathing, the other arising from asset maintenance. Building bridges between these sets of data (for example, for assessing vehicle suitability) would be difficult;

An infrastructure manager pointed out the difficulty of running many systems, keeping data accurate, etc. It was important not to be too ambitious. This had a particular relevance to systems justified as a result of a specific event (an accident, for example), such applications tended to be disregarded during the passage of time.

Most infrastructure managers who were interviewed had sophisticated operations systems broadly compatible with TSIs however the infrastructure databases were less sophisticated and considerable investments will be needed to be compatible with the full needs of RINF/register of infrastructure.

An infrastructure manager thought it was important that there is a business case for all the investments. Systems must also be simple and clear. The costs need to be justified.

All agreed that common processes and interfaces are needed for border handover between IMs as each has its own procedure at the moment.

Many infrastructure managers have begun to support electronic bid offers for paths.

There is as yet no consensus on the precise requirements for receiving and 'validating' train composition data.

5.5.4 Railway undertakings

A railway undertaking suggested that the interchange message should have the capacity to hold electronic documents to cover exceptional loads (the consultants note that this could be extended to cover other accompanying documents, import/export, plant and animal health, etc.);

One railway undertaking thought that standard rules for confidentiality were essential.

A railway undertaking thought that there was a need for the meaning of "short-term" to be aligned and that there should be a common method of path allocation in both cases.

All the railway undertakings interviewed supported the ongoing requirement for interchange messages as currently exchanged and see it as obviating the need for a separate train composition message.

All the railway undertakings interviewed saw a need to modify the Wagon Order message to be similar to the eCN message used by Orfeus project and the eRailfreight project.

Keepers and entities in charge of maintenance should both be included in the TSI framework

5.5.5 Vehicle keepers

Vehicle keepers pointed out that they needed information to allow them to deploy their fleet properly. They were sensitive however to railway undertakings having technical details of the vehicles.

Vehicle keepers pointed out their complex relationships with railway undertakings and entities charged with maintenance, it was important not to misunderstand or muddy that relationship;



Vehicle keepers pointed out a need for expiry of certificates to be covered;

5.5.6 Regulatory bodies

Regulatory bodies pointed out that whilst there was an obligation on the states to ensure databases were set up there was no obligation on the state to run it;

Regulatory bodies insisted on clarity of specification of duties and responsibilities and saw merit in making those with relevant responsibilities also becoming responsible for data supply.

One national safety authority thought that being given the responsibility to ensure there was an infrastructure file implied that the safety authority should run it. Whilst the incumbent railways had rolling stock databases, it was clear that creating national databases for rolling stock was still some way away.

5.5.7 Proposals for a different approach to implementing TAF TSI

Two organisations proposed a different approach to implementing TAF TSI based on implementing a Service Oriented Architecture (SOA), for data exchange built around event driven message exchange and web services open standards.

Full consideration of this alternative approach was outside our remit, however it is recommended for future staged development of real shared services.

5.5.8 Interface with the Task Force

The consultants met the Task Force three times (9 & 24 February and 3 May 2011). On 9 February and 3 May, the consultants presented an update of the work so far and answered questions. On 24 February the CER made a presentation of the views of its members.

The points made by the task force included the following:

- ▶ how was safety-related data to be dealt with;
- ▶ options for collecting details of wagon performance;
- ▶ how to collect distance run by trains;
- ▶ where liability was to lie;
- ▶ how cost and benefit information was to be presented;

The CER made the following points:

- ▶ exclusion of the customer interface from the study;
- ▶ the study should be properly coordinated with other work in hand;
- ▶ the study should not call existing work on implementing the TAF TSI into question;

5.6 Return on experience (REX)

The study requirements required a report on REX (refers to the concept of building on existing experience).

In the questionnaire in part one of the study, the consultants asked all participants for details of their existing systems and the results of their experience in implementing them, the issues and the benefits.

The interim report contained a detailed analysis of the responses to the questions. Most of the respondents who did not cite commercial sensitivity in answering the



questions felt their systems were up to date and the issues of quality were down to their partners! There was also a tendency to declare that benefits were mainly realised by their partners rather than themselves. All declined to assess benefits in financial terms but that was not surprising to the consultants!

The detailed responses are described below

5.6.1 Infrastructure systems

Most of the respondents used an IT system of some sort, only one relying on commercial office products, MS Excel in that case. In one case an IM replied that more than a single system was used, with some data held by other organisations.

No organisation supported the full RINF/register of infrastructure data elements specification, and few had any firm plans to develop a RINF/register of infrastructure or modify existing systems to supply RINF/register of infrastructure data and functions although the legislation is being studied. This is not surprising as the legislation is only recently published.

Most organisations saw the benefits in RINF/register of infrastructure as cost reduction in assessing trains on the infrastructure, and in managing the network, but one respondent saw no benefits to themselves, only to others. One saw significant benefits to RUs to have precise information on the infrastructure capability.

Most of the systems were claimed as reasonably modern with the exception of one IM, where a number of legacy systems are still in use, but planned for replacement. One IM was commencing development of its system from June 2011. All respondents reported positive experiences from using their systems, but integration or technical compatibility with other systems was reported as a problem by four respondents. Differing data formats were also reported as a problem.

Two respondents had linked their systems to the internal infrastructure restriction notice.

Benefits reported varied, with easier path requests process for RUs (four), engineering benefits, (one), and operational benefits, (three), although one IM reported that benefits had only accrued to the RUs.

Two major railways use different coding for locations from their main RUs and the resolution of these differences will be expensive and take some time.

One IM supplier has recently linked his system also with the timetable and a GIS.

5.6.1.1 Infrastructure restrictions

Seven respondents claimed to have use or access to a system, with three maintaining their own system. Two IMs use a commercial product from OLTIS Group. Only one uses MS Excel. All respondents see cost reduction as the main driver for adding additional restrictions data, by making day-to-day network management easier. Some had only a restrictions database which is used to supply RUs with advisory information concerning the route.

Four respondents stated that the system data is integrated with their infrastructure register data, but apart from two, none had integrated IRN with their network statements.

Benefits reported include access charging, and ease of path requests for RUs. One IM reports the quicker advice of restrictions to RUs mean fewer access requests are refused.

Replies indicate that most systems only support temporary speed restrictions.



Most respondents believe their systems are up-to-date, although one has the data spread across several systems some of which are some years old. Virtually all respondents indicate that system changes will be needed to comply with the TAF TSI train related messages,

Most respondents indicate positive experiences with their system in relation to planning and running trains and validating compatibility with infrastructure, and five cite use by engineering functions. Negative experiences include difficulties integrating with other systems, (some cited as being over forty years old), and problems with data format incompatibility. This latter is a continuing theme in most of the IT systems surveyed.

5.6.2 Vehicle registers

Registers in this question covered a broad range, covering vehicle records held by RUs, and keepers, and NVRs. Most registers do not include all the vehicle information specified for inclusion in the ERATV, but compliance with the NVR dataset is better.

All respondents maintained structured electronic records of vehicles, with many respondents having several roles in relation to these records, (owner, keeper, hirer etc). None of the register systems is currently compatible with the TAF TSI and TAF TSI data structure, but most respondents have plans in place for compliance in accordance with the SEDP, (completion by 2014).

All bar one respondent considered their systems up-to-date, although one RU declined to respond citing competition reasons.

Most respondents were positive about their experiences with their systems, although some negative experiences were reported, such as data quality, obtaining data from RUs, and one reporting performance and reliability issues. There seemed to be a reluctance to change established practices and modify system interfaces where there were already long-standing systems in place.

Commercial benefits were seen in the ability to offer wagon information to potential customers, and being able to supply it to RUs and ECMs. Engineering benefits were seen in wagon maintenance planning and knowledge of defects and repairs. Operational benefits were reported in train preparation, links between engineering and operations staff related to temporary defects, and as a source of wagon data for service planning. The wagon keepers saw collection of distance-run as particularly useful.

Operational benefits were seen by the wagon keepers in validating wagon status, and as a basic source of wagon data for planning purposes such as knowing when inspections are due to a vehicle.

One respondent reported problems with data exchange citing lack of common data formats, and another reported problems with performance and reliability

5.6.3 Consignment note systems

Only RUs and intermodal operators are likely to have such systems, so the questionnaire was only sent to these organisation types. Eight organisations responded.

All of the respondents reported that they used a consignment note system, with one respondent, implying it, but not being specific. That railway undertaking correctly pointed out that such systems are not part of the TAF TSI, although the consultants note that the wagon order message contains a subset of the consignment note data.



All respondents reported that the data listed in TAF TSI Annex 3 and also in SEDP Deliverable 2 (Appendix F) was mostly available in their systems, with one RU also stating that they considered Annex 3 to be full of mistakes and inconsistencies, indicating some degree of dissatisfaction with the TAF TSI project. Dissatisfaction with TAF TSI in relation to consignment information was also expressed by another RU.

Apart from one large RU, which declined to respond on the detailed questions, the respondents reported their systems as up-to-date, and foresaw no problems with them providing data. Both reported positive experiences with the systems, but also some negative experiences. All the systems were used to support customer billing. One large RU, in particular, indicated much satisfaction with the benefits obtained from their system, and was emphatic that it was being structured as a state-of-the-art system. It indicated the following were all being delivered: -

- ▶ faster consignment process, more convenient for customers,
- ▶ more accurate data, fewer disputed charges,
- ▶ more accurate data, less need for amendment,
- ▶ simplified automated consignment tracking,
- ▶ quicker billing thus improving cash flow,
- ▶ re-collecting data for traffic received from other railway undertakings avoided,
- ▶ “follow-on” savings of staff in yards and terminals permitted.

One RU reported problems with data quality of partner paper documents when transcribing into their system.

5.6.4 Train path allocation

Only four IMs responded to the questionnaire section for pathing systems although interviews confirmed that most IMs have such systems.

Three IMs had their own system for pathing, (essentially train planning). Oddly, one respondent IM claimed that the data was recorded by RUs. Some use the Pathfinder system (now PCS), which is a joint system of RNE used by several IMs for international path co-ordination.

All respondents reported broad compatibility with the needs of TAF and TAP TSIs; although two pointed out that some TAF/TAP TSI enhancements were expected, following which they would enhance their systems if necessary. Two reported that some data elements listed in TAF TSI Annex 4 were missing, although the main elements were present in all cases. Two respondents expected to add missing elements within the TAF_TSI SEDP roll-out period the other two having no plans, so presumably waiting for the amendments.

Four supported the full TAF/TAP TSI ad-hoc pathing messages suite, the others only supporting one or two. Respondents with online path request systems report increased demand for short term paths as a result of making the system more easily available.

All respondents considered their system up-to-date, one IM having only recently introduced its new system. Three respondents saw no difficulties were seen in maintaining the messaging service, as all systems were 24x7;

All respondents reported positive experiences from using their systems, citing data quality, and data being used for operations planning for timetabling management with their customers, the RUs. Two cited validation of requests for paths as a



particular benefit

Negative experiences were reported with data quality, and difficulty in integrating the system with others either technical incompatibility, or differing data formats. One respondent reported that customers had access to the system, whilst two reported the system as being linked to their network statements, whilst the others were separate.

Problems with the systems continued a theme seen in other questionnaire sections, of data quality problems (accuracy, completeness, timeliness) (three respondents), and problems integrating with other systems, (three respondents), whilst one respondent advised of problems with data exchanges.

Commercial benefits were seen in easier and quicker turn-rounds of path requests, (three), use by customers to test new service patterns (one), and calculating access charges, (one)

Only one respondent reported engineering benefits, (source for planning engineering work).

5.6.5 Train operation management

All five respondents and five interviewees had a system for managing and recording train movements on their infrastructure, one in particular had been in use for decades.

Most of the systems held the majority of the data elements listed in the questionnaire, although train consist information was missing from one, and the RU identity from one system.

Most of the systems had train movement reports supplied from the signalling system, plus manual entry, whilst several also received GPS position reports to record train movements.

Only one system was able to supply train running, delay, and consist information complying with TAF & TAP TSIs although using proprietary functionality. The other systems supplied some data, or would be developed during the SEDP to do so.

No respondents anticipated any problems supporting TAF/TAP TSI messaging, with all systems operating, as one would expect, 24x7 to match the hours of operation of trains.

Only one respondent reported that his system was not up-to-date, pointing out that it was, in fact, over forty years old. This respondent did advise, however, that a major programme was underway to implement a new traffic management system, therefore the TAF and TAP TSI would be implemented on the new system, the old system would not be upgraded.

All respondents reported positive experiences of their systems, one pointing out that the system was essential to the operation of the railway industry in the Member State concerned. The others cited data quality, use by contract and billing management, and use by the operations function for train circulation management, validating delays, and advising customers of train performance.

Negative experiences were reported with integrating with other systems, problems with data supply and timeliness from RUs.

In terms of commercial benefits, one respondent reported that the system was essential to the operation of the railway industry in the Member State. Others reported a variety of benefits in terms of RUs ability to monitor their own services,



easier network traffic management with information available to all levels, and calculation of access charges

Engineering benefits were reported as ability to link infrastructure use to maintenance requirements, train-kms data can be used by vehicle maintainers, and engineering costs can be reduced by comparing traffic volumes to engineering costs.

All respondents reported a variety of operational benefits, in terms of performance measurement, improved tracking and monitoring of trains, and linking operations and engineering managers for arranging temporary line closures, route restrictions etc

5.6.6 Vehicle operations

The five respondents comprised four freight RUs, one intermodal operator, and one keeper. One RU only responded to certain questions, citing commercial confidentiality for its partial response. All respondents reported use of a system for their vehicle operations. Of the RUs, one pointed out that the vehicle operational data as listed in SEDP Deliverable 2, Specification 2 – WIMO was not part of the legal requirements, and it would only fulfil the legal requirements of the TAF TSI. The other two RUs had systems which contained all the WIMO data. The other two respondents systems were less data-rich, presumably only containing the data needed for the organisation needs, (Intermodal operations, and keeper).

As regards question 4 on general comments on the TAF TSI, two RU respondents stated that they were uncertain of the relevance of the TAF TSI messages, whilst one considered that about 40% of TAF TSI was not needed (e.g. wagon order) or was not realistic (e.g. WIMO, ETI/ETA, IRNDB). Comment was also made that no RU was able to follow and plan trips for intermodal units, and they should be removed from the TAF TSI scope, as intermodal operators are not covered by TAF TSI. Trip planning and reliable ETAs was impossible until everybody has a booking and control system. The WIMO concept was considered over-complex. The others responded with “no comment”

All bar one RU respondent stated they would be compliant with the TAF TSI either within the SEDP timescale, or within the next five years, the exception being an RU, and the intermodal operator that had no firm plans for compliance. One respondent emphasised that only the legal requirements would be in place, the implication being that no additional, (even if useful), requirements would be considered.

The situation with the TAF TSI train movement event messages suite was somewhat mixed, with no respondents able to support the full message suite, although one respondent was only missing information on train delays. One RU stated that legal compliance would be achieved in accordance with the TAF TSI implementation timetable, and another was waiting for “feasible, realistic and approved specifications”, (the consultants assume this refers to the TAF messages). The intermodal respondent did not support the suite at all, or intend to, as it supplied data to the RU conveying the containers who was expected to support the messages.

Wagon events to support the TAF TSI message suite were mostly all recorded by the RUs, although, again, one RU advised that the legal requirements would be in place without stating what events were currently recorded.

Four respondents confirmed they foresaw no problems supporting TAF or TAP TSI messages at any particular times such as planned outages or systems not being 24x7. One respondent did not provide any information on this aspect.



As regards modernity of systems, the few respondents made it difficult to assess the situation, with only one reporting favourably.

As expected, respondents who answered advised that the information was maintained in the system by online entry by staff in yards and terminals, with two also using entry in data centres. One also reported automatic updates from the infrastructure manager, presumably train running events.

No respondents foresaw any problems supporting the TAF and TAP TSI at any time

Respondents answering reported positive experiences of using their system including improved data quality, use by commercial functions for contract and billing management, dispute resolution, and use by their operations function for train management. Negative experiences were few, one even reporting none.

Linkage of the system to engineering function was reported by one respondent, but three respondents had no links, the systems being separate.

Most respondents reported commercial benefits, including easier monitoring of services, customer facilities for tracking consignments, easier wagon supply, essential for cost and performance calculations, etc two reported using their system for driving customer billing from the arrival at destination event report.

Engineering benefits were reported, including wagon use linked to maintenance planning, improved quality and consistency of maintenance data, and a reduction in maintenance costs.

Operational benefits were reported including source for wagon mileage, defect management with three respondents reporting benefits from GPS reporting.

5.6.7 Vehicle maintenance and repair

Seven respondents replied to questions on vehicle maintenance and repair systems.

All respondents reported use of a system of their own, with three reporting this as supplied by a commercial (COTS) supplier, (IBM Maximo and Railsys are two examples in use).

Only one respondent confirmed that their wagon data conformed to the elements defined for an RSRD in the TAF TSI. One respondent system supported all the elements, but required the data to be supplied from RUs and keepers. There was some support for maintenance and repair information, but only one organisation held the full set of data.

Most respondents systems were able to support interfaces to external systems, such as would be required for ECMs to exchange data with various parties under the draft Regulation for ECM certification, (although this does not mandate IT or telematics). One respondent though that the ECM Regulation is unrealistic stating that the ECM model cannot work unless very complex and costly systems are implemented by all players.

One party foresaw difficulty in supporting data exchanges at weekends due to the system being office hours only, and another also mentioned system availability not being 24x7 as a potential difficulty.

All respondents considered their systems to be modern and up-to-date technically.

Positive experiences were cited as improved data quality, use by commercial functions as a source for defect and claims management, and contract and billing activities. The system data was used by operations functions to validate train formations, (for defects).



Negative experiences were reported as slow process for updating the database, with two respondents reported data quality as problematic.

Two respondents reported benefits in linkage between the system and the engineering function or subcontractors, whilst three had no such links

One respondent (an intermodal operator), reported problems with data supply from RUs

5.6.8 What can we learn from this REX?

From this feedback we can see that most large RUs and IMs fully support the basic functions of train operations, wagon management and consignment data.

IMs have sophisticated train planning systems with some supporting receipt of electronic bids.

The newer functions of common bid / offer, wagon order, delay manage and rolling stock defect management by external companies will be more difficult to implement.

Infrastructure reference databases, infrastructure restriction notices database and ECM systems will mainly need new investments.

Data quality and the on time capture of data as well as coding issues will remain a significant challenge for successful implementation and significant attention will have to be maintained on these specific issues throughout the implementation.



6. Market needs - Gap analysis

The term “gap”, in wide use in the IT industry, has been used in this report. In this report “gap” means the absence or inadequacy of a data element or the absence or inadequacy of software or process which makes it highly unlikely or impossible for applications to fulfil the requirements expected of them. The report covers both inadequacies in terms of legislative requirements and in terms of the need to run an efficient and effective railway.

For each gap, this section of the report identifies the problem and provides a solution. The consultants’ proposals, however, comprise an integrated solution and so some of the solutions overlap a number of gaps. Likewise solutions are in some cases qualified to provide for constraints imposed in other areas. Nevertheless, the text covers all the gaps identified by the consultants and provides cross references.

In the case of vehicles, the text primarily refers to freight vehicles

6.1 Examination of the gaps identified

6.1.1 Providing railway undertakings with the vehicle technical data needed to run a train

This gap covers the following items

- ▶ railway undertaking having access to vehicle data
- ▶ every railway undertaking in the chain needing journey information
- ▶ all parties needing up-to-date information on the maintenance status of the wagon
- ▶ railway undertaking needing vehicle incident and defect data
- ▶ providing railway undertakings with technical data for vehicles
- ▶ vehicle temporary restrictions
- ▶ vehicle registration ok
- ▶ vehicle certification ok

Requirement

Before incorporating a vehicle in a train, a railway undertaking needs its technical data. It needs to know the vehicle’s permanent characteristics: its length; tare weight; maximum speed at the various categories of load, braking characteristics at the various conditions of load, distance between axles, etc. This permanent vehicle data is extensive and under some conditions may reach 1000 characters. Other information, such as carrying capacity, would be prudently obtained before loading the vehicle. Some data might be regarded as “library information”, the data might not be essential for the journey in question but the railway undertaking may require it for the next journey as a loaded or empty vehicle. All this data is essentially permanent; it is not expected to change during the life of the vehicle. Railway undertakings use this data in their operating systems to manage vehicles whilst they are on their systems. There is no requirement to hold the data long term (although many railway undertakings do).

Other technical information is also required by a railway undertaking. This other data whilst technical is also ephemeral; it can change during the life of the vehicle. It includes the vehicle condition, toilets out of use on a passenger vehicle, bodywork defects, etc.; it includes next overhaul data and includes temporary



limitations on the operation of the vehicle (speed restriction, brake inoperative, etc.). It would be prudent to have this data before loading the vehicle. The data may change whilst the vehicle is in the custody of the railway undertaking, repairs may be made and indeed an incident may occur that requires a restriction to be imposed. Under these conditions the ECM will need to be informed (see below). In all cases however, the system must ensure that the next railway undertaking in the chain receives the information. Railway undertakings use this data in their operating systems to manage vehicles whilst they are on their systems. The data should not be held longer term as it is essentially ephemeral.

Furthermore, the railway undertaking must check (preferably before loading the vehicle) that it is approved to run at all and secondly to run through to its destination. Railway undertakings use this data in their operating systems to manage vehicles whilst they are on their systems. There is no requirement to hold the data long term (although many railway undertakings do).

There are no arrangements for exchanging details of traction units. Remembering that traction units are now frequently used outside their home state, it is essential that their details are shared. It may be that this is better dealt with an ad-hoc arrangement (loading details of locomotives on to the host railway undertaking system permanently, for example) but the requirement and some principles need to be set down.

The gap

There is an operational need for this data and it is implicit in the train composition requirements of the OPE TSI (4.2.2.5) that it will be provided. These requirements are not satisfied in the current framework for message exchange.

Existing approach

The existing techniques for exchanging vehicle data have much to commend them. At present the interchange delivering railway sends a HERMES interchange message with all the vehicle data (and much else) to the interchange receiving railway. This avoids the receiving railway having to search multiple files. The application is already programmed and in widespread use.

Even so there remain problems which require to be resolved. The first problem is gaps in the information being passed over. It is proposed that the user railway undertaking simply interrogates the keeper's file for any data not received. Authorisation will be by checking the pointer file.

The second is more complex. The HERMES system was based on the presumption of registering railways. It was assumed that the data (which moves with the vehicle) is refreshed periodically when the vehicle returns to the home railway. That is no longer a justified assumption and an alternative means of updating is required. These updates are only required when the keeper changes data (and so not when the field reports something). A typical instance might be the discovery of an error in the data. The update should be made as soon as possible, for that reason; it is desirable that the keeper's file pushes updates to the user railway undertaking. It is also worth remarking that updating the vehicle characteristics in this way is likely to be rare and so the push approach will reduce data transfer.

Constraints and other considerations

It is desirable that master files, the source of the data, are held by parties close to the data. The consultants also note that Member States and the ERA do not expect their files, the NVR and ERATV to be used for current operations purposes (it is understood that this is primarily for reasons of liability but availability and update issues may play a role).



For commercial reasons, wagon keepers are sensitive about technical details of their vehicles being widely available to railway undertakings. The consultants are not entirely convinced of the validity of this point but have nevertheless taken account of it. Respecting this imposes a further constraint on the solution.

Wagon keepers are reluctant to become involved with day to day maintenance and repair activities which they say user railway undertakings should undertake. Keepers acknowledge however that it is logical to centralise the data and that railway undertakings should not be the repository.

Coding structures are available for this data and railway undertakings operating systems have the capacity to hold and process this data.

The solution

It is logical to have all this technical data located on one file. The logical file manager is the keeper; the keeper is close to the data and has every interest in keeping it up to date. The keepers' reluctance to hold the master copy of vehicle condition data derived from reports from railway undertakings is understandable but there is no logical alternative solution.

Identifying the file holding the data is a problem. A pointer file will be required for this. It may be of course that a service provider manages the data for a number of keepers in a rolling stock database. It may likewise be that a keeper's fleet is split between a number of databases for organisational or technical reasons. In any event, a pointer file will be required to point from the wagon number to the keeper's database. This file should also hold details of the keeper himself, his ECM and any long-term hire contract (see below).

A pointer file (which may in fact be the same one) is also required to indicate the railway undertaking currently using the vehicle. The pointer file should be updated on interchange by the delivering railway. This then will need a message from the delivering railway to the pointer file (and of course to the lead railway undertaking's traffic file).

Slightly more complex arrangements are required at the interface with railway undertakings that do not support the system. As before a record is sent notifying that vehicle has moved to the next railway undertaking. The pointer file is updated and a flag set that the vehicle is outside the network covered and that a message to notify the return of the vehicle is not to be expected. A special table will be required for this purpose. This table will also be required for other applications. When the vehicle returns the user railway merely asserts he has the vehicle on its arrival and sends a message claiming the vehicle.

A solution is required for cases where one railway undertaking delivers a vehicle for loading/unloading and another collects it. In addition, IT system failures, etc, where the delivering railway is unable to send the message must also be accommodated. For those cases it is proposed that again the receiving undertaking taking over the vehicle also claims it. To provide a check on abuse it is proposed that the pointer file sends a message to the railway undertaking last recorded as having the vehicle and only updates the pointer file if there is no challenge within (say) a minute.

The keeper's sensitivity to access to data must be recognised. It is proposed that the pointer file which indicates the railway undertaking using the vehicle at any one time is the prime authority for access to vehicle data (it may also be that exchange of data via HERMES will provide the data needed).

Railway undertakings must also be required to set up arrangements for exchanging details of tractive rolling stock. Given that the details can be complex, it might be



right simply to set down a requirement that sufficient data must be exchanged between the keeper and user in such a way as to allow the traction unit to operate effectively and efficiently in perfect safety.

Nature of the solution

This gap is primarily an omission in the TAF TSI. The outline structure, an obligation on keepers to hold vehicle information and on railway undertakings to use it should be reflected in legislation. Likewise the messages to give effect to the structure should be statutory.

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

New pointer files with vehicle number, keeper, hirer, ECM, acting ECM, location of vehicle database, user RU, and vehicle off-system indicator.

Additional messages

From interchange delivering RU to pointer file and to lead RU to update railway undertaking using the vehicle (might be modelled on HERMES frontier crossing message).

From user RU to pointer file to identify the keeper's database and reply.

From user RU to keeper's database to ask for defined data items or all data items for a vehicle and reply.

From keeper to pointer file to check user RU's entitlement to technical data and reply.

(There may be means of avoiding some of these messages by sending requests via the pointer file for authentication and user railway undertakings holding details of keepers' databases for ranges of wagons in their own databases.)

From user RU to pointer file to claim a vehicle coming from outside the system, change of RU on loading/unloading or following system problems and acknowledgement.

From pointer file to last known user of vehicle to check that a claim to have a vehicle is valid and reply.

6.1.2 Supply of vehicle data to the keeper

This gap covers the following items in the table

- ▶ keeper/ECM requires maintenance and repair data from the field
- ▶ providing vehicle performance data for performance based maintenance
- ▶ vehicle repairs completed
- ▶ vehicle temporary restrictions
- ▶ vehicle temporary restrictions notified
- ▶ vehicle temporary restrictions cleared

Requirement

The data structure outlined in the section above in which the keeper holds the master data base for vehicle technical data including that data which is transitory (such as being stopped and repaired en route), requires the keeper to be kept informed in real time of events affecting the vehicle condition so that he can then



hold the information to be available to the whole rail community.

The keeper's file will then become, in effect, an asset file. It is highly desirable that this file contains the "URVIS number", the unique asset identifier specified in the Luxembourg Protocol. The URVIS number never changes and might therefore form a key to the file.

Keepers and ECM also require data on vehicle performance to drive vehicle maintenance systems to ensure wagons are in a safe state to run. Keepers and ECM also require means to promote the effective control of maintenance information and the ability to share that data.

In the absence of a preventative maintenance regime, exhaustive inspection is necessary. Vehicle inspection is a very expensive process, and many railway undertakings that are also vehicle keepers, have moved to use-based maintenance for those vehicles used exclusively by themselves, i.e. vehicles that are not interchanged to other railways.

This data must be supplied promptly to allow keepers to make appropriate decisions on the next task for a vehicle when it has finished a journey. This section therefore examines the data exchange with the keeper, principally the supply of data to the keeper (supply from the keeper is dealt with above).

The data sent to the keeper therefore includes records of the vehicle being stopped, the follow up from that, repair, continuation of the journey, movement forward under restrictions, movement to workshops. Some of that data complements data being exchanged between railway undertakings and keepers to define and justify repairs made en route and indeed paying for them. It might thus be hoped that some duplicated work can be avoided. Likewise, it might be hoped that data on failures of components might be exchanged to allow analysis of component failure to drive maintenance programmes and component development.

Vehicle performance data must also be supplied to the keeper. The industry view is that this should consist of distance run by load category (at least loaded and empty) and number of loading events. The responsibility to supply this data must obviously be placed on railway undertakings since they are the parties using the wagon. However railway undertakings do not necessarily know distance run (particularly in the case of alternative routes for trains or diversions). There should therefore be a requirement for infrastructure managers to supply distance run by trains on request.

It is clear that distances run by rolling stock such as locomotives and hauled vehicles are key to modern maintenance practice based on the use made of the resources. Distance-run by diesel locomotives matched to fuel consumed enables identification of poorly performing assets, and well as facilitating economic appraisal of resources. Therefore train running information to RUs and others, needs enhancing to supply the distances run by trains, so that kms-run by resources can be derived and used in maintenance applications.

Likewise the distance run by locomotives could in future be a key counter in decisions on maintenance, and even fuelling.

Provision will be required for the keeper to share the data with his ECM.

Legislation

Regulation (EU) No 445/2011 covers ECM certification and requires: -

Article 3g - An RU shall be given the assurance that a 'return to operation' is based on all maintenance work having been completed and the wagon is safe to be used possibly subject to temporary restrictions.



Article 5.3 - An RU may request information for operational purposes on the maintenance of a freight wagon

Annex III section I.7, II.7, and IV.9 – Procedures to ensure adequate exchange of information of reliable and up to date information with respect to the configuration of vehicles/components and any possible fault or defect regarding safety

Annex I.7.4 - Information on operations (including distance run)

The gap

There is an operational and technical need for this data. Article 5 of the ECM Regulation sets down a requirement for the supply of information but in any event it represents good operational practice and helps both to increase safety levels and reduce costs. A requirement to exchange data is not specified in the current legal framework.

The ECM Regulation requires data to be exchanged between a number of independent organisations, but does not describe how the information should be held or accessed. Use of IT technology or telematics is not required of any party that needs to exchange information. In summary:

- ▶ the exact maintenance data to be shared is not defined
- ▶ there is no database schema for the required data
- ▶ there are no message definitions which would allow the parties involved to supply or retrieve data

Existing approach

Rolling stock maintenance is usually based on two values, firstly for locomotives, the hours in traffic, or calendar days on a first-hit basis and secondly for hauled stock, calendar days since last overhaul, with frequent physical inspection in between to detect component failure or deterioration, and repair, such as brake blocks.

There are existing solutions both to supply stopping and repair data and vehicle performance data in the HERMES system. Many railway undertakings have already developed the technology to extract and send the data. It would be sensible to build on the HERMES application and indeed to base any new message on the existing messages defined in UIC leaflets 404-2 and 404-3. Changes are required to reflect the fact that the data will go direct to the keeper rather than through the “registering railway” and to cover the case where the railway undertaking making the report was not the user at the time of the event. Similar messages to report incidents should be sent to the lead railway undertaking. They are dealt with below.

Many RUS are also keepers and ECMs, (or contract for maintenance with third parties), and have internal processes and IT systems for maintaining their rolling stock. In many cases the maintenance regimes have been inserted into the operations system they use, and where systems are separate, proprietary interfaces link the two systems with no information required to be passed outside the RU.

Keepers have not traditionally been involved in wagon repair and remedial maintenance; this has been left to RUs to arrange, either under contract with engineering workshops, or undertaken in the RU workshops.

Constraints and other considerations

An important distinction must be made between the keeper and ECM. The consultants have relied on the fact that the keeper appoints and has a contractual relationship with the ECM to propose that the keeper should hold the database and that it should be a single database with all the data for each wagon kept together.



This implies that ECMs must have access and be able to read, write to and amend certain (but not all) fields. The existing legislative structure which defines the keeper in terms of his powers and the ECM in terms of his duties may need revision to define the link between them more tightly.

Wagon keepers are reluctant to become involved with day to day maintenance and repair activities which they say user railway undertakings should undertake. Keepers acknowledge however that it is less logical for the data to remain with railway undertakings.

The RSRDs maintained by keepers may not be to the same standard of utility and operability, some of the smaller keepers may not even have IT-based registers, and those that exist may require extensive development or even replacement. Coding structures are available for most of this data and most railway undertakings operating systems have the capacity to produce this data.

The solution must allow for railway undertakings not supplying information, either because they have not yet cut over the application, or there is a technical problem transferring the information or the vehicle travels outside the EU.

Railway undertakings are reluctant to supply keepers with journey data (i.e. commodities, locations and customers) for commercial reasons. It seems essential however that keepers (and ECMs) are supplied with distance run by load type and number of loading events even if they are not provided with the actual journey details. Commodity may also be relevant to maintenance (rock-salt being the obvious example). This data must be available immediately after journeys have been completed to allow the keeper to decide the next movement of his vehicle.

Keepers are fleet managers, (but not necessarily owners); they frequently lease out vehicles long-term on the basis that the lessee will have full control of them. Despite the fact that control has passed to another party, the rail industry still regards the original keeper as being the keeper. Furthermore, the lease terms may be inclusive or exclusive of maintenance. This complicates the supply of information.

Many rolling stock databases have no external links as they are owned by an RU and no external parties have ever needed access to the information.

The solution

It is logical to have all this technical data located on one file. The logical file manager is the keeper; the keeper is close to the data and has every interest in keeping it up to date. The keepers' reluctance to hold the master copy of vehicle condition data derived from reports from railway undertakings is understandable but there is no logical alternative solution.

Filling the gap therefore requires railway undertakings to supply keepers with defined information in real time. Information on stopping and repair of wagons is well understood although if component data is to be sent, there is no message or coding structure. Likewise no work has been done on amalgamating advice of stopping and repair with the charging of the repair work.

It must be recognised that it may not be possible to report some vehicle defects in real time (particularly where vehicles are "off the system" when the defect is noted). Provision should therefore be made for flagging up that data has not been reported and for it to be reported by subsequent railway undertakings in the chain.

Information on vehicle performance is likewise well defined. However collecting it, supplying it and assembly by the keeper is not a trivial task. The following solution is proposed: distance run for each vehicle is to be assembled by the user railway undertaking as an aggregate of the sections run in each train. For that purpose, the



user railway undertaking is to be entitled to ask the infrastructure manager to supply distance run by each train between stopping points at which vehicles are attached or detached. Loading events are also to be recorded. This data is to be supplied in real time. The distances are to be totalled when vehicles are interchange delivered or placed for loading or unloading; the distances run are then to be sent to the keeper in real time indicating load category. Keepers are to assemble the data for vehicles in a coherent manner, identifying gaps where data is missing and filling them as best they can. As appropriate, keepers/ECMs are then to use the data to drive preventative maintenance of their vehicles.

To protect commercial interests, where keepers have hired wagons out long-term (a standard definition is desirable, the consultants suggest six months) with or without maintenance, then the following is appropriate. The long-term hirer is to be indicated in the pointer file. If maintenance has also been assigned then the new ECM is to be shown in a new acting ECM field. The hirer will be required to copy the original keeper's data including maintenance and performance history to date and hold it in a technical file. The data exchanges will then operate to and from the hirer/acting ECM. At the end of the hire period, the process is reversed. Performance histories may need to be summarised for confidentiality reasons but it is essential that the records are complete. The parties may agree not to make these arrangements.

The solution needs to support separation of user, keeper, and maintainer as these are likely to be the predominant business model in future. Although the EC regulation does not require use of IT and telematics for maintenance of wagons, the solution must include: -

- ▶ maintenance data to be defined more specifically, (component types, work done, defects etc) within the legislation
- ▶ coding systems to be devised for the above
- ▶ a database schema to be defined for the above
- ▶ RSRD access made available to RUs/ECMs etc on a 'defined access basis'
- ▶ a new message is required to the wagon keeper/event index to update the vehicle data to record who currently has the vehicle and which RSRD the data resides in
- ▶ new messages to be added to TAF TSI to allow exchange of data between interested parties
- ▶ the key maintenance data for operation of wagons is recorded in the RSRD
- ▶ the pointer file

It may be of course that a service provider manages the data for a number of keepers in a rolling stock database. It may likewise be that a keeper's fleet is split between a number of databases for organisational or technical reasons. In any event a pointer file will be required to point from the wagon number to the keeper's database. This file should also hold details of the keeper himself, his ECM and any long-term hire contract (see above).

Message structure

Detailed structures for the messages have not been provided in this report.



Additional data fields

New pointer files with vehicle number, keeper, hirer, ECM, acting ECM, location of vehicle database, user RU, and vehicle off-system indicator.

Indication that it has not been possible to report vehicle condition to the keeper.

Additional messages

Reports of stopping and repair of wagons, movement to workshops and release all sent by the user RU to the keeper. These messages exist as HERMES messages, they will need minor amendment to cover the fact that they are being sent to the keeper (rather than the “registering railway” and to cover the case of a second-hand report. Similar messages to report incidents should be sent to the lead railway undertaking.

Further work needs to be done on defining details of components that have failed so that studies of reliability may be made.

Further work needs to be done on linking the messages to report stopping and repair and the messages to agree charges in accordance with the GCU.

6.1.3 Vehicle incident data for commercial purposes

This gap covers the following item in the table

- ▶ vehicle incident data for commercial purposes

Requirement

There is an obvious commercial requirement for interruptions in the vehicle’s journey to be passed to the customer. This is not clearly provided for in the wagon exception message. The requirement can be met by messages that are similar to those which are used to update the keeper’s files (see above) and a standard message for both purposes is to be desired. This set of messages should cover stopping of the vehicle, removal to workshops, repair and release. Technical data is not required except insofar as it enhances an understanding of the problem and the length of time required to remedy it.

A message should also be sent in the case of transshipment giving details of the new vehicle(s).

These messages should be sent to the lead railway undertaking, acting as the customer’s contact point.

The gap

There is a market need to keep customers fully informed of incidents en-route. These requirements are not clearly satisfied in the current statutory framework.

Existing approach

There are existing solutions both to supply stopping and repair data and vehicle performance data in the HERMES system. Many railway undertakings have already developed the technology to extract and send the data. It would be sensible to build on the HERMES application and indeed to base any new message on the existing messages defined in UIC leaflets 404-2. Changes are required to reflect the fact that the data will go direct to the keeper rather than through the “registering railway” and to cover the case of a second-hand report.

Constraints and other considerations

In the view of the consultants, this message is considerably more important than the various yard arrival messages.



The solution

Messages closely modelled on the existing HERMES messages are desirable.

The pointer file (see above) will be required to identify the database to which the data is sent.

Pointer file

It may be of course that a service provider manages the data for a number of keepers in a rolling stock database. It may likewise be that a keeper's fleet is split between a number of databases for organisational or technical reasons. In any event a pointer file will be required to point from the wagon number to the keeper's database. This file should also hold details of the keeper himself, his ECM and any long-term hire contract (see below).

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

Indication that it has not been possible to report vehicle condition to the keeper.

Additional messages

Reports of stopping and repair of wagons, movement to workshops and release all sent by the user RU to the keeper. These messages exist as HERMES messages, they will need minor amendment to cover the fact that they are being sent to the keeper and to cover the case of a second-hand report.

Further work needs to be done on defining details of components that have failed so that studies of reliability may be made.

Further work needs to be done on linking messages to report stopping and repair and messages to agree charges in accordance with the GCU.

6.1.4 Wagon order message

This gap covers the following item

- ▶ wagon order message

Requirement

The wagon order message is essentially a set of data about the consignment sent by the lead railway undertaking to the RUs involved in the wagon journey. It should not be intended to provide details of the vehicle (for those see above). It should however contain enough information for each of the successive carriers (CIM Article 3 (note error in the original English text)) in the chain to handle the consignment correctly. For that purpose, the wagon order message needs to be enhanced significantly to include much more consignment note data. In the electronic consignment note age the wagon order message should be merged with the electronic consignment note application (or there is a very clear risk of duplication).

It should be noted that this comment specifically claims a role for the wagon order message in the electronic consignment system.

At the same time not all railway undertakings have the same rights to data. In particular "substitute carriers" who do not take part in the contract of carriage do not have a right to much of the information and sub-contractors have rights to even less. The wagon order message needs to cope with these subtleties. Substitute railway undertakings are identified as such in the consignment note.

The standard HERMES interchange message contains some information which might



be considered as not being appropriate for all railway undertakings (consignor/nee for example). The interchange message will therefore need to be reviewed so that this type of “confidential” information only comes from the wagon order.

Whilst providing for this, it would be prudent to allow for data for consignments going on to (and indeed coming from) SMGS stations.

The gap

The wagon order message provides some but not all the data required for the movement of traffic. The requirement for change is partly operational (the information is required for current operations) and partly commercial (it is envisaged that commercial data would be added to the wagon order message); there is no statutory requirement to enhance the wagon order message. As conceived it therefore risks having to be duplicated by other data flows coming from the electronic consignment note. Furthermore it fails to distinguish between the data entitlements of the various parties in the chain.

Existing approach

There is no close equivalent at present.

Constraints and other considerations

Requirements for data and entitlements to it are dealt with in various publications of the CIT to which the attention of stakeholders is drawn.

Coding structures are available for this data and railway undertakings operating systems have the capacity to hold and process this data.

The solution

The overall structure is simple:

a user railway undertaking gets vehicle technical information from a HERMES interchange message, or failing that, directly from the keeper

a railway undertaking in the chain gets consignment information from the lead railway undertaking. the information it gets is a function of the role it plays.

Railway undertakings amalgamate these two data sources to derive the set of data they need to move the vehicle. Reports as necessary are made to the lead railway undertaking.

When the vehicle leaves the user railway undertaking the data may be deleted because the lead railway undertaking is keeping a copy of the consignment record.

Nature of the solution

This gap is primarily an under-specification in the TAF TSI. The messages to give effect to the structure should be statutory.

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

Numerous extra data fields are needed in the wagon order message to reflect all the consignment note data together with the extra data required by the SMGS. New flags are needed for data not to be shared with other carriers. Some RUs have proposed to use the eCN structure.

Additional messages

None



6.1.5 Dangerous goods data

This gap just covers the following item in the table

- ▶ dangerous goods data

Requirement

The railway undertakings have made significant progress in collecting and handling dangerous goods data. The consultants recommend there should be a requirement to exploit the data and make use of existing international databases.

The gap

The requirement is primarily operational, it enforces good practice. Clarification and consolidation of requirements.

Existing approach

File transfer arrangements are already in place for the dangerous goods master files and many railway undertakings already use the data in the way described above. This good practice should be standardised.

Constraints and other considerations

None.

The solution

Railway undertakings should download and use standardised RID data files. The data should be used to validate declarations by consignors, as an input to examination of traffic before movement and to populate operating files. Data should be used to prepare written instructions for drivers. For international traffics, data should be used to derive descriptions in other languages.

Nature of the solution

Given that the issue impinges on safety, there should be a statutory requirement to make use of standard RID data files in national applications. (This in fact saves costs over maintaining one's own.)

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

Appropriate amendments to national systems.

Additional messages

None.

6.1.6 Exceptional load data

This gap just covers exceptional load data:

Requirement

Exceptional loads (exceptional consignments in international railway terminology) cover a range of different traffics. In addition to traffics which are exceptionally large or heavy there are such traffics as items of unusual rolling stock. In all cases these traffics are the object of specific studies before they move. They are normally specially examined before passing on to each new infrastructure to ensure they meet the conditions laid down for their movement.



The factors which make loads exceptional are therefore many and complex and do not lend themselves readily to IT treatment. Furthermore the actual arrangements for their movement are robust. Nevertheless, there are some opportunities to make use of IT techniques in the organisation and execution of movements of out-of-gauge consignments. These opportunities follow from the coding of profiles by the UIC.

The gap

The requirement is primarily operational; it standardises good practice and makes for a more efficient operation. There are significant opportunities to make organisation of out-of-gauge movements more efficient.

Existing approach

The parties involved arrange the traffic movement making use of telephone and e-mail, but generally no specific IT systems are used.

Constraints and other considerations

None.

The solution

UIC coding should be used to should be used in applications for the movement of out-of-gauge loads possibly using formatted e-mails rather than automated systems.

Other exceptional loads, metro stock on delivery, tamping machines on hire, etc are too disparate to benefit from IT techniques.

Nature of the solution

Good practice, no statutory requirement.

Message structure

None.

Additional data fields

None.

Additional messages

None.

6.1.7 Transhipment

This gap just covers the following item

- ▶ transhipment

Requirement

Whilst transhipment as the result of a faulty vehicle is rare, its repercussions are serious from the customer service viewpoint. Transhipment also makes it impossible to follow a consignment by following a wagon.

There is also planned transhipment. As a result of extension of the standard gauge into Iberia, this is becoming rarer in Western Europe but the enormous potential East-West market must also be considered.

A record of transhipment is therefore required.

The gap

Whilst the data exchange is primarily operational, the need is commercial - to allow



customers to be notified of a major event in the progress of their consignment. It is not clear if the wagon exception message (4.2.8.6) is intended to include transshipment, it would not appear that it does.

Existing approach

There are HERMES messages, but they will need amending and a fuller logic (involving a replacement wagon order) is needed.

Constraints and other considerations

None.

The solution

A specific transshipment message is required. This might be built on the HERMES incidents en route message (provided it is amended), but in any event will be required to be sent to the lead railway undertaking. The lead railway undertaking will update the consignment file (thus ensuring that it is still possible to trace the consignment) and send a new wagon order message with the new wagon number(s).

Nature of the solution

The solution fills gaps in the TAF TSI.

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

None.

Additional messages

Transshipment message is needed from the user railway undertaking to the lead railway undertaking.

6.1.8 Vehicle search enquiry and reply

This gap just covers the following item:

- ▶ vehicle search enquiry and reply

Requirement

It is a clear and imperative customer requirement to be able to monitor the movement of traffic. The TAF TSI sets down a system of messages passed from user railway undertakings to the lead railway undertaking to allow an estimated time of arrival to be calculated and updated. In fact that data exchange requirement is comparatively demanding. However, since it is essentially speculative, the estimated time of arrival is never more than an estimate. The consultants consider there is also a need for hard information. "Your traffic is in Strelsau".

The gap

The requirement is wholly commercial and driven by the market. There is no provision in the TAF TSI for finding the actual location of wagons or traffic, although the wagon deviation enquiry comes closest for wagons. For trainload, there is the train running enquiry, but this is requested by train number, therefore the enquirer must know the traffic is on the train requested.



Existing approach

The HERMES wagon search message fulfils this requirement most closely, although some development would be needed to avoid the need for the enquirer to specify the subject railways for the search, i.e. the enquiry needs modernising to fit the current industry structure.

Constraints and other considerations

Confidentiality is an issue. Clearly enquiries coming via the lead railway undertaking are authorised. The problem arises however for access by keepers. The definition of keeper is the party with the right to control the wagon and it is very difficult to see how that might be done without knowing where it is. Railway undertakings are very sensitive about keepers having access for commercial reasons. The consultants believe the problems arise principally with long term hire and believe therefore that their solution for long term hire will resolve that problem.

The solution

An enquiry message send by the lead railway undertaking or keeper to the user railway undertaking identified in the pointer file, together with the reply. The existing HERMES message might be used. The lead railway undertaking's traffic file should indicate the user railway undertaking to which the enquiry should be sent. The keeper may have to interrogate the pointer file.

Nature of the solution

Good practice, no statutory requirement.

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

None.

Additional messages

enquiry message

reply message.

from keeper to pointer file to identify user RU.

(There may be a means of avoiding this message by sending the request via the pointer file for routing.)

6.1.9 Keeper access to vehicle information

This gap just covers the following item:

- ▶ keeper access to vehicle information

Requirement

The keeper is the entity with the right to deploy the vehicle. To do that he needs to know where it is and be aware of its arrival. Likewise the keeper needs to know where the vehicle is if he (or the ECM) wants to bring it in for maintenance. The TAF TSI makes no provision for this information.

The easiest way to do that is to provide the keeper with access to the summary information held by the lead RU.

The gap

This represents an operational need; the keeper cannot run his business effectively



without the information. There is no provision for information to be supplied to the keeper in the TAF TSI.

Constraints and other considerations

Railway undertakings are sensitive to keepers having access to traffic information. In part this relates to long term hire for which the consultants have suggested a solution.

Nevertheless railway undertakings are sensitive to allowing the keeper's access to information held by the lead railway undertaking to be unrestricted. It is suggested it be restricted to most recent reported position and event (and hence would include reports of arrival).

The solution

Providing the keeper with access to defined information in the lead railway undertaking's traffic file.

Nature of the solution

This gap is an omission in the TAF TSI. The right to information follows from the statutory definition of keeper and should therefore be statutory.

Existing approach

There is no close equivalent at present.

Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

None.

Additional messages

From the keeper to the lead RU to ask for most recent location and event.

From the lead RU to the pointer file to check the wagon against the keeper and reply.

From the lead RU to the keeper.

6.1.10 Making path requests

This gap covers the following items:

- ▶ making path requests
- ▶ path request – offer process

Requirement

All RUs with track access agreements with IMs need to arrange paths at short notice, (including a notice period of one or two hours or even less on occasion). Once a path is requested, offered, and accepted, there is a legal obligation on the RU to pay for the track access granted, even if the path is subsequently not used. The process for making path requests, their processing by the IM and return of a path offer, (or refusal of a path), is therefore a trading process.

Legislation

The TAF and TAP TSIs mandate a series of messages to be exchanged between RU and IM for requesting paths and their being offered and accepted.



The gaps

The gaps represent a technical need insofar as a process is defined in TAF TSI but it is technically inappropriate for some of its expected users. Two gaps exist in the path request process: -

The TAF TSI messaging is far too sophisticated for many RUs classed as small and medium enterprises (SMEs) many of which do not have the sophisticated IT systems necessary to support the messaging in the TAF TSI, indeed many of the larger RUs will have to develop their systems at considerable cost to meet the TAF TSI requirement. Many of the train operations systems of the ex-incumbent railways are legacy systems of long standing, some forty years old or more, designed for an integrated railway and very difficult and expensive to enhance. There is therefore a need for a simpler path request process and system, not dependent on automated message exchanges between independent systems, and which can support various degrees of sophistication of the RU systems, and even support an RU with no IT system at all.

The message suite in the TAF TSI could be considered the minimum necessary. Additional path request-related messages are required along the lines established in UIC Leaflet 407-1. The assumption in the TAF TSI is that all path requests will be for new paths not currently in existence, whereas many requests from RUs are for variations to paths they already have, such as the traffic stops need to be varied, or they wish to use an unused path in a train path catalogue. These situations are covered by UIC Leaflet 407-1.

The above issues represent gaps in the coverage of the TAF TSIs which need to be closed

Constraints

In most cases, although many of the RUs may not have sophisticated systems, facilities to provide path information to them must be available. Many RUs, even without a system are likely to require a download of the schedule in an electronic form of some kind for internal use when arranging resources and for monitoring the train during its journey. Simple PDF or MS Excel files will probably suffice with a choice being available.

Existing process

The processes for RUs to request and be granted (or refused) ad-hoc path requests mostly rely on manual methods and paper documents, albeit these may be based on electronic files passed by e-mail). Paper request documents are usually sent by fax and responded to in the same way.

For international trains, the Pathfinder application of RailNetEurope does contain an ad-hoc request function, however the nature of Pathfinder means this is applicable only for multi-IM paths and, more crucially, it also has a 72 hour cut-off period. Most ad-hoc requests are from a single RU to a single IM, and can be only a few hours in advance of the intended movement, in some cases, less than one hour by arrangement with IM control offices.

Nature of the solution

The solution divides into two parts: -

Introduction of an IT based process for path requests which does not use messaging and intended for use by RUs unable, (or unwilling), to support automated messaging. This solution involves a web-based electronic trading type of application, (many models exist on the internet), in which the IM would develop a web-based path request application fronting their pathing system, for use by RUs to



request paths, and to advise of the granting of paths, or their refusal. The application would require RUs to register on the site, to specify persons permitted to request paths and e-mail addresses for download of path and other information. In essence, the TAF TSI messages would be internalised in the IM application. This option requires the TAF TSI to be amended so that the messaging is a choice, not a requirement. One IM in the EU is already intending to develop such an application.

Additional options in the existing TAF TSI Path Request message to be added based on those in Application 25 of UIC Leaflet 407-1:

re-routeing request – train path is already booked, but RU wants to vary the route

use of unused path – many IMs and path allocation bodies produce catalogues of available paths for RUs to use on an ad-hoc request basis.

vary scheduled stops – RU wants to carry out traffic activities at alternative locations on the existing path.

Message structure

As already established in the TAF and TAP TSIs plus UIC 407-1. It is understood that Working Group 5 has developed proposals for changes based on fully harmonised and partially harmonised approach. These are welcomed but are likely to be too complex for small and medium sized RUs to support with IT. RNE and individual IMs should consider offering simple request / offer for these clients.

Additional data fields

Additional field for options in the path request message

- ▶ new path
- ▶ re-route path (route changes to be specified)
- ▶ use inactive path (path to be specified)
- ▶ vary stops on path (changes to be specified)

Additional messages

None required if the options described above are added to the TAF TSI path request message.

6.1.11 Handover and interchange

This gap just covers the following item:

- ▶ handover and interchange

Requirement

Handover requires infrastructure managers to exchange data on the progress of trains to allow the next infrastructure manager to provide track capacity for the train. Infrastructure managers also require details of the train, a train envelope certainly, but possibly more details of the train.

Railway undertakings require details of train running to be able to provide staff and traction to take the train forward. They also require details of the train itself and of the vehicles comprising it as a function of their role (successive or substitute carrier); some of these details will come from the wagon order message but technical details of the vehicles are required.

The gap

The need here is a need for rationalisation; processes are set down in the TAF TSI but they do not appear to be logical and certainly are not simple. The TAF TSI does



not set out message exchange very clearly; in addition there appear to be a number of gaps despite the large number of messages defined. The following areas would seem to require attention.

The train composition messages (4.2.3.2) sent between the RUs and those sent to the IM must be different, the first with a wealth of detail, the second only summary. The different needs of railway undertakings and infrastructure managers have been totally overlooked in the TAF TSI.

Where the railway undertaking is to send train composition messages (4.2.3.2) to more than one infrastructure manager it is not clear that the railway undertaking will necessarily have the software to prepare train composition messages using the right rules for train formation for all of them.

A railway undertaking having received a train is required to reissue the train composition message (4.2.3.2), whether or not there has been a change to composition or change of infrastructure manager. This might be nuanced.

It is unclear why the RU should send the IM message 4.2.9.3 saying it has a particular wagon. IMs should not be interested in individual wagons.

There is no handover message as such between infrastructure managers on the lines of "here is train 12345"; whilst such a message need not always be required, it is surprising that it is not even provided for.

Constraints and other considerations

None.

The solution

Taking the points in order:

The train composition message needs to be much more sophisticated. References are made above to the use of the HERMES interchange message. If it is also to form the basis for the train composition message (4.2.3.2), then it needs to reflect use as a train envelope message for notifying infrastructure managers and a fuller message for railway undertakings. Full consignment detail is supplied down the chain by the wagon order message.

In this context, it might be worth pointing out that a substitute carrier is not able to provide the infrastructure manager with more detail than he himself holds.

The issue of validating train compositions is dealt with in the next section.

Where a railway undertaking passes responsibility to another on the same infrastructure, there would not seem to be any need for a train composition message (4.2.3.2) unless the details of the train have changed. This should be reflected in the requirements.

Messages concerning individual wagons should not be sent to infrastructure managers.

A message to indicate/confirm handover of a train should be defined but need not be mandatory.

Nature of the solution

These gaps represent incomplete specifications in the TAF TSI.

Existing approach

The existing HERMES interchange message does not reflect the sophistication required.



Message structure

Detailed structures for the messages have not been provided in this report.

Additional data fields

None.

Additional messages

None.

6.1.12 Creating and validating train operating documentation

This gap covers the following items:

- ▶ creating and validating train operating documentation
- ▶ validation of train composition against infrastructure criteria

Requirement

It would be desirable for the rules for the composition of trains to be standard so that any train could run anywhere. This is not the case and is unlikely to be the case, perhaps forever. In addition to criteria imposed by civil engineering features, the strength of under-bridges and the length of passing loops, for example, there may be inherent criteria, the profile of the route may require strengthened drawgear, etc. In addition, for various reasons, national rules may impose rules, long steel not being marshalled next to tank wagons, for example. Railway undertakings need to check that they have complied with Member State regulations that govern the marshalling of a train, and also the limits applied to overall train loads over the route the train is passing, the main ones being: -

- ▶ maximum load over the route (for each class or type of traction)
- ▶ minimum brake percentage required
- ▶ maximum allowable axle loading and mass per metre
- ▶ maximum length

The regulations (and also most railway undertakings operating rules), invariably require drivers to carry a document, (sometimes called a train list, or wagon list), containing information on the train being driven, its origin and destination, weight, length and braked weight, etc the document is usually formatted so as to demonstrate to the driver that the requirements of the regulations and the load limits over the route have been met by showing a comparison of the actual train against the authorised parameters.

In effect, the train document is a certificate that the train is in good order to proceed. Many railways require the document to be signed as authority for travel by the person preparing the train.

Legislation

The OPE-TSI requires the train composition to be described in a “harmonised train composition document”. (4.2.2. Specifications Relating To Trains, 4.2.2.5. Train composition), but this is still to be prepared (Appendix U). The OPE-TSI is unclear on whether the regulations underlying this document will also be harmonised.

Operating regulations are a combination of those imposed by national statutory provisions, by regulatory bodies, by infrastructure managers and those designed by railway undertakings themselves. There is no common model for maintaining and enforcing the regulations. There is less standardisation than might be expected although various initiatives are giving rise to more alignment. In this way, the railways of Northern Ireland and the Republic of Ireland now have a common rule book.



The gap

There is an operating need for all the restrictions to be explicit when the train is formed up. There is an operating need for appropriate documentation to demonstrate compliance. Until the harmonised train composition document is made available, trains traversing several infrastructures in several Member States, require drivers to carry train documents specific to the infrastructures and regulations of the Member State being traversed, implying the need for several documents for the same train and formation. In addition, before the train starts its journey, the RU needs to be sure that the train formation complies with the operating requirements over the whole route, to avoid potential delays at handover points. RUs also need to be sure before the train starts its journey that the wagons on the train are authorised to run within the Member States traversed.

The gap here lies in the difficulty an RU at the origin of a train passing over several infrastructures and Member States has in checking the train formation for validity over the whole route, and also in producing documents for each of the networks with differing regulations.

Infrastructure managers sell paths subject to restrictions. These restrictions are normally very general and there is a presumption that traffic out of the ordinary will be checked against the infrastructure restrictions file. This is more difficult than might seem, ERATV (the means assumed) does not have all the vehicle types for example.

Constraints and other considerations

Train documents need to be understandable by the driver, and train preparer, therefore will need to be printed/available in their native language, or at least the language used by their employer. A train document specific to a Member State is also likely to be required to be printed in the language of that Member State in case an IM in that state, or a government inspector, demands it be produced for inspection.

Railway undertakings receiving wagons in interchange need to know the technical and lading data for the wagons so that they can prepare a train document and carry out the checks required on the train formation to ensure the train is suitable for travel. This information must allow checks to be made against the regulations applicable in all Member States to be traversed by the train.

Nature of the solution

The gap is primarily an under-specification in the OPE-TSI and subsequent failure to deal with the harmonised train composition document which remains to be written in Appendix U. There can be no permanent solution until the harmonised train document is agreed and made available for use.

National rules are being progressively aligned, for example the annual report of the Austrian Safety Authority (http://versa.bmvit.gv.at/uploads/media/BAV-Taetigkeitsbericht_2010.pdf) reports on recommendations to align Austrian braking rules to UIC recommendations. Such realignment makes the task of validating train compositions and producing documents for train crew much easier

Whilst some railway undertakings have developed software for different infrastructures, the majority have not. The longer term solution might consist of jointly sponsored modular software to allow differing infrastructure limitations to be plugged in. These limitations could include such modular factors as the lengths of freight loops. It might be hoped too that railway undertakings and infrastructure managers cooperate to draw up more standardised rules for train composition to reflect such issues as barrier distances, marshalling of wagons with long loads, etc.



This latter has widespread implications (on loading standards, for example) and is outside the remit of the study.

The consultants see no need for further legislation, but would strongly encourage the present initiatives within RailNetEurope. The rapidly increasing total of international trains being encompassed in the Pathfinder system means that advance checking of the proposed train loading could be added to the system, as it already contains a function to add train formation data. This would speed up planning of trains by ensuring at least that the proposed loads can be conveyed over the required route.

There then remains the need to check actual train formations on-the-day for which some form of on-line check system is needed. Assuming harmonisation of regulations continues, a system covering several infrastructure managers could be offered to railway undertakings. RailNetEurope might be well placed to take on such a task on behalf of its members. This would avoid the need for costly modifications to RU operations systems, and facilitate checking for the smaller RUs.

Existing approach

Regulations for train operations are specific to Member States and the railways within them, and have been built up over decades. These regulations inevitably reflect the experience of operations on the railway of the Member State, and lessons learnt from incidents and accidents. Regulations therefore usually include dangerous goods rules, the marshalling of particular wagons, how many wagons with non-operational brakes are allowed on the trains, where exceptional consignments must be marshalled, etc.

Most ex-incumbent railway undertakings use IT systems developed before 91/440/EEC that produce and print train documents with the various operational standards and regulations checked as part of the software that produces the list. Part of this checking usually outputs warnings on the document to train preparers and drivers of various conditions that may need attention, such as wagons with defective brakes, presence of dangerous goods and action to be taken in emergencies.

These systems usually have only the regulations for the host IM and Member State as part of the program; it is left to other RUs in other Member States to validate trains when interchanged to them. Current practice therefore is to produce the train document afresh at each change of infrastructure using the operations system in use by the RU using that infrastructure. Changes of operating rules are normally at the frontier between Member States. Most railways transmit the HERMES interchange message "Advice of International Train" to the railway undertaking taking over the train at the frontier, even when the recipient is a subsidiary within a grouping containing both RUs. The data in the HERMES message allows the receiving system to update its files, and the train to be checked against the applicable regulations in the recipient RU, and a new train document produced.

Message structure

Details of messages for the option of requesting train composition validation have not been provided in this report.

Additional data fields

Existing wagon data is likely to be sufficient for proving the suitability of train compositions, but there is likely to be a need to introduce standard data elements for the authorised limits if these are not contained in the Registers of Infrastructure.



Additional messages

A new message for submitting a request for train validation, and the response to it will be required if the option for remote IT-based validating is taken up.

6.1.13 Advising the railway undertaking of why a train is not suitable

This gap covers the following item:

- ▶ validation of train composition against infrastructure criteria

Requirement

It would be desirable for railway undertakings to be notified of the reasons for a train being unacceptable. This should be in some detail so that the railway undertaking can consider options, detaching a wagon, cancelling the train, diversion, running at a lower speed, etc. However, the TAF TSI “train not suitable” message (4.2.3.4) only provides an optional textual description of why the train is not suitable.

The gap

There is an operating need for all the restrictions to be explicit when the train is formed up. Railway undertakings cannot take the right action if the problem has not been identified adequately. The problem arises both on initial departure of the train and when it passes onto any new infrastructure. Preferably, the RU needs to be sure that the train formation complies with the operating requirements over the whole route before the train starts its journey so as to avoid potential delays at handover points. RUs also need to be sure before the train starts its journey that the wagons on the train are authorised to run within the Member States traversed.

Nature of the solution

Given that the “train not suitable” message is likely to be generated by an automatic process, it would not seem difficult to flag up if the train as a whole or just individual vehicles are a problem, details of the vehicles that are problematic and the basic cause (weight, speed, gauge, commodity, etc.) Common comment texts in the various languages could be prepared with indications of what might be acceptable solutions (for example, brake force inadequate for this class of train, adequate for class XXX).

Existing approach

The existing approach relies on railway undertakings self-validating train compositions.

Most ex-incumbent railway undertakings use IT systems developed before 91/440/EEC that produce and print train documents with the various operational standards and regulations checked as part of the software that produces the list. Part of this checking usually outputs warnings on the document to train preparers and drivers of various conditions that may need attention, such as wagons with defective brakes, presence of dangerous goods and action to be taken in emergencies.

These systems usually have only the regulations for the host IM and Member State as part of the program; it is left to other RUs in other Member States to validate trains when interchanged to them. Current practice therefore is to produce the train document afresh at each change of infrastructure using the operations system in use by the RU using that infrastructure.

**Message structure**

Details of the amendments to the “train not suitable message” have not been provided in this report.

Additional data fields

The cause field needs to be systematically populated with explanatory text.

Additional messages

No new messages are required.

6.1.14 Access to data in the RINF/register of infrastructure

This gap just covers the following item:

- ▶ access to data in the RINF/register of infrastructure

Requirement

Railway undertakings, vehicle builders, and other related organisations need access to the data held in RINF/register of infrastructures so that they can be certain that vehicles are fit to pass over the infrastructure. This involves comparing actual or proposed vehicle parameters with infrastructure parameters. Remote and structured access to infrastructure data therefore needs to be possible. Such access needs to be possible using a standard and commonplace method without the need to purchase special IT tools, preferably by use of a web-browser.

Railway undertakings especially need access to check train formations so that the aggregate train parameters are suitable for the route of the train, bearing in mind that the RU would have previously determined whether the individual vehicles are authorised over the network in the Member States concerned.

Legislation

Article 35 of Directive 2008/57/EC requires each Member State to ensure that a Register of Infrastructure is established and defines the main features each register must contain. A common specification²⁶ for the register was published as this report was being prepared.

The ERA is required to prepare draft specifications on this register regarding its presentation and format, its revision cycle and instructions for use. The assumption is that registers will contain information on the networks managed by all the infrastructure managers within the Member State.

The INF-TSI which defines the infrastructure characteristics, in Annex D, defines the information concerning the infrastructure which is to be included in the Register of Infrastructure.

The OPE-TSI requires trains to be fit to travel over the infrastructures on its route.

The gap

The requirement that has not been fulfilled is operational. At the present time, no structured and remote means of access for RINF/register of infrastructures is yet available, although it is understood this will be developed, however even if such access is provided this is less of a problem than that of system availability. If the database is to be used for day-to-day checking of actual train formations, it needs to be available 24x7.

²⁶ Commission Implementing Decision 2011/633/EU of 15 September 2011 on the common specifications of the register of railway infrastructure, OJ L 256, 1.10.2011, p. 1.



In its report on RINF/register of infrastructure development the ERA assumes that the RINF/register of infrastructure is not intended for day-to-day checking of compatibility of trains with infrastructure, only with planning of trains well in advance of their operation, (see IU-RINF-101110-Rep 1.0 Para 5.4). The gap arises with the variability of train parameters even when planned in advance, for instance the train length, weight and axles loads can vary on each train. In addition, requests RUs make for ad-hoc paths on the network, imply the planning period is much truncated or even omitted. For ad-hoc paths, the exact train composition may only be known a few hours, even less than one hour before a train departs; this is especially the case with trains composed of wagonload consignments.

By assuming the RINF/register of infrastructure is only for planning purposes, it is not intended to be available 24x7, only during office hours, therefore even if rapid access were possible for checking a train formation; the system would not be available for checks outside office hours, which means non-availability includes weekends.

Constraints and other considerations

Not all RUs operate sophisticated operations systems able to support messaging.

Checking of train formations against infrastructure takes place at train preparation time, therefore any checking system needs to be available 24x7.

Existing approach

RUs with their own operations systems have developed them to provide train formation checks based on infrastructure characteristics supplied by their host IM. In many cases the infrastructure characteristics are in the form of paper documents, or their electronic equivalent, (Word or Adobe pdf). Such documents are transcribed into the system files and kept up-to-date by a system administrator.

Nature of the solution

In general most RUs operating trains on a single IM network experience few problems with train compatibility with infrastructure as its characteristics are well known, the vehicles are fit to pass individually, and the authorised train parameters are usually available, and even built in to their IT systems. The solution needs to concentrate on international trains where checking is much more problematic if it has to be done at short notice.

Provision of an on-line real-time enquiry to a RINF/register of infrastructure is needed to allow an RU to submit the actual train formation together with the technical information needing to be checked against the infrastructure characteristics. In cases where more than one network is traversed, the RU would either submit the enquiry to each RINF/register of infrastructure, or with the common interface in operation, would specify the RINF/register of infrastructures concerned on a single input message, and receive responses in turn from each RINF/register of infrastructure.

As a first step to introducing such a solution, every RINF/register of infrastructure must be made available 24x7 so that the enquiry messages can be processed before train departure at any time of day or any day of a week.

Message structure

To be defined

Additional data fields

To be defined



6.1.15 Linkage between RINF/register of infrastructure and network statement

This gap just covers the following item:

- ▶ linkage between RINF/register of infrastructure and network statement

Requirement

The existing legislative requirements imposed on infrastructure managers for publication of a network statement, and also for development and implementation of an RINF/register of infrastructure are separately imposed, in fact several years separate the two legislative impositions.

Legislation

1. Directive 2001/14/EC requires IMs to publish network statements
2. Directive 2008/57/EC requires Member States to create and publish registers of infrastructure

The gap

The unfulfilled need is technical but may mask the possibility that operational data cannot be extracted and used. There are no mandated or even any defined links between information held in a network statement, and that held in a register of infrastructure. The RNE has developed a “common structure” for the network statement which it recommends to its members.

Whilst most network statements are available as electronic documents (e.g. pdf files) there is no requirement to link them to RINF/register of infrastructures, so any organisation examining a network statement which indicates data is held in an RINF/register of infrastructure must, perforce, manually extract information from the network statement and then attempt to use this to obtain information from the RINF/register of infrastructure.

Constraints and other considerations

Network statements set out “general rules, deadlines, procedures”²⁷ and are not intended for the minutia of infrastructure characteristics.

Existing approach

IMs publish a variety of documents to support their network statements with varying degrees of detail.

Nature of the solution

The solution lies in migrating network statements to become structured databases, allowing text documents to be accessed directly, and for details of infrastructure to be obtained by offering various enquiry functions to obtain data from RINF/register of infrastructures.

Message structure

Not defined in this report – needs careful investigation of the detailed industry requirements.

Additional data fields

Requires definition following the investigation and recommendations

²⁷ Article 2j) of Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification OJEC L75 15. 3. 2001 p.33



6.1.16 Gap analysis - updating of TAF TSI requirements for RINF/register of infrastructure

This gap just covers the following item:

- ▶ updating of TAF TSI requirements for RINF/register of infrastructure

Requirement

The TAF TSI predates the RINF/register of infrastructure by several years, and needs to be updated to acknowledge, and also potentially make use of this database, for the purpose of train formation validation, both in planning trains, and also to check an actual train for compliance with the infrastructure over which it will pass.

Legislation

The TAF TSI in Section 4.2 includes train parameter data as part of the path data held by the IM and advised to the RU operating the train who must then comply with it. This data includes: - max. weight, max. length, max. speed, max. axle weight, min. brake force, max. weight per metre, information concerning exceptional gauging, identifiers of dangerous goods not allowed. This information is related to infrastructure characteristics which impose maximum limits on each section of route

The gap

The unfulfilled need is operational. In its final report on RINF/register of infrastructure, the ERA provides a list of amendments to TSIs arising from the introduction of RINF/register of infrastructure in Annex 3. The TAF TSI is absent from this list yet the use of RINF/register of infrastructure by the TAF TSI potentially provides an ideal and simple way for RUs to obtain the authorised parameters for a train over a defined route, and also to validate any train formation for compliance with the infrastructures over which the train passes. With more and more rail freight traffic passing on a short-term basis, a quicker way of validating train formations is needed, and the RINF/register of infrastructure would be a key component of any checking system.

Constraints

Any solution must provide for all stakeholders requiring to check and validate train formations including small and medium size railway undertakings

Individual RINF/register of infrastructures are to be established for each IM, but trains may pass over two or more networks, thus needing access to several RINF/register of infrastructure for the same train.

Existing approach

The larger, usually ex-incumbent railway undertakings have developed sophisticated systems for the validating of train formations. These normally only cover the infrastructure characteristics of a single "host" IM. The software normally also includes the various regulations for train loads relevant to the Member State of residence. Information on infrastructure characteristics is invariably manually transcribed from published documents including the network statement, and also any other documents referenced in these statements.

Nature of the solution

The use of the train composition message should be expanded in the TAF TSI to encompass checking of the train parameters against the infrastructure limits. This is already hinted at by provision of the "train not suitable" message from an IM in response to a train composition message from an RU.



Message structure

The existing messages for train composition and response from IMs are suitable, but needs careful investigation of the detailed industry requirements for train formation validation.

Additional data fields

Not defined

6.1.17 Train running information for railway undertakings

This gap covers the following items:

- ▶ train running information for railway undertakings
- ▶ exchange of train running information between infrastructure managers

Requirement

All the parties involved in train running need information on the locations of trains in real time or near real time for control purposes.

infrastructure managers need to know train running information for regulation purposes and thus minimise delays and maximise the availability of their infrastructure. Advance information on the running of trains shortly to be handed over from other IMs is therefore essential to their management of the network

railway undertakings need train running data for supplying information to customers on the whereabouts of their consignments, to arrange or rearrange resources (locomotives and train crew as appropriate) at relief points, and to combine train running information with other information to derive data such as the distances run by wagons and locomotives.

Legislation

Directive 2001/14/EC requires infrastructure managers to cooperate in managing international train operations, and suggests the establishment of joint organisations for this purpose. Regulation (EU) No 913/2010 takes this further.

RailNetEurope, the infrastructure managers' trade association was established in 2004 and since then has developed the TIS system (formerly EUROPTIRAILS) which makes train running information available. In addition, the UIC has driven forward the introduction of revised UIC leaflets to support train operations, (Leaflet 407-1 of November 2009), in fact the TIS project relies on the messages defined within UIC 407-1. Many railway undertakings have also agreed on joint traffic arrangements.

However all that has been undertaken so far has been proprietary, with no obligation on any RU, or IM to join TIS or indeed any other project. The messages in UIC leaflets are available for freely chosen bilateral agreement between parties for them to be exchanged; they are not a requirement of UIC membership.

The gap

The need is operational; stakeholders require the information to be able to run their businesses efficiently. Whilst the TAF and TAP TSIs require infrastructure managers to supply train running data to railway undertakings, there is no requirement for them to exchange the same data directly between themselves for trains which pass over two or more infrastructures. Any such exchange is defined as via the railway undertakings. The OPE-TSI does not set down any requirement, although the need for the parties to cooperate is a requirement in Regulation (EU) No 913/2010 and the main IMs are cooperating as intended. It would seem desirable for a (non-mandatory) message to be specified.



Where there is interchange without handover, there appears to be no responsibility placed on the IM to notify the receiving railway undertaking of the progress of the train; that appears to be defined as the first railway undertaking's job. Whilst the first infrastructure manager does not necessarily have a contractual relationship with the second railway undertaking, it is slightly surprising that there is no provision for train running information to be supplied direct. The new railway undertaking is required to reissue the train composition message, whether or not there has been a change to composition.

Another gap is that the data supplied to railway undertakings by IMs in the existing messages is deficient in that it does not contain anything for the distance run by the train. Any railway undertaking that needs to calculate distances-run by vehicles he is using can only derive such values by reference to distance tables and the reports of trains at the locations on the train schedule.

A further gap is that there is no requirement for train formation information to be exchanged between IMs prior to handover.

Constraints and other considerations

The ability of small and medium-sized railway undertakings to support receipt and processing of messages generated by the train circulation systems of the IMs is a constraint.

Despite most track access charging systems being based on train-kms and tonne-kms, generation of kms-run in real-time (or near-real time), may require development of IM systems to add the necessary data implying a development effort to be financed to supply a benefit to the RU but with no obvious benefit to the IM supplying the data.

Nature of the solution

In view of the expansion of TIS, with eleven IMs now on-board, and its use of the very comprehensive UIC 407-1 message suite, and the data available to RUs and IMs from the TIS system, there would not seem to be any need for further legislation in regard to supply of train information to railway undertakings, or between IMs.

In addition, distances-run should be added to the train running information already mandated for supply to RUs so that it can then be made available to the parties involved in rolling stock maintenance.

Message structure

No changes

Additional data fields

A new data element to be added to the train running advice message (TAF & TAP TSIs) for kms-run by the train from, its origin station.

6.1.18 Train Timetable Identification between IMs and RUs

The gap

In TAF TSI the present proposals assign two identifiers for a train - the Train Identifier and the Path Identifier. The Path Identifier being assigned by the IM and the Train Identifier being the common ident between the RU and IM. This took account of the situation where a train is running late and can be scheduled by the IM to use another path particularly relevant where freight trains are using congested infrastructure.

This proposal also went to CEN to create a formal norm for these identifiers.



However it was recognised that this did not solve all situations where change of identifiers occur at present and did not create a unique identifier for reference and enquiries. Most enquires at the moment use the Train Identifier and date of scheduled departure from origin to create a common reference.

A working group was created (WG10) to address this problem and to propose a solution.

ERTMS and GSM-R standards need a common Operational Train Number known and used by both IMs and RUs and which has to be all numeric and not a maximum of 8 characters. Most European signalling systems are restricted to 5 numeric characters to register the trains and this is compatible with the present UIC leaflets 419-1 and 419-2 describing the formats for international freight and passenger trains.

This WG has produced a new proposal for a TTID with 24 characters for planning and 32 including the date, with 4 versions for a train to cover the full life cycle.

The versions are

- ▶ Train
- ▶ Path
- ▶ Path Request
- ▶ Case reference.

The solution

In our discussions with RUs and IMs the vast majority felt the solution to be too complex and the problem where the TTID is not found by one of the players is a serious gap. The above identifiers would not all have to be present in every message but the potential for failure during the overall process would be quite high. The role of RNE's PCS system in co-ordinating international paths is already useful and would assist with a process for resolving missing or out of synchronisation of the ids but most interviewees felt train and path were the main essential ids and that the key one must be train wherever possible for the main train number to be the same as the Operational Train Number OTN.

The gap is to have an agreed TTID and OTN as part of a revised TAF and TAP TSI.



7. Recommended system

7.1 Who does what?

This section of the report summarises the approach proposed. It acts as a lead-in to the following section which provides much more detail and also explains the logic behind the approach.

For traffic information, the consultants propose that

- ▶ the lead railway undertaking acts as the repository of all the information about the consignment and supplies information to railway undertakings along the chain as a function of their role.
- ▶ Wagon keepers hold master files for vehicles in their fleets and supply that information as required to railway undertakings.
- ▶ Railway undertakings along the chain only hold such data as is necessary for current operations; they update the lead railway undertaking as required.
- ▶ Railway undertakings supply wagon keepers with wagon status and performance data to allow the keepers to update their files and to base maintenance on performance.
- ▶ Central files are necessary to identify the parties and route messages.

For infrastructure information: the infrastructure manager holds and maintains the files, creating appropriate bridges between asset based systems and systems designed for railway operations.

7.2 Data required and data supply

The centralised WIMO as originally specified is not going forward for development and implementation. It was originally proposed in order to deliver customer service involving multiple RUs and wagon keepers. The WIMO avoided a multiplicity of separate databases which could have made it very difficult to provide quality transport service data. The central source had been regarded as the best way to make information available to interested parties. This original mandate met with considerable opposition from the railway undertaking community who regarded much of the WIMO information as confidential to them and their partner RUs in the transport chain. There were also significant interface issues with non-EU railways.

Therefore in response to the original TAF TSI, the railway undertakings proposed a distributed WIMO, in which only a wagon pointer file would be central and information concerning wagons would be obtained from the system of the RU responsible for the wagon. Currently many RUs use or plan to use ISR for this purpose. This approach runs the risk of a lack of clarity in data flows (where, for example, would a record for a container transhipped at a break of gauge be held). The Xrail project also proposes using a copy of the ISR data for comparing trip plans based on the operational timetable with actual events, and hence would store planned and actual journey information. One unresolved issue is that trainload movements of wagons are also required by the TAF TSI, but in most cases are not in ISR but only the RU database.

The current study also provides the opportunity to think through the groups of data that are actually required for the various processes and then decide the origin of that data and the use of that data. That provides a logical approach and the opportunity to distinguish between the various roles a player may hold (the roles of a railway undertaking as a carrier, keeper and ECM for example). Using this data-led approach, sensible conclusions on where the data should be held can be made.



It also provides the opportunity to define where data is to be held as a master file and where data is held, either permanently or temporarily in other files. The first task is to define the datasets.

The section below therefore firstly identifies the needs for data then suggests how this data might be supplied.

7.2.1 The data required

The data items that are required are treated in groups below. The major groups of data are authorisation data, permanent technical characteristics, transient technical information, journey related data and traffic monitoring data (at the consignment and container level).

7.2.1.1 Authorisation data

Section 4.2.2.5 of the Traffic Operation and Management TSI implies a requirement that railway undertakings and infrastructure managers need to know that vehicles are properly authorised for use. This includes whether the vehicles are authorised at all and whether they are authorised for a particular infrastructure over which they are due to run.

For the latter, the forwarding railway undertaking will clearly need software to identify the route a train or wagon is to take. Consignment note data includes the interchange points between railway undertakings but this may not be enough to indicate the infrastructures used unambiguously. Both authorisation at all and authorisation for particular infrastructures can be satisfied by the authorisation data on the NVR (subject to its being up to date). Because this authorisation data has some affinity with the permanent vehicle characteristics, it is proposed for a number of reasons that authorisation data is copied whenever the NVR is updated to the file holding the permanent technical details of the vehicle and treated in the same way (see below). This means the data will be pushed by the NVR rather than pulled by the keeper and thus represents a change in philosophy.

7.2.1.2 Permanent technical characteristics

Railway undertakings and infrastructure managers require the permanent technical characteristics of vehicles. The need for length and tare weight is self evident but such data as the load panel which gives details of permissible speeds given load and line category is also required. Braking characteristics are required. The carrying capacity in tonnes is essential and capacity in cubic metres or hectolitres may be also be essential. Railway undertakings may need to know the products a vehicle is approved to carry in the case of dangerous goods. Further information such as the distance between wheels may be needed where there is a risk that vehicles will bridge track circuits. All this data may be summarised as permanent technical data.

Railway undertakings need this data when they receive a vehicle on interchange to be able to calculate train characteristics. It could be argued that railway undertakings only need data relevant to the journey being made (the speed, brake weight, etc. under those loads conditions) but given that reloading has to be provided for, it is prudent to propose that railway undertakings receive a full set of data. The existing HERMES messages provide for a full set of technical data to move with the vehicle (see below).

7.2.1.3 Transient technical data

Railway undertakings and infrastructure managers need to know that vehicles are fit for service. This requires access to both the maintenance periodicity data to ensure



that a vehicle is within its general overhaul date (or other criterion if maintenance is performance related) and also to know if the vehicle is free of restrictions (such as an isolated brake). This information might also be supplemented by confirmation that the entity in charge of maintenance is still certified. Whilst keepers may also impose some restrictions of a quasi operational type (such as do not send this wagon to Syldavia), it is probably better to police those by other means.

7.2.1.4 Checking and refreshing the technical data

When and how often this data is to be checked is an important consideration, at one extreme it could be checked before every loading and after every interchange, at the other extreme a railway undertaking could hold data indefinitely without seeking to update it.

As wagons move on journeys, there is a requirement for the data described above to be available along the chain of movement for the same reasons. There is a need to ensure the data is accessible downstream of a railway undertaking with an IT system which is down or which has not been enhanced to hold the data.

7.2.1.5 Journey related data

Railway undertakings along the chain also require operational data for the wagon, pre-eminently destination, routeing, etc. but also commodity data and data which affect how the wagon is to be processed (such as customs or dangerous goods information). Operational data need not necessarily be retained for long term by user railway undertakings. It should be noted that the TAF TSI solution, the use of wagon order messages, requires amendment to suppress certain data when the railway undertaking in question has a subcontracting role and is not entitled to a full set of data. The wagon order solution does however ensure that railway undertakings downstream of the subcontracting undertaking can receive a full set.

Further data such as whether the wagon was loaded by the consignor (which has consequences in the case of load adjustment) is also desirable. In addition to this there is commercial data proper such as whether a charges note has been prepared. The most extreme case of this data is the charges for the movement. That data will be very carefully protected as it is transferred between railway undertakings; charges data will not be supplied to railway undertakings with a subcontracting role. (It has to be said that charging is normally centralised and so individual charging is now very rare.)

7.2.1.6 Traffic monitoring data

In addition to the quasi-technical data above there is a need to follow traffic for commercial reasons. It should be quite clear that this requirement is a “traffic” requirement rather than a vehicle requirement and the data should follow the consignment. It should allow traffic to be monitored in the event of transshipment (transshipment of a container at the Franco-Spanish frontier, for example). The distinction between wagon data and traffic data is not made adequately in TAF TSI. The two are quite different and need to be handled separately.

The requirement might be satisfied by the ability to search for a consignment on an ad-hoc basis or systematic supply of event data to a single repository. The TAF TSI opts for the latter solution which offers the opportunity to assemble complete journey files and thus collect quality statistics. That solution however, requires significantly more messages.



7.2.2 How should the data be organised?

7.2.2.1 System criteria

Railway undertakings (in particular) have historically spent a lot of time and effort into building up systems and databases to run their rail operations. Amongst these developments have been databases and messages. As far as possible, any new system should build on this existing work rather than attempt to supplant it. Systems must also be simple and be capable of being built block by block to allow railway undertakings with more limited funds and capabilities to take part in a progressive way.

7.2.2.2 Criteria for the ownership of data

To establish where data should be held, some principles for holding and managing data are needed. Amongst these is that the party holding and managing the data must be:

- ▶ close to the data so that it can be updated quickly and accurately;
- ▶ have an interest in the data being available and correct;
- ▶ prepared to accept liability for it;
- ▶ sufficiently resourceful to be able to run reliable IT systems.

As far as possible, data should be held in one-stop-shops, the one-stop-shop approach provides for clarity, all the data is in a single place and it reduces the number of enquiries.

It is understood that Member States do not see themselves having a role in current railway operations. They would not therefore see the NVR either being made available to provide real time vehicle characteristics or enhancing the file to cover data items (such as braking characteristics) that are currently absent.

By its nature the ERATV is unsuitable to provide information about individual vehicles.

The proposal above is for authorisation data (see above) to be pushed by the NVR to the keeper's file whenever there is a change in the authorisation characteristics. As an alternative, keepers might use their rights of access to interrogate and take data from the NVR (say) once a month and put it with the permanent vehicle characteristics for consultation. This would be less satisfactory in terms of keeping files up to date but requires no changes to principles.

There is a question of which file is the master file for technical characteristics, the NVR or the keeper's own file. Despite the regulatory nature of the NVR it is difficult to avoid the conclusion that the keeper's file must be the master file for the permanent characteristics (with the exception of the authorisation data referred to above). The keeper's file is "closer to the action" and may be updated more frequently.

7.2.3 The vehicle master files

This then leads to the following conclusions for vehicle data:

7.2.3.1 Authorisation data and permanent vehicle characteristics

A railway undertaking that wishes to use a vehicle for a journey needs its technical characteristics.

Once a vehicle is no longer being used by a user railway undertaking (as such), there is no need to hold its technical details on file. Railway undertakings may



choose to hold permanent technical wagon characteristics on their files. Currently some railway undertakings continue to hold the user set of that data semi-permanently, others delete it after a period. Railway undertakings should be free to make their own choices in this matter.

The technical data must however have a source master file. A distinction needs to be made between the master file for this data and subsidiary files that may hold and use it. This distinction is most important in the case of a railway undertaking which may hold data in a single file as the keeper but also user of a vehicle. Whilst it would clearly be ridiculous to require separate files for these roles, the fact that the data fulfils two different purposes should not be overlooked.

The keeper therefore will hold the vehicle master file. In many respects it can be considered as an asset register. As such, it is highly desirable that it contains the "URVIS number" the rolling stock identifier defined in the Luxembourg Protocol. It should be noted that 12 digit running numbers may change (as a result of modifications to the vehicle, but the URVIS number will not.

There is an important issue of accessibility. Not only must there be a clear responsibility on one party to hold the data, it must be clear to the rest of the community who that party is and how the data may be accessed. This requires a table (a pointer file) to provide details of the party holding the data for every wagon. If the assumption is that that party will be the keeper or a service provider commissioned by him, then a central file with vehicle number, the keeper and the keeper's database is essential. Indicating both the keeper and his database is essential to provide for the case where the keeper has more than one database (as a result of amalgamations or management structures). Keeper here can of course be a railway undertaking, but acting as a keeper rather than a train operator. The consultants propose (below) that maintenance information is exchanged with keeper rather than the ECM but clearly a central file which also held ECM data could be helpful. For the same reasons as those for technical data, it would seem that the VVR and NVR combination are not suitable for this purpose. Again it would seem desirable for the central file thus constituted to be regarded as the master file. The file that is being defined thus is very similar to that used by the GCU file. A second pointer file (see below) is also required to indicate user railway undertaking at any one time. Technical studies will indicate if these two pointer files, location of vehicle characteristics and user responsibility for the vehicle, can be combined.

A number of messages require the user railway undertaking to be identified and for this a pointer file will be required. This might be done by bleeding off information from interchange messages but the consultants are under no illusions that the information will always be reliable. Failures to implement and system downtime will make this pointer file an incomplete tool. Automated means of passing on messages and updating data are therefore to be desired. Fortunately these are not difficult to design.

The solution for supplying user railway undertakings with technical data must also provide for failures to transfer technical data and railway undertakings that do not transfer the very full HERMES interchange data set.

An issue which needs consideration is whether user railway undertakings need to access a master file each time a vehicle comes into their care or if railway undertakings can rely on a HERMES interchange message or hold permanent data indefinitely. The need to revalidate data from the master file periodically must also be considered to ensure that data has not been corrupted or has changed (also see below on transient data). There is balance to be struck between interrogating a master file frequently and keeping message volume down. If data is accessed each time from a master file, then it is clear it is always up to date, on the other hand



that gives rise to significant data volumes (the weight/speed characteristics alone for freight wagons can run to 400 characters). It is clear that the master file must be interrogated where the user railway undertaking does not have a complete set of data. Otherwise, the HERMES approach of passing forward data has much to commend it. In any event, an application to find and search the master file will be required.

Under current circumstances, railway undertakings acquire copies of the vehicle file via HERMES on interchange and then hold those details while they use the vehicle. It would seem sensible to continue this practice since the data exchange is efficient and controlled (the parties are clear, no searches are required and the protocols are well established).

The danger is the details on file for a vehicle may be changed in some significant way (for example to correct an error or update the data after workshop attention) but the user may be totally aware of the change. The design of the existing HERMES system relied on information being passed between railway undertakings and the “registering” railway undertaking holding the master file. When the vehicle returned to the “registering” railway its details were automatically refreshed. Under present circumstances, where a keeper is not also a railway undertaking there is no automatic updating of vehicle characteristics as the vehicle moves around the system. The consultants propose that a message is pushed to the user railway when the keeper makes a change to the file. It should be noted that the HERMES data includes details of infrastructures on which vehicles are authorised to run.

The consultants recommend continuing with the HERMES interchange messages, which are effective, efficient and well understood. It would be desirable to require this full exchange of vehicle technical data in the TAF TSI. Even in the case of trainload flows where wagons may be well known to the various users, there is a requirement to pass details of defects which may have arisen.

7.2.3.2 Transient technical data

By transient technical data, is meant technical data which changes. This includes such data as date of next overhaul but also data which affects the current journey, such data as technical restrictions because of the condition of the vehicle. This is exemplified by an isolated brake. The origin of transient technical data may be the user railway undertaking (which has stopped a vehicle), it may be a maintenance organisation (which has made temporary repairs) or it may indeed be the keeper himself. In any event the user railway undertaking requires that data for operating purposes, the keeper and his ECM require it for follow up and subsequent users require to be supplied with it or to have access to it. A mechanism is needed to indicate if the information has been passed to the keeper (so that, for example, if the railway undertaking identifying a defect is not able to pass the information to the keeper, someone else can).

It is logical to have the master file for temporary data in the same place as for permanent data; that provides for a one stop shop for all data and further reinforces the argument for the keeper to be the holder of the master file with all the technical data.

Although the GCU (Article 19.1) places significant responsibilities on railway undertakings to keep vehicles fit for use, there is a clear implicit requirement for keepers to monitor the state of their assets. There is some overlap in that the entity in charge of maintenance bears responsibility for the maintenance of the vehicle, in face the curative work is largely done by railway undertakings quite outside the control of the ECM. Despite (and perhaps because of) the fact that much of the work is done by a number of parties (in accordance with the GCU and ECM legislation), it would seem desirable for all the data related to an individual



vehicle to be kept in a single location rather than by the party doing the work. Railway undertakings (as such) should not hold this transient repair data on their files permanently.

It is presumed that details of vehicle condition will be passed on (as now) on interchange, however messages will be required to report wagon condition back to keepers. A format for this already exists and is in use between certain railway undertakings. Messages have already been postulated (above) for railway undertakings to enquire about vehicle condition. Indicators will be required to flag that the data has been passed to the keeper so that in case of default, other railway undertakings in the chain can remedy the deficiency.

Where vehicles are actually called in for maintenance based on performance, the process should follow from the principle in the GCU (Article 9.2) that only the keeper can give instructions for the movement of his wagon. In many cases of course, the keeper will delegate this power but the delegation will be recorded and be under controlled conditions. Delegation may take one of two forms, a long term delegation in the form of a wagon lease to a customer or a short term, geographically defined delegation to a railway undertaking following RIV principles. In the first case, calling a wagon for maintenance will require the customer to be notified. The second case is more complex, it requires the current location to be identified, the user railway undertaking to be identified and instructions to be given which take effect when the wagon becomes empty. In this case the keeper will need the ability to identify where the wagon is and under whose control it is before being able to initiate a request for its return. Quite complex software and messaging will be required.

It should be noted that in many cases where the keeper is a railway undertaking and also an ECM it will not send messages to itself.

Safety agencies should have a right to inspect and audit both the permanent and transient technical data on vehicle files. Keeping both sets of data in the same place will aid this process.

7.2.3.3 Journey related data

Journey related data is only relevant to the current journey and only relevant to the current user. The TAF TSI specifies that the data will be supplied in the “wagon order” message. It follows therefore that the data should be held by the user railway undertaking and linked with the wagon on its arrival. After the vehicle has left, there is no further requirement to hold the data. There should be an option to be able to “reload” journey related data from the lead railway to cover system failures and where a vehicle is transhipped.

It seems to the consultants that the wagon order message in purpose and content has a great deal in common with the consignment note data. It seems logical to combine them. That will require a much more sophisticated message with much more data but the ability for the lead railway undertaking to turn-off the supply of data to railway undertakings not entitled to it. This likewise implies that some of the data in the HERMES interchange message is switched off.

7.2.3.4 Technical work done on the vehicle

It is important that work done on the vehicle (remedy of defects, adjustment of settings, replacement of components, etc) is recorded. Records are desirable as part of the keeper's/ECM's duty to monitor the state of the vehicle. Records allow monitoring of component reliability in the interests of continuous improvement. Not least records of work-done support the charging system. It is logical that these records are held with the other technical data. Keepers will be responsible for



collating the data and analysing it for their own or regulatory purposes. It is the consultant's belief that there is significant value in enhancing this data with finer details of maintenance work so that data on such issues as component reliability can be collected.

There is a question of whether data on vehicle condition and performance should be held and supplied by the keeper or the ECM. The consultants have no hesitation in saying the keeper should be responsible for all the data. The responsibility for the vehicle is the keeper's; the keeper discharges that responsibility by a contract with the ECM. The keeper is therefore the key party. Secondly, it is highly desirable to have a single file with all the vehicle technical data, permanent as well as transient. That can only be kept by the keeper.

7.2.3.5 Vehicle performance data

Vehicle performance is a valuable aid to driving maintenance. If ad-hoc (and expensive) solutions such as GPS are rejected, then the only source of the information is from user railway undertakings. Axle mounted equipment might be a potential solution for restricted and highly controlled flows. Accordingly some system for funnelling performance data back to keepers is required. This will require the same vehicle to keeper look up table as has been discussed. Keepers would then be responsible for collating data from the various railway undertakings. Whilst railway undertakings might have their own look up tables for distances, it would be prudent to provide for infrastructure managers being required to provide distance run between stopping points for trains on specific days on demand. That would either require a specific question and answer message initiated by the user railway undertaking or an automatic message sent when a train completes its journey or arrives at a handover point.

7.2.3.6 Traffic monitoring data

There is a requirement as part of good customer service to hold details of traffic movement for current monitoring purposes and for statistical and quality of service purposes. The logical responsibility for that data falls to the lead railway undertaking which will be supplied with updates on the progress of the traffic by railway undertakings en-route. Whilst, as outlined above, the railway undertakings en-route have no need of journey information after a vehicle departs, the lead railway undertaking will hold traffic monitoring data at least until the end of the journey. The need to derive statistics may suggest an even longer timescale.

Traffic data is of vital importance to customers and needs to be collated by an entity which can establish a clear right to it and validate access to it. Only the lead railway undertaking with his customer relationship is in a position to do that.

Passing the event data to the lead railway undertaking involves significant flows of data. It may be that this data would in fact be rarely used. The consultants therefore considered an alternative; that is that the railway undertakings in the chain kept the event history themselves and thus that the event file was virtual. In the consultants' judgement however, this solution is not robust and was not pursued any further.

7.2.3.7 Traction units

The proposal is made above that there is a requirement to exchange data in respect of traction units.



7.2.4 Derivative files

The discussion above refers to master files for authorisation data, permanent technical characteristics, transient technical information, journey related data and traffic monitoring data. Files that interrogate and use that data also need to be considered.

7.2.4.1 Railway undertaking files

A railway undertaking will assemble all the data it needs to run its trains. It is important that the systems of data exchange are simple and allow one-stop-shopping. HERMES messages may provide some of this data, searches may be necessary to fill gaps in data. The data required will include the permanent and transient data for the wagon and the journey data. Sources of the data will depend on the role of the railway undertaking, for a lead railway undertaking this data may come from the customer, the forwarding railway undertaking will initiate other data, for transit and destination railway undertakings this data will come from a HERMES interchange message or by default from the keeper's master file. Transit and destination railway undertakings will also need journey related data for those vehicles, this data will come in a "wagon order" message. Substitute railway undertakings, those not bound by the principal contract of carriage, will get only a subset of this data but they will have enough data to be able to run the train safely. Each railway undertaking will be required to match the wagon order with the interchange message. Clearly a railway undertaking will need to hold the technical details of the vehicles it is currently using; the railway undertaking may also hold master files for vehicles for which it is the keeper. How it actually organises those files may be left to its discretion.

If incidents occur, then they will be flagged up to the lead railway undertaking for customer information purposes and the keeper for vehicle monitoring purposes. The railway undertaking will also update his copy of the vehicle transient data and ensure that it is passed to other railway undertakings in the chain.

When the wagon is delivered or interchanged (or perhaps after each train), the user railway undertaking will supply details of distance run to the keeper.

7.2.4.2 Data supplied to infrastructure managers

Railway undertakings should be free to choose their own means to extract and supply the data they are required to supply to infrastructure managers in the train composition messages.

7.2.5 Summary

7.2.5.1 The data files

The five sets of data identified, authorisation data, permanent technical characteristics, transient technical information, journey related data and traffic monitoring data, should be accommodated by having:

- ▶ master files maintained by keepers for authorisation data, permanent and transient technical data. These files would be authoritative sources for all but the authorisation data which itself would be taken from the NVR. Railway undertakings would interrogate that file as necessary for vehicle data and update it with changes to the vehicle's conditions and the vehicles performance. That file would be the source of data for maintenance. A pointer file, perhaps derived from the GCU file, would indicate the keeper file for every vehicle and hence allow messages. To reduce data transfer, railway undertakings in practice will hold copies of the permanent data for many



vehicles on their own operating files;

- ▶ journey related data held by user railway undertakings relating just to the journey in hand and purged after the departure of the vehicle;
- ▶ traffic monitoring data held by the lead railway undertaking;
- ▶ pointer files for the user railway undertaking. This pointer file will be updated by interchange messages. Since the pointer files are cross-industry and have no obvious owner, they will require special governance structures.

7.2.5.2 Message structure

These conclusions amplify rather than contradict the various TSIs. They require additional messages to service the data files. In many cases these messages are already specified and in use as HERMES messages so little additional software effort is required.

7.2.6 Infrastructure data

There is little ambiguity on how infrastructure data is to be held. Adopting the same principles for data management as those above, whilst national governments may have the obligation to set up infrastructure files, there can be little doubt that placing those files under the responsibility of infrastructure managers makes sense. Likewise, there is little need of pointer files or links. By contrast however, the well defined coding structure for all aspects of vehicle use is totally lacking for infrastructure attributes.

7.3 The “To-be Diagram”

This is based on the “As-is Diagram”, but certain entities related to IT are removed and replaced by others as part of the proposals made by the consultants. All the data flows remain present, but those included in the proposals are highlighted in yellow, and the consultants have added additional data exchanges where necessary. Those flows which are highlighted involve the use of structured messages sent electronically using a common interface. The detailed mechanism for facilitating data exchange is described in the technical description of the solution. The solution is based on work already done for the TAF TSI, but the central WIMO as defined in the TAF TSI is removed and replaced with a pointer file to allow the holder of information on a wagon to be determined prior to requesting data from the holder.

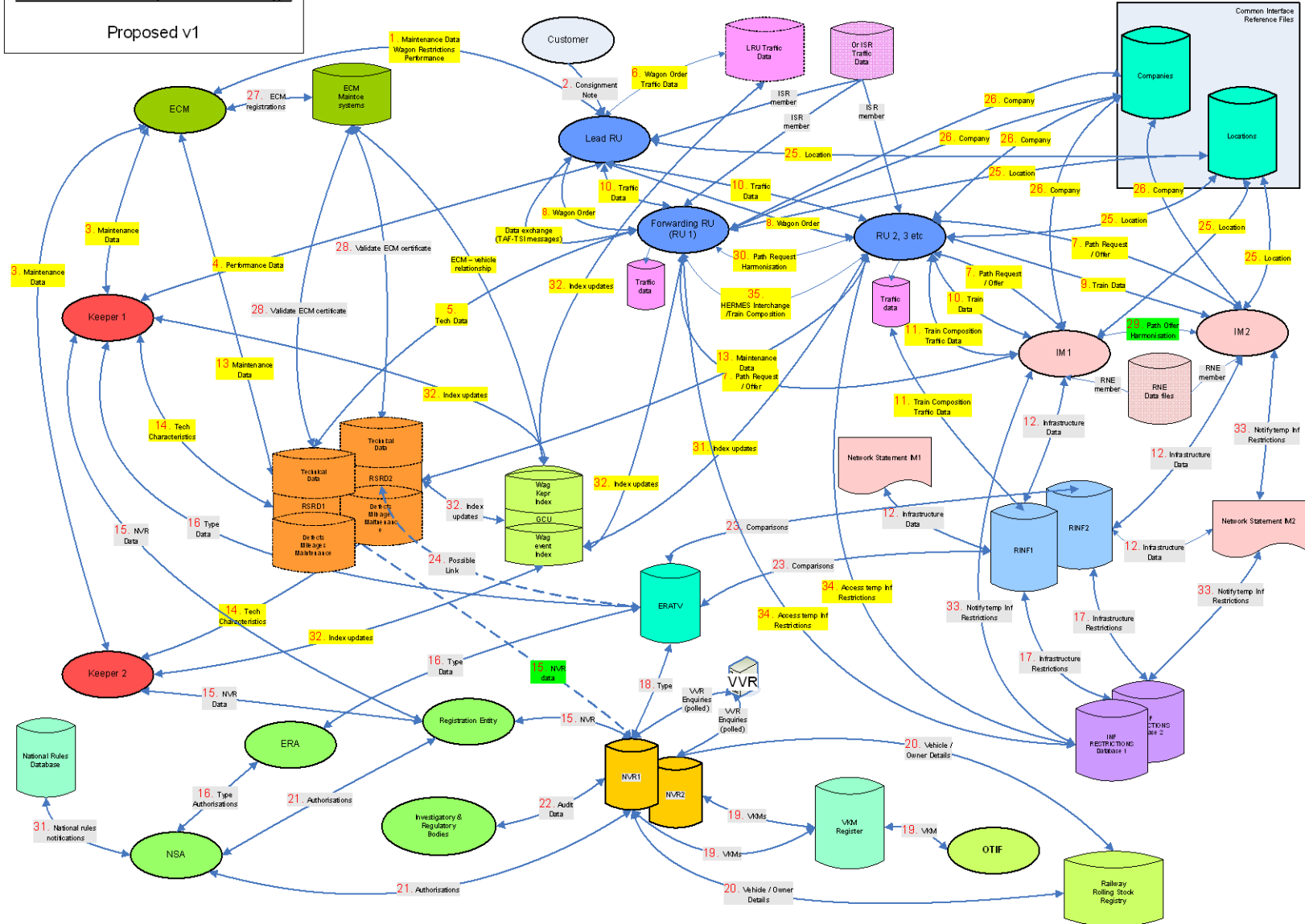
In the diagram, the various databases are shown using the traditional “cylinder”, whilst organisations are shown as coloured ovals. Organisations are colour-distinguished as are the databases.

Stakeholders	Colour
Railway undertaking	- dark blue
Infrastructure manager	- pink
Keeper	- red
ECM	- dark green
Governmental & regulatory	- light green



EC Database Study - Data Exchange

Proposed v1





No	Description	TAF TSI (or other) Message/interface	Solution changes
1	<p>Maintenance Data/Wagon restrictions/Performance</p> <p>As described in the rolling stock – freight wagons TSI, the RU will require maintenance/restriction data to assure themselves of the vehicles fitness to run.</p> <p>Additionally the RU should provide performance data back to ECM/keeper to allow for future maintenance planning</p> <p>2006/861/EC – Section 4.2.8.1.2</p>	None suitable	<p>RU will request maintenance/restriction data (see also flows 3, 5) from the relevant keeper database (RSRD). The relevant RSRD will be identified by initial querying of the pointer file and the data may be retained in the RU traffic database as a date series to ensure it is up to date and as accurate as possible</p> <p>Additional messages required :</p> <ol style="list-style-type: none"> 1. From RU to pointer file to update RU using the vehicle number obtained from HERMES interchange message 2. From RU to pointer file to identify keeper database and reply 3. From RU to keeper’s database to request defined data items for a vehicle and reply 4. From keeper to pointer file to check RU’s entitlement to data and reply 5. From RU to pointer file to claim a vehicle coming from outside system 6. From RU to keeper database (RSRD)/ECM to provide maintenance/performance data/stop-release. We propose the HERMES “Goethe” message to be considered as a possible model for provision of wagon use/performance information by RUs to keepers
2	<p>Consignment note</p> <p>The customer and lead RU will exchange the consignment note detailing information to support complete transportation</p> <p>62/2006/EC – Section 4.2.1</p>	None LRU completes and processes the CN and enters the relevant data into his system	<p>After processing the CN, the lead RU will transmit wagon orders to the relevant RUs in the transport chain.</p> <p>The wagon order message is to be amended to be provide for more consignment note data</p>



No	Description	TAF TSI (or other) Message/interface	Solution changes
3	<p>Maintenance data</p> <p>It is anticipated that keepers will require data about maintenance carried out to ensure contracts with ECMs are being fulfilled correctly 445/2011 (ECM Regulation) Article 5 / Annex 1</p>	None defined	<p>As in flow 1 above</p> <p>2. From RU to pointer file to identify keeper database and reply</p> <p>6. From RU to keeper database (RSRD)/ECM to provide maintenance/performance data/stop-release (possibly modelled on HERMES messaging)</p>
4	<p>Traffic data/Performance data</p> <p>It is anticipated that RUs should provide data about traffic and vehicle performance back to keepers to support future maintenance planning 445/2011 (ECM Regulation) Article 5 / Annex 1</p>	None defined	<p>As in flow 1 above</p> <p>6. From RU to keeper database (RSRD)/ECM to provide maintenance/performance data/stop-release (possibly modelled on HERMES messaging)</p> <p>HERMES “Goethe” message could be used as the basis for a message suitably updated for current maintenance practices</p>
5	<p>Technical data</p> <p>Technical data is required by the WIMO to support operations 62/2006/EC - Section 4.2.12.2 / Annex A / Index 2</p>	<p>Definition may need amendment</p> <p>WagonTechData -</p>	<p>Centralised WIMO not to be developed; all parties will access the relevant RSRDs of the keepers to obtain technical information to support their operations.</p> <p>As in flow 1 above</p> <p>2. From RU to pointer file to identify keeper database and reply</p> <p>3. From RU to keeper’s database to request defined data items for a vehicle and reply</p> <p>4. From keeper to pointer file to check RU’s entitlement to data and reply</p>



No	Description	TAF TSI (or other) Message/interface	Solution changes
6	Wagon order/Traffic data WIMO will require reports of train movements 62/2006/EC – Section 4.2.12.2 / Annex A / Index 2	Definitions of the following may need amendment TrainRunningForecast TrainRunningInformation TrainRunningInterruption	Centralised WIMO not to be developed. TAF TSI train running messages are insufficient Recommendation is for RUs to receive train movement reports from IMs as provided for in the TAF TSI plus additional messages as per xml version of UIC 407-1. Providing there is a business case recommend for accurate train-kms to be supplied in the train movement reports for use in managing resources
7	Path requests Message sent from RU to each IM involved requesting train path 62/2006/EC – Section 4.2.2 Annex A / Index 1	Defined in TAF as PathRequest	Path request messaging will require amendment to include re-routing, details of unused paths and varying of scheduled stops. These are in draft from WG5 but simpler options will be important Additional facility for SME RUs to access IM systems directly via webpages rather than support system-system messaging.
8	Wagon order/Interchange/Train composition RUs must exchange data at Interchange 62/2006/EC – Section 4.2.2/4.2.3 Annex A / Index 1	Definition of the following may need amendment WagonOrderORU WagonInterchangeNotice TrainComposition	Wagon order messaging will require amendment to reflect all Consignment note data/SMGS stations The HERMES interchange message already in XML format to be accepted as the basis as so many RUs already support it. The message is a combination of train composition, wagon interchange notice and wagon order.
9/ 10	Traffic data Train running information is required to be exchanged between RU and IM 62/2006/EC – Section 4.2.3/4.2.4/4.2.5/4.2.6 Annex A / Index 1	Definitions of the following need amendment TrainRunningForecast TrainRunningInformation TrainRunningInterruption	As provided for in the TAF and TAP TSI and in UIC 407-1 Providing there is a business case then it is recommended that accurate train-kms to be provided to RUs on the reports to help RUs to provide performance data to the keeper.



No	Description	TAF TSI (or other) Message/interface	Solution changes
11	Train composition/Traffic data The RU must check that the infrastructure is compatible with the train/vehicles Annex 1 to Recommendation ERA/REC/04-2011/INT (2.5)	Direct access to RINF/register of infrastructures / IRNDB A study group is still working on the detailed solution.	For efficient implementation will require the RU to have direct access to the IRNDB. The RU should have regular extracts from the RINF/register of infrastructure to ensure that long term changes to infrastructure capability are known and used when planning train consists.
12	Infrastructure data IMs must maintain infrastructure data in their RINF/register of infrastructures 2008/578/EC Article 35, 2011/217/EC	Direct access to RINF/register of infrastructures	Already provided for in RINF for web access
13	Maintenance data RU to supply maintenance data to RSRD (for keeper/ECM) Not specified but assumed requirement	Direct access to RSRD	As in flow 1 above From RU to keeper database (RSRD)/ECM to provide maintenance/performance data data/stop-release (possibly modelled on HERMES GOETHE message)
14	Technical characteristics Keeper to maintain technical characteristics in RSRD 62/2006/EC - Section 4.2.11.3 / Annex A / Index 2	Direct access to RSRD	In addition to operating an RSRD, keepers to be obliged to allow access to technical data by authorised RUs and others.



No	Description	TAF TSI (or other) Message/interface	Solution changes
15	<p>NVR data NVR data must be supplied by keeper to Registration entity/NVR. RE to enter data to NVR 2008/57/EC Article 33, 2011/107/EU (3.2.3)</p>	<p>Keeper manual (email/fax) advice to RE and then direct access to NVR</p>	<p>The consultants recommend a new message to forward Authorisation/ECM changes to relevant RSRD of vehicles.</p>
16	<p>Type data NSA will submit Type data to ERATV electronically via web. ERA will check/publish data, keepers will enquire on data 2008/57/EC Article 34, ERA/REC/07-2010/INT</p>	<p>Direct submission/enquiry via web</p>	<p>Interface required, but assume ERA will specify</p>
17	<p>Infrastructure restrictions Infrastructure restrictions database required by TAF TSI. Data will need to be exchanged with RINF/register of infrastructure to enable RUs to access. More logically the restriction data should be held in the RINF/register of infrastructure 62/2006/EC - Section 4.2.11.2 / Annex A / Index 2</p>	<p>Interface to RINF/register of infrastructure or RU accesses Infrastructure RINF/register of infrastructure A study group is still working on the detailed solution.</p>	<p>The consultants recommend access is possible by line of route coding such that a list of characteristics and line is validated by a single message. Possibly combine Infrastructure restrictions database with RINF/register of infrastructure in the future.</p>



No	Description	TAF TSI (or other) Message/interface	Solution changes
18	Type NVR/ERATV interface via type reference 2011/107/EU (2.1)	Assumed to be a direct interface	Interface required, but no specific recommendation by the consultants
19	VKMs NVR interfaces with OTIF database presumably with VKM 2011/107/EU (2.1)	Direct interface agreed with OTIF	Already agreed an interface with OTIF
20	Vehicle Owner Details NVR interfaces with RRSR – presumably with Vehicle Number/Owner details 2011/107/EU (2.1)	Direct interface agreed with OTIF	Will be part of the interface with OTIF
21	Authorisations NSA authorises vehicles for placing into service. Could be either direct access or via RE 2011/107/EU (4.2)	Direct access to NVR	ERA to discuss with NSAs
22	Audit data Investigatory/regulatory bodies enquires on NVR for audit purposes 2011/107/EU (3.3)	Direct access to NVR	ERA to discuss with audit authorities



No	Description	TAF TSI (or other) Message/interface	Solution changes
23	Comparisons ERATV report indicates possible links to RINF/register of infrastructure in the future to allow comparisons between types/infrastructure ERA/REC/07-2010/INT (10 - Interfaces of ERATV)	None suitable/nothing defined	No specific recommendation by the consultant, but see gap analysis. The message to allow comparisons by line of route. Part of ERA workload
24	ERATV/RSRD ERATV report indicates possible links to allow export/import of type technical data ERA/REC/07-2010/INT (10 - Interfaces of ERATV)	None suitable/nothing defined	Export/import of technical data would need specification of an interface Part of ERA workload
25	Location data TAF TSI requires central reference files to be held detailing company/location data to be accessible by RUs/IMs etc - note awaiting European harmonised standard 62/2006/EC - Section 4.2.11.1	Part of the Common Components	Message required to allow validation/checking of location data From RU or IM to location database Part of the Common Components



No	Description	TAF TSI (or other) Message/interface	Solution changes
26	<p>Company data</p> <p>TAF TSI requires central reference files to be held detailing company/location data to be accessible by RUs/IMs etc - note awaiting European harmonised standard</p> <p>62/2006/EC - Section 4.2.11.1</p>	<p>Part of the Common Components</p>	<p>Message required to allow validation/checking of company data</p> <p>From RU or IM to Company database</p> <p>Part of the Common Components</p>
27	<p>ECM registration</p> <p>All vehicle keepers must declare the ECM for their rolling stock to the NVR ensuring that the ECM is certificated</p> <p>2007/107/EU</p>	<p>Not defined</p>	<p>Each NSA will specify how it intends to manage certification of ECMs but probably need database to enable checks of valid ECMs</p> <p>No specific recommendation by the consultants</p>
28	<p>Validate ECM certification</p> <p>Each RU/IM shall ensure freight wagons before departure have a certificated ECM</p> <p>445/2011 (ECM Regulation) Article 5</p>	<p>Not defined</p>	<p>Each NSA will specify how it intends to manage certification of ECMs but probably but probably needs a practical push message to ensure checks of valid ECMs can be carried out efficiently. UIP also proposing a solution.</p>
29	<p>Path offer harmonisation</p> <p>Harmonisation of path for multi-IM paths. IMs agree handover times and locations</p>	<p>Not defined</p>	<p>Recommendation made for expansion of the path request messaging. (WG5 covering)</p> <p>See gap analysis</p>



No	Description	TAF TSI (or other) Message/interface	Solution changes
30	Path request harmonisation Harmonisation of request for a multi-RU path. RUs involved in the train agree interchange points and times.	Not defined	WG5 covering
31	National rules notification Member States advise the database administrator of national rules and updates to the rules	Not defined	No specific recommendation by the consultants On line browse direct access to database is required.
32	Index updates RUs to advise index of the RU holding the wagon currently Keepers advise index of changes to keeper and ECM information.	Not defined	As in flow 1 above Additional messages required : 1. From RU to pointer file to update RU using the vehicle (HERMES interchange message) 2. From keeper to pointer file to update keeper/ECM data Part of the proposed solution
33	Notify temporary infrastructure restrictions IMs update their IRNdb with infrastructure restriction changes	A study group is still working on the detailed solution.	No specific recommendation by the consultants, but see gap analysis Direct update of database (though see flow 17 above)
34	Access temporary infrastructure restrictions RUs and others enquire on infrastructure restrictions in the IRNdb	Not defined A study group is still working on the detailed solution.	No specific recommendation by the consultants, but see gap analysis Message required to access IRNdb 13. From RU to IRNdb and reply



No	Description	TAF TSI (or other) Message/interface	Solution changes
35	HERMES Interchange (H30) RUs require train data to be exchanged at interchange	Existing HERMES interchange message	See also flow 11 above The TAF TSI train composition message does not offer sufficient data to support operations. The HERMES interchange message may be suitable for use but again would need amendment Widespread use of the interchange message is such that it is proposed as a model for data exchange so as to minimise IT development and implementation costs



7.4 Derivation of technical requirements

The main technical requirements are to provide a system that fulfils the business and legislative requirements, with an acceptable response time and system cost. This is subject to the data volumes as discussed below.

The system envisaged by the study is a distributed system, linked by a central index, and connected via either private or public networks. At a very simplistic level, this is a straightforward model to implement.

The system is required to be robust and require minimal intervention, and be capable of 24x7 (or very close to that) operation. This is due to the fact that freight traffic runs at all times of the day and every day of the week.

In order to size the central systems and message volumes, various figures were required. These figures were obtained from various sources, and validated from the consultants' experience.

The two most important figures are:

- ▶ Freight trains/day in the system
- ▶ Wagons in the system

These are critical to the sizing of the system. We have used UIC figures for 2008, for EU-27 as the basis for these figures. However, the calculation spreadsheet is readily available and simply modifiable should a differing calculation be required. The other major factors used are listed below for convenience:

train consist/re-consists per train	1.5
Interchanges per train	0.12
Average time between wagon defects (days)	60
Average time between wagon transit and re-use (days)	2
Number of traffic reports per train	5
Wagon ETA change volume (per wagon, per transit)	0.5
Number of path requests/train	1.05
RUs/train	1.1
Wagons per train	15
Customers per train	2
Number of times LRU is not the FRU and/or only RU	0.1
Next transit for a wagon is not the same LRU as previously	0.1
Wagons on long term hire	0.1
Times that the ECM is not the LRU	0.1

These figures lead us to deduce that the message volume to/from the central index system will be 78,000 update requests per day. These messages will generally be updating the responsible RU, and more rarely the Lead RU for a wagon. The index is envisaged as a pair of indexed tables (One for the pointer to the Lead and responsible RU and one for the maintenance index), which will result in approximately 5 I/O per transaction.

None of the messages are time critical, data on the wagon itself being the fallback. Therefore, response times to the vast majority of the updates/queries are not critical.



The volume of enquiries to the central index is generally unknown. With the introduction of a simple to use facility which leverages access to useful data, it could become very high. This is balanced by the fact that the data storage requirement is relatively small, so the entire database could easily remain in memory at all times, simply being written through to disk as required. This will greatly improve response times. Therefore, for a typical 4 I/O indexed read of a table row, it is likely that no physical I/O will need to take place.

Given the 'worst case' scenario of 30 index enquiries being posted (for the hypothetical 'worst case' train where all 30 wagons have different RU's), then, on the specified system, the response should be available within 1 second at the server itself. Assuming a network transport time of 1 second per leg, then the issuer of the query would have the response within 3 seconds. Then, they would post queries out to the relevant RU's (in parallel), whose response should come back within (worst case) about 5 seconds. Therefore, even for the 'worst case' query, the answer ought to be available within 8 seconds.

7.5 System architecture issues

Overall system architecture has been largely dictated by the requirements. There are many existing systems which must be brought under the umbrella of the proposed system using pre-defined message formats. New players in the market will then add their own systems. Thus, a method of co-operative messaging has been devised which can be used by either player. Such a method is useable by either the new or the older technologies in the various players' systems.

The solution requires inter-system connectivity. The consultants do not dictate exactly how that should be achieved – it could use the public internet, or private networks. This leaves players to choose the best solution for them, based on their requirements – cost, simplicity, reliability and security. Players will choose based on the criticality to their business of the TSI transactions. Gateways between private and public networks can ensure interoperability.

The design uses loose coupling between systems because that allows the systems the freedom to have different availability, reliability and response times without affecting partner systems. Very few of the messages are time critical, which is also well suited to a loosely coupled system.

7.6 Proposals for future architecture

The main technical issue here is the medium to be used for the transmission of the data. The consultants suggest the use of web services with XML encoded data as the data exchange standard. This is a widely understood interface, thus reducing cost.

New (or recent) system development would cater for this transmission method relatively simply; however legacy systems would require more work to front end them. For players with existing systems who do not wish to front end them specifically, the TAF TSI Common Components subsystem would appear to be a suitable tool to perform this function, as well as providing security, auditability etc

The common components Common Interface (CI) is shortly to be released and provides two basic types of communication between players based on the RICS code for the player. The interfaces use either HTTPS and SOAP or Java Messaging Service (JMS). For this to work efficiently with the newly proposed indices some changes will be necessary as store and forward architecture may not be fast enough for the response times desired. .

A further technical study will be required to validate and resolve that this assumption.



7.7 Technical Options for meeting the to-be architecture

There are several possible database architectures which would fulfil the business requirements stated above. These include:

1. A central database
2. A database distributed nationally
3. A fully distributed database

Each of which has advantages and disadvantages with regards to:

1. Data access times
2. Build cost
3. Usage cost
4. Cost for existing players
5. Cost for new players

Clearly, any solution will be a compromise – but the consultants have reached what they believe is the best solution possible given all these drivers. In the following sections, we will discuss advantages and disadvantages of each of the above approaches, which have led us to our recommended solution.

7.7.1 Central Database

7.7.1.1 Advantages

From a purely technical architecture point of view, this is the perfect solution. All data will be assured to be maintained once and only once, it will all have the same security, backup and access times, and it will be to a common standard. It will all be accessible in the same data format, and from the one, central place. Response times would be consistent, although, assuming access via the internet, would have an element which was proportional to distance away from the database.

Commonality of data formats is assured because there is just one system into which all data is fed.

System management will be straightforward, in that there is just a single system to maintain and run.

7.7.1.2 Disadvantages

Such a system does not currently exist, so would have to be developed from scratch. This would take time, and money to accomplish, and represents a major risk. Existing systems would have to act as feeders into it, leaving the owners of those systems with the issue of either:

1. Trusting the new system and abandoning theirs, or
2. Not trusting it, and keeping theirs, in which case they would be paying twice for the same thing, and there would be no master source of data.

Existing players would doubtless have issues with building a new system from scratch when they already have systems to perform many of the functions – especially as they would bear most of the risk of implementation, whereas new players who came along later would have none of this to deal with.

It would be challenging to come up with a ‘fair’ charging scheme which all would agree to. Whatever scheme was arrived at, someone, somewhere, would end up paying more than someone else, leading to disquiet about the system being unfairly



charged.

Such a system would, by definition, have to be developed and run by a trusted third party. This party would have to be carefully selected from a range of IT suppliers who had a pedigree in such systems. This would be a costly and time consuming exercise. As such, all existing systems which deal with such data would either have to be decommissioned or amended to interface directly to the central store. All system outputs would need to be amended, and users trained in the new system,

7.7.1.3 Summary

While this option is the IT purists choice, it is the most expensive and time consuming to implement, and would lead to loss of 'national identity' in the systems of the end users.

7.7.2 Nationally distributed database

7.7.2.1 Advantages

Building a nationally distributed database would appear to be a good idea – most users would be enquiring about vehicles moving within one state, thus making access relatively simple. The system could be run by a suitably selected body within that state (perhaps the national infrastructure owner, for instance), which would give consistency in the running of these systems.

If this were built as a single system, replicated through all the states, then commonality of data validation, storage and processing would be assured.

7.7.2.2 Disadvantages

Clearly, distributing systems reduces the risk of a single system instance failing. Thus, the risk is shared in a system like this. However, an architecture distributed in this way means that, for railway undertakings that span more than one state (and most do), then the issue arises of where to send the relevant data. The issue becomes worse on retrieval – finding exactly which state ones data resides in could be a major challenge.

Such a system does not currently exist, so would have to be developed from scratch. This would take time, and money to accomplish, and represents a major risk. Existing systems would have to act as feeders into it, leaving the owners of those systems with the issue of either:

1. Trusting the new system and abandoning theirs, or
2. Not trusting it, and keeping theirs, in which case they would be paying twice for the same thing, and there would be no master source of data.

Existing players would doubtless have issues with building a new system from scratch when they already have systems to perform many of the functions – especially as they would bear most of the risk of implementation, whereas new players who came along later would have none of this to deal with.

7.7.2.3 Summary

This option probably is the worst of both worlds – it lacks the simplicity of the central system without the benefits of the full distributed system.

7.7.3 Fully distributed database

7.7.3.1 Advantages

A fully distributed database, where data is held by its owner has advantages over



the previous two architectures where systems already exist. In this case, the value of those systems can be leveraged into the new system, which results in a lower cost and risk architecture.

The owner is one of the best placed people to take care of that data – after all, it is them who has the duty to maintain that data correctly and for the required period. Thus, responsibility for data is direct, removing any issues about who is responsible for missing or corrupt data.

The same argument applies for the physical systems which sit behind that data – the owners have a need to keep those systems functioning properly and at an agreed reliability level, so there is no devolution of responsibility.

By re-using existing systems, the risk in implementation is lower.

While the front-ending of these systems to have a common interface to the world could be seen as risky, the use of the TAF TSI common components to do this would appear to be an ideal way of managing that process, ensuring consistency of interface and reducing risk (and, in the end, total cost).

7.7.3.2 Disadvantages

Some work would be required to existing systems to ensure that common coding schemes are used; however, use of the TAF TSI common reference files would greatly assist in his task.

A fully distributed database requires a method of resolving the question ‘where is my data’. This may not be a trivial task. The consultants have recommended the central pointer files as the means to get round this issue. These central files would be relatively light in volume, and thus require less effort to build and maintain than a central database would.

7.7.3.3 Summary

Given that most players already have systems which perform some of the roles of this system, then the least cost (and thus risk) option is this one. It also builds on the strengths of existing TAF TSI initiatives: especially the common components and reference files. It keeps data where it should most logically be stored: with the person responsible for that data. This means that data integrity will be of the best quality.

Clearly, a solution to the question ‘How do I get to the data I need?’ is required, and the pointer files are a simple and elegant and solution to that. They are kept to the smallest size possible, leading to a reduction in cost and risk, which means that the system can be built rapidly and dependably.

If sub-second response to enquiries were required, then it would probably not be suitable – but this is not the case, a response of a few seconds is more than adequate.

7.7.4 Comparison of options

The three main options are:

1. Centralised system
2. Nationally-distributed system
3. Fully distributed system

In an ideal world, the centralized system would be the selected option. However, we do not live in an ideal world – issues of cost and timescales matter, as does charging. Given that many systems already exists to perform functions very similar



to that proposed, this kind of ideal world thinking is probably not cost effective.

At the opposite end of the scale is the fully distributed system, which, while less ideal from an academic, though not cost, perspective, is actually the best solution here because it imposes least cost on each of the players, some of whom may see little or no benefit from such a system.

The consultants cannot see any real advantage in the nationally distributed system – indeed, it probably has the worst of both worlds when it comes to cost/acceptability to the players in the total system.

Distributed systems can suffer from lack of performance due to the distances involved, plus the difficulty in locating the required information. In this case, lack of performance is not an issue – none of the proposed functions require split-second responses, and the central pointer files will make locating the required data simple.

We, therefore, believe that the proposed solution of a fully distributed system with centralized pointer files is the best possible option given all the different options and cost/performance factors involved.

7.8 Technical Options for data retrieval

The main technical option set surrounds the mechanism for getting to data via the pointer files. There are two options:

- ▶ the user requests the data from the pointer, receives the response, then requests the main data from the (pointed to) user system;
- ▶ the user requests data from the pointer. The pointer then passes the request directly to the target system, which then returns the response to the issuer of the query.

The second option will result in a quicker response; however the user IDs and passwords used at the target system would have to be provided by the pointer system, which raises some security issues.

The pointer file system itself poses no significant issues, the main sizes being:

- ▶ wagons in the EU: 655,000
- ▶ update messages per day: 78,000 (average 5 per minute)

Note: Sizing is discussed more fully in Annex 6.

Given the sizing above, the central system would need the following hardware:

- ▶ Quad core, 3Ghz server
- ▶ 4GB Ram
- ▶ 80GB Free HDD space

And the following system software:

- ▶ Operating system
- ▶ Java runtime environment
- ▶ JBoss server
- ▶ MySQL

Plus a mirror for disaster recovery.



7.9 Recommended technical option

The recommended option is to obtain data by a two-step process, first going to the pointer file and obtaining the source of the data and then on to the target system. While this option is slower and slightly more cumbersome than the 3-step option, it is more secure in that different system user IDs and passwords are only known to the originator of the query (who owns those passwords).

7.10 Implementation plan

This section of the report considers the issue of implementation.

7.10.1 The structure of the implementation plan

The consultants have identified priority applications. These have been chosen as a function of their importance to the rail business and their logical importance in the structure of the system. Three stages are anticipated. They have been structured to make early gains and to exploit existing work as far as possible. Both geographic and functionality basis for phasing have been considered.

For all operations functions phasing should be based on basic functions which deliver key benefits from common ways of working and which involve all RUs and IMs. Proof of concept testing can be included where necessary but the benefits will accrue to the maximum when all players can support the standard messages.

For the RINF/register of infrastructure and related databases then a geographical implementation based on the key freight corridors is recommended as there is a large amount of data to be collected. The ERA working group will also be recommending phasing for the large numbers of data elements involved.

7.10.2 Stage 1 of the implementation plan

In the first stage of implementation, existing HERMES messages will be modified for liberalised circumstances and extended to railway undertakings, keepers and infrastructure managers who do not currently use them. The new XML versions of these messages allow flexible implementation, something not possible with the earlier topographical bit format. This flexibility will allow the various parties to be able to implement at their own speeds without repercussions on other players. Given that the structure of the data (format, coding structures, etc.) is all well understood, this should be both a rapid and simple process. In some cases, databases to send or receive these messages will not have been created, implementation must allow for that (the keepers' databases in particular). The benefits provided by the HERMES interchange messages will be available to those railway undertakings that do not use them. The benefits of HERMES wagon performance messages will be available where they can be sent and used.

7.10.3 Stage 2 of the implementation plan

In the second stage, the databases defined in the report will be created. The principal databases in this context are the keepers' databases, the lead railway undertakings' traffic databases and to a lesser extent the infrastructure managers' databases. Work on these will have commenced in parallel with stage 1 and the flexibility of the message structure ensures that cut-over of the databases can take place on a flexible basis.

The pointer files will have to be cut-over at this time to prepare for the new messages in stage 3.



It is to be hoped that the development work can be cooperative in order to reduce costs.

This stage should also deliver further key functionality and the following are proposed for inclusion

- ▶ Handover and interchange common processes and messages
- ▶ Forecasts based on ETA and ETI messages

7.10.4 Stage 3 of the implementation plan

The third stage involves all the new messages. This stage is inevitably more complex and more costly since it involves new programming. Again, the adoption of flexible message structures will allow stakeholders to cut-over as they are able. It has to be recognised however that the full benefits of applications such as wagon maintenance can only be realised when a high proportion of stakeholders are sending messages. Likewise, messages to and from infrastructure managers will only be effective as their systems are cut-over.

7.10.5 Other considerations

The implementation plan must also take into account the extension of the EU acquis into the Balkan states and interfaces with railways operating to OSJD standards.

7.11 Possible impact on existing development projects

7.11.1 RSRD²

The rolling stock reference database designed by the UIP is progressing well and should be ready in 2011. It is not however, fully compatible with the proposed RSRD in that defects and maintenance data has been excluded in the initial version. When messages are exchanged with RUs and ECMs report, this new functionality will be required. This is part of phase 2 after the indices are working.

7.11.1.1 RAILDATA applications/databases

RAILDATA support two key databases known as ISR and ORFEUS. They are also implementing a version of the common interface in order to support clients who have yet to implement the native TSI messages. The consultants consider that RUs will be able to take advantage of the following existing RAILDATA investments:

- ▶ RAILDATA to offer ISR database to be the new data repository for RUs who choose this option. RAILDATA would have to link ISR messages to the proposed index of RUs operations databases and support enquiries from both RAILDATA members and non members.
- ▶ RAILDATA ORFEUS to support the revised wagon order message and other commercial enquiries. This should be straight forward but would require RAILDATA to support enquiries from both RAILDATA members and non members.
- ▶ RAILDATA to agree to interface to and from the RSRD indices to read and write data to the distributed RSRDs
- ▶ RAILDATA to agree to interface to and from the RU operational indices to receive and forward wagon operational messages

7.11.2 RNE applications

RNE has been working closely with all the TAF TSI developments and is investing in



the interfaces as and when its members have clear directions and priorities.

It is progressively consolidating its databases which were separate individual solutions into a single architecture.

In order to support phase 1 of the consultant's proposals, RNE will need to support two basic sets of functions which are:

- ▶ path request and offer;
- ▶ train reporting and disruption (mostly exists);
- ▶ modifications to paths;
- ▶ the proposed simplified train composition message.

It has also been suggested to the consultants that it should exercise great caution before endorsing proposals from WG10 for TTIDs. The WG10 proposals are complex and are likely to be expensive to implement. They will not be suitable for small to medium RUs and would be likely to delay early implementation of Phase 1 should it be made mandatory.

7.11.3 X-Rail system

The X-Rail system is still under final development and offers two types of trip planning.

- ▶ Trip planning based on the available timetables as supplied by each RU which participates in X-Rail. In these cases X-Rail calculates and proposes a theoretical trip plan based on the best feasible timetable but not the most optimistic.
- ▶ Trip plan based on a plan calculated by each RU and sent to X_Rail.

X-Rail then uses the wagon movement messages sent to it from ISR to monitor the actual wagon movement against the stored plan.

Trip planning was included in the original TAF TSI but has been made optional although wagon forecasts for interchange times (ETI) and final arrival (ETA) are included in the basic TAF TSI messages.

Since X-Rail only supports part of the distributed WIMO functionality, then the X-Rail TSI messages will need to read the WIMO index and send its updates to the nominated database OR to route only via each RU's system from its own internally stored addresses.



8. Feasibility

8.1 Technical feasibility

8.1.1 Introduction

The consultants' design shows a series of interconnected systems with messages flowing between them. In reality there is another layer of complexity to add – that of the target systems. Many of the various undertakings will be re-using or adding to existing systems, which exist on a variety of platforms using many different technologies. Some (newer) players may be starting from scratch – but even they can have different drivers – some will be small players, other larger, with IT budgets to suit their operation. As stated previously, for some of these players, over-complexity of the solution is to be avoided. Therefore, we have a variety of technologies, of various maturities and abilities, which we need to interconnect. The technical challenge, therefore, is to seamlessly join them all together such that they can all interoperate, and they all 'speak the same language'.

While railway messaging systems were originally designed to work over private networks, in more recent times, the public internet has been adopted by many as their point to point carrier. This is a choice based on cost, availability, and reliability, with the slight drawback of exposing the parties to some security issues. Such issues are well known and understood. This is no single ideal solution for this system – we require many to many links, at low cost, with variable message volumes.

However, for many the additional security and guaranteed quality of VPNs is important and therefore none of the above rules out the use of private networks – it simply shows that the solution must cater for a range of underlying transports as well as physical technologies.

8.1.2 Methodology

While the main technical architecture (above) was defined by the consultants, technical validation of this design was approached by using metrics, spreadsheets and tables obtained from Atos' extensive store of past projects of this size and nature, coupled with volumes etc. for this particular project. Hence, we can be certain that the estimates obtained are realistic. There were 3 main sources of information used in this part of the study:

- ▶ Project estimation spreadsheet
- ▶ Message volumes spreadsheet
- ▶ Message timing spreadsheet

The project estimation spreadsheet is an internal tool, which, given parameters listing the technical details of the system, provides an estimate as to the time taken to develop that system. This spreadsheet is widely used in Atos as a reliable tool for this job, and was the basis for the time and cost estimates for system development presented elsewhere in this report.

The latter two were custom-written spreadsheets for this project, which, given various parameters about the system, calculated the various volumes in the system to validate that:

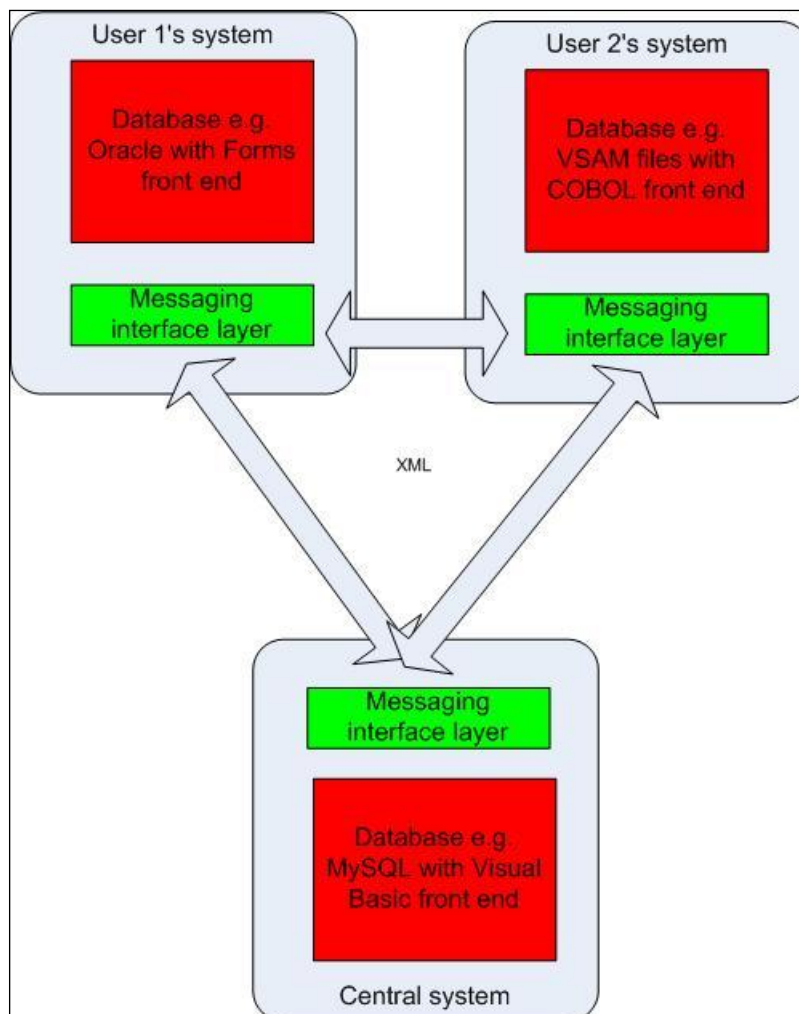
- ▶ Message volumes were achievable, and
- ▶ Response times were achievable



The latter is important with this project moving away from the central WIMO concept to a distributed system. Our figures show that, assuming the central index performs as required, then, by issuing parallel queries to the (possible) many sources of data that a sustainable response can be had. This was calculated assuming the worst possible case – a train with many wagons, each of which belonged to a different RU, for which a query was made. In practice, the situation will be significantly simpler than that, which shows that the proposed system will perform as required.

8.1.3 The chosen interface solution

The consultants' design is for loosely coupled systems, passing messages of an agreed format between them. This allows for maximum flexibility for the partners in the system because the implementation of their own database (be it modification to an existing system, or a new system) is not visible to others and therefore can be done with their own timescales, methodologies and technologies. Partners can, therefore, choose their platforms, programming languages, and database tools to suit their own circumstances, not be dictated to by this system. Players could group together and have a shared system, or have separate individual systems: their systems could also fulfil more than one role in the overall picture. All of this is catered for by this technical architecture.



XML messaging with a front end isolates the target system from those technologies



Message passing using proprietary message queuing middleware (e.g. MQ series) would seem to be an excellent option, freeing the sender and receiver from the need to have outward-facing interfaces with good response. This means that the undertaking only needs to provide the messaging architecture in real time – the back office system might be less available, as its own requirements dictate. This allows smaller players to come under this umbrella, allowing for their own circumstances.

There are two main technical issues to consider:

- ▶ the interface between the systems, and
- ▶ the availability of the systems

The interface between those systems must be carefully defined and agreed before work commences. This will include message formats and exact meanings of data within fields, as well as security and access rights. This will ensure that message content and meanings are unambiguous, and that no misunderstandings occur. Most of the messages proposed exist and are documented already – however, it may be advantageous to have a short study in advance of implementation to ensure that those message fields are very clearly and unambiguously defined, in order to ensure that no misunderstandings exist, and that the system will perform exactly as required.

The current technical solution to this would be to use XML. XML has many advantages for a system like this, especially in its ability to define and document the messages. That does not mean that XML has to be used everywhere, or even produced and/or consumed by the systems: a common interface layer could be developed which could convert from/to XML and the native formats. In this way, existing investment can be reused extensively, thus reducing cost and increasing benefit.

System availability (of the individual component systems) is another key issue. Players will have differing availability levels (and times) for their systems, yet they must be able to intercommunicate in a meaningful way. Stakeholders should aim for systems whose external interfaces are available for use 24x7. This will mean that message senders can always successfully send a message to any destination undertaking. This does not infer that the response will have to be returned quickly: downtime of systems is inevitable, data requestors should take heed of this and allow for the fact that the target system may not respond in a timely manner.

The central system ('pointer files') has the same advantages as the member companies' systems: because it sits behind the messaging layer, the technologies chosen to implement it can be selected as dictated by the requirements, not by the technology stack.

8.1.4 The central system

The central system is referred to in most of the text as 'the pointer files'. In reality, of course, it is more complex than that – although that is an easily understood way of viewing it. This system has the following components:

- ▶ Message reception
- ▶ Security
- ▶ Message validation (source, contents)
- ▶ Apply message to index
- ▶ Index query



As it is a crucial part of the system, it will need adequate disaster recovery backup and support, so that the service can continue in the event of a major failure.

The message reception layer will shield the system from the outside world, and whatever protocols that it chooses to use.

This system has no need to access the location or other shared data. It will also be developed from scratch. Therefore, the Common Components repository would seem to offer little to this system.

8.1.5 Fit with existing EU components/legislation etc

In designing this system, the consultants have carefully considered existing data stores and mandated components. The design proposed has been made so that those items can, as far as is possible, be re-used, or used as tools to simplify the transition from the current situation to the one proposed by this study. In this way, the complexity of the task will be significantly less than would have been required by custom system integration work. Some examples of this are presented in the next few sections.

8.1.5.1 TAF TSI common components

The TAF TSI common components are considered by the consultants to be a good way of legacy or previously developed systems to be brought into the proposed system. They will assist by simply and quickly providing a secure, auditable, internet facing front end to existing systems. As this process may be repeated many times, with only the back end interface being different, there is merit in a small project being undertaken to generalize this front ending work.

This front ending process is illustrated in the diagram in section 8.1.3

8.1.5.2 Location (and other) common reference files

For a process like this to function at all, common reference files are required to ensure that all systems speak the same, external, language. It is quite possible that the systems will, internally, have their own coding schemes - we are not saying that anyone should change that - but there needs to be a translation from internal to external formal and vice versa. The common reference files are the way to achieve this in a controlled and manageable manner.

8.1.5.3 RSRD

The RSRD is known in this study as the vehicle keeper database. It is a central plank to the system and is used to maintain data enabling the keeper to carry out the various duties as required by their role. Aspects of it will be accessible by this system, over the internet, with a pointer to it in the central system.

8.1.5.4 Vehicle Registers

These are dealt with in section 5.2

8.2 Economic feasibility

The proposals significantly improve the economic feasibility of Interoperability through the following:

Phasing of the implementation re-using existing implementations with some modest changes which will deliver consistent early benefits



Simplification of the common elements to ensure that only a small central component is required. It is important that this also applies to the common interface element as that is currently too complex to be implemented by the SMEs (see 7.3 below)

Inclusion of the present solutions of TIS, RAILDATA, RSRD2, and X-Rail as valid solutions by choice of the players.

The benefits calculated (see 7.10) show that over time there will be significant benefits however these will only accrue in the longer term and therefore the industry must accept the need to act in a co-ordinated way to make the rail offering of a quality to compete with non-rail modes.

8.3 Technical and economic risks

The main risk in this system is in the understanding and implementation of the message formats. These must be very clearly and unambiguously defined, so that each of the many implementations will conform to the same rules. Any misunderstandings of such fields could lead to incorrect, bad or corrupt data.

The second significant risk concerns over-complexity. The working groups have been developing changes to the base TAF TSI messages which reflect the complexity of some rail operational processes. However, this has resulted in significantly complex solutions which make it both expensive to develop and implement and much more difficult for the small players.

8.4 Deriving the data

There are no particular surprises in defining the source of the various data items. Section 7.2 “Data required and data supply” sets down the principles. The table below shows a CRUD analysis of data responsibility for each of the interfaces in the ‘to be architecture’.

No	Description	Source	IM	LRU	Other RU	Keeper	ECM
1	Maintenance Data/ Wagon restrictions/ Performance	RU	Read	Create Read	Create Read	Read	Read Update
2	Consignment note	Customer		Create	Read		
3	Maintenance data	ECM				Read	Create Update
4	Traffic data/ Performance data	RU		Create	Create	Read	Read
5	Technical data	Vehicle builder/ designer	Read	Read	Read	Read	Read
6	Wagon order/ Traffic data	RU	Create	Read	Read		



No	Description	Source	IM	LRU	Other RU	Keeper	ECM
7	Path requests	RU	Read	Create	Create		
8	Wagon order/ Interchange/ Train composition	RU			Create Read		
9/ 10	Traffic data	IM	Create	Read	Read		
11	Train composition/ Traffic data	RU		Create	Read		
12	Infrastructure data	IM	Create Update Delete	Read	Read		
13	Maintenance data	RU		Create	Create		
14	Technical characteristics	Keeper	Read	Read	Read	Create	Read
15	NVR data	Keeper				Create	
16	Type data	NSA				Read	
17	Infrastructure restrictions	IM	Create Update Delete		Read		
18	Type	ERA	Read	Read	Read	Read	Read
19	VKMs	ERA					
20	Vehicle Owner Details	NSA					
21	Authorisations	NSA					
22	Audit data	NSA					
23	Comparisons		Read	Read	Read		
24	ERATV/RSRD		Read	Read	Read		
25	Location data	IM	Read	Read	Read		
26	Company data	All	Read	Read	Read		
27	ECM registration	Keeper				Create	



No	Description	Source	IM	LRU	Other RU	Keeper	ECM
28	Validate ECM certification		Read	Read	Read		
29	Path offer harmonisation	IM	Create Read				
30	Path request harmonisation.	RU			Create Read		
31	National rules notification	Member states					
32	Index updates	RU			Create Update	Update	
33	Notify temporary infrastructure restrictions	IM	Create Update				
34	Access temporary infrastructure restrictions		Create Update		Read		
35	HERMES Interchange (H30)	RU		Create	Read/ update		



9. Cost benefit analysis

This section of the report considers the issue of costs and benefits. The cost benefit analysis looks at the system as a whole. In so far as it is possible to identify those who contribute or gain the most, comments have been made.

9.1.1 Cost benefit analysis – direct impact on players

Based on the extensive database held by Atos of previous projects and in order to provide a high level view of the potential costs incurred in supporting new databases and interfaces the consultants propose to use the following table of costs.

Initial development costs are in € - man-days converted at assumed average internal cost of €300 based on using existing teams but if externally sourced would be around double the estimates

Type of development	On modern web based technology	On mainframe technology	On bespoke small computers (SMEs)	
New simple interface	4335	5202	3685	
New complex interface	8160	9792	6936	
Modified simple interface	3655	4386	3107	
Modified complex interface	5610	6732	4768	
New RS database	29155	34986	24782	
New Ops Database	37740	45288	32079	
New INF database	24225	29070	20591	
Modified RS database	15342	73644	13041	
Modified Ops Database	20995	100776	17846	
Modified INF database	-	-	-	



Ongoing support and operational costs per annum in €

Type of development	On modern web based technology	On mainframe technology	On bespoke small computers (SMEs)	
New simple interface	4335	5202	3685	
New complex interface	8160	9792	6936	
Modified simple interface	3655	4386	3107	
Modified complex interface	5610	6732	4769	
New database RS	29155	34986	24782	
New Database Ops	37740	45288	32079	
New database INF	24225	29070	20591	
Modified database RS	15343	18411	13041	
Modified Database Ops	20995	25194	17846	
Modified database INF	-	-	-	

List of Abbreviations

Type	Abbreviation
New simple interface	NSI
New complex interface	NCI
Modified simple interface	MSI
Modified complex interface	MCI
new RSRD database	NRD
new traffic database	NTD
new RINF (infra) database	NID
modified RS database	MRD
modified traffic database	MTD
modified inf database	MID
New IM	NI
New RU	NR



List of Interfaces and types

List of Interfaces databases and their impact on user types													
Interface	Type	R1 (assume mf)	R2 (assume ws)	R3 (assume sme)	R4 (special ltd) and R5	I1(assume mf)	I2 (assume ws)	K1 (assume mf)	K2 (assume ws)	K3 (assume sme)	E1 (assume ws)	E2 (assume sme)	
1. Maintenance data	NSI	✓	✓	✓							✓	✓	
2. Consignment Note	NCI	✓	✓	✓									
3. Maintenance data	NSI							✓	✓	✓	✓	✓	
4. Performance data	NSI	✓	✓	✓	✓			✓	✓	✓			
5. Technical data	NCI	✓	✓	✓	✓								
6. Wagon orders traffic data	MSI	✓	✓	✓	✓								
7. Path Request / Offer	MCI	✓	✓	✓	✓	✓	✓						
8. Wagon order	MSI	✓	✓	✓									
9. Train data	MSI	✓	✓	✓	✓	✓	✓						
10. Train data ?	MSI	✓	✓	✓	✓	✓	✓						
11. Train Composition	MCI	✓	✓	✓	✓	✓	✓						
12. Infrastructure data	NCI					✓	✓						
13. Maintenance data	NSI										✓	✓	
14. Technical characteristics	NCI							✓	✓	✓			
15. NVR data	NSI							✓	✓	✓			
16. Type authorisations	NSI												
17. Infrastructure restrictions	NCI												
18. Type data	MSI												
19. VKM updates	NSI												
20. Vehicle owner details	MSI												
21. NSA authorisations	NSI												
22. Audit data	NSI												
23. Comparisons ERATV RINF	NCI					✓	✓						
24. ERATV RSRD link?	NSI							✓	✓				
25. Location data	MSI	✓	✓	✓	✓	✓	✓						
26. Company data	MSI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
27. ECM registrations	NSI										✓	✓	
28. Validate ECM certificate	NSI												
29. Path offer - harmonisation	NCI	✓	✓	✓	✓	✓	✓						
30. Path request - harmonisation	NCI	✓	✓	✓	✓	✓	✓						
31. National rule notifications	NSI												
32. Index updates	NCI	✓	✓	✓	✓			✓	✓	✓			
33. Notify temp inf restrictions	NSI					✓	✓						
34. Access temp inf restrictions	NSI	✓	✓	✓	✓								
35. Interchange	MCI	✓	✓	✓	✓	✓	✓						



The first issue is to define the base case against which the cost and benefits of the proposal will be measured. The base case assumes that systems and databases have been installed in accordance with all the existing legislation and that they are all up and running.

The proposed system therefore derives benefits from:

- ▶ not doing programming work that was previously required;
- ▶ WIMO – this large highly dynamic database was estimated at €2M for the central database development and ongoing running costs of €300K per annum
- ▶ replication of technical data for wagons
- ▶ fewer changes
- ▶ lower IT operating costs;
- ▶ reuse of present solutions including the HERMES interchange message, and RAILDATA,
- ▶ no copying to a central service
- ▶ savings in IT operational costs arising from changes in the specification;
- ▶ using the HERMES interchange messages saves having to develop an alternative
- ▶ type approval based on interface to RINF/register of infrastructure
- ▶ RAILDATA leverage
- ▶ RNE leverage
- ▶ commercial benefits arising from changes in the specification; (customer service benefits)
 - handover of consignment (additional benefits if border as well)
 - enquiries by consignment
 - enquiries by UTI (intermodal unit)
- ▶ benefits from more open competition increasing rail's market competitiveness.

Likewise costs arise from:

- ▶ additional programming work;
- ▶ supporting interfaces with ECMs
- ▶ pointer updates and achieving integrity of the pointer files
- ▶ higher IT operating costs;
- ▶ UTI support
- ▶ consignment tracking
- ▶ opportunity costs from the use of resources (including capital) for this purpose rather than another;
- ▶ increased uniformity in ways of working – before interoperability all railways in Europe followed UIC standards for international traffic. Whilst their domestic operations were influenced by international standards, there were a significant number of national practices. Interoperability increases the degree of uniformity in that railways essentially operate in accordance with EU standards and national standards only apply where special national notified technical rules apply (NNTR).



9.1.2 Treatment of shared costs – to be financed as part of governance

The cost estimates below are provided for a tightly managed, lean organisation and are based on examples.

System(s)	Amortised annual costs € ,000s	Notes
Specification and development of central pointer files	100	Development costs of amortised over 5 years
Operation and support of central pointer file	50	From year 3 only
CI operation and support of central components	400	Taken over from Common Components Group if required)
Reference files operation and support	100	Taken over from CCG could include additional ref files over time
Governance elements		
Administrative staff	45	Minimum central staffing plus expenses of Board of Management
Legal	15	Estimated legal costs
Accounting	35	Financial administration and audit
Travel and other expenses	35	Guess
Accommodation	40	One small central office
Publications and publicity	20	Annual publications and publicity (web admin)
Totals	840	

9.1.3 Impact Assessment

9.1.3.1 Methodology

In the section below, stakeholders are considered by type and size to characterise the likely costs and benefits which they will experience. Costs and benefits arising from the various elements are attributed to the stakeholders. Finally, totals are calculated to provide an overall assessment.

Against each category of user described above the consultants estimated the changes to a base case. The base case is the implementation of TAF TSI and the other related legislation on an as-published basis. For all the related legislation issued since TAF TSI such as the ECM and NVR legislation the cost benefits are also shown as neutral except where the consultants have suggested improvements or enhancements.

9.1.3.2 Categorisation of beneficiaries

In order to assess the potential impact on players it is necessary to categorize the types of players and judge the impact depending on their size and types of activity.



The following categories are proposed

Railway Undertakings (RUs)

Category R1 - Large RUs operating internationally with sophisticated commercial and traffic management systems.

R1 type RUs will need to modify their systems to support new interfaces and modified fields. They will probably already be using RAILDATA so they can fast track development and implementation using their TSI support. They will already support international freight messaging.

Category R2 - Medium RUs operating internationally with reasonably sophisticated commercial and traffic management systems.

R2 type RUs will need to enhance their systems to support new functions and interfaces and new and modified fields. Some will already be using RAILDATA so can fast track using their TSI support. Already support international freight messaging.

Category R3 - Medium RUs operating nationally and geared to national rules

R3 type RUs will need to modify their national procedures to support the TSI processes messages and interfaces applicable to them. This will need to be done in conjunction with their IM as it impacts traffic messages.

Category R4 - Small RUs operating internationally with very simple IT

R4 type RUs will need a small system to support the three basic functions of train composition, path request and train running. This should form the minimum package.

Category R5 - Small RUs operating nationally in a limited geographic area with simple IT and only one IM.

R5 type RUs should only need to support the HERMES interchange message as they would use online access to the IMs traffic system for traffic purposes.

Infrastructure Managers (IMs)

Category I1 - Large IMs with sophisticated IT and multiple RUs as customers

Category I2 - Small to medium sized IMs with less sophisticated IT and only a few RUs as customers.

Keepers

Category K1 - Large RUs with their own fleet for which they act as wagon keepers.

They will already hold a wagon database which will require small enhancements to meet the RSRD requirements.

Category K2 - Independent wagon owners and operator belonging to the UIP.

They will use the new RSRD²

Category K3 - Small RUs without a wagon database suitable for RSRD and small wagon keepers not participating in UIP

They will require to use either a suitable package or build a small database. Alternatively they could purchase access to RSRD²



Entities in charge of maintenance (ECMs)

Category E1 - RUs responsible for their own maintenance and maintenance staff.

They will need to ensure maintenance and defect data is recorded and interfaced in accordance with the TSI

Category E2 - Independent maintainers.

These are maintainers who do not have an RU safety certificate and do not operate trains. They maintain rolling stock under contract with the keeper.

9.1.3.3 Calculation of the impact

In order to calculate the impact, two types of assessment have been made:

an IT impact based on the numbers of changed interfaces and new or eliminated database access. This then uses Atos metrics from its extensive data from previous projects to provide an order of magnitude costs for development and operations per type of technology employed

an estimated number of players in each category to be validated by the ERA

an estimate of cost saving as a result of having a standard method of working shown as a % of costs incurred by each type

a spreadsheet assessing the cumulative effect over the three stages of implementation proposed

where the impact is neutral as compared to the TSI as implemented it is shown as a net of 'zero'

ERA records identified over 700 railway undertakings with safety certificates, the consultants' judgement however is that the figures below represent the number of active railway undertakings, and these figures have been used in the appraisal.

The table below assesses the impact on each category.

Category	Estimated No of each	Systems impact	Interfaces Impact	Notes (± on TAF TSI)
R1	30	-1	-3	WIMO & able to use HERMES interchange
R2	50	-1	-3	WIMO & able to use HERMES interchange
R3	100	-1	-3	WIMO & able to use HERMES interchange
R4	10	-1	-1	WIMO & able to use HERMES interchange
R5	170	-1	-1	Only use simplified HERMES interchange
I1	45	-1	-1	



Category	Estimated No of each	Systems impact	Interfaces Impact	Notes (± on TAF TSI)
I2	55	-1	-1	
K1	85	0	-1	RSRD needed anyway reduced if to WIMO
K2	100		-1	
K3	45		-1	
E1	100			New player
E2	150			Excludes those where RU or Keeper are also ECM

9.1.3.4 Net benefit calculation

Benefit Category	Impact on RU	Impact on IM	Impact on keeper	Impact on ECM
Much smaller distributed WIMO	Large as does not have to develop new WIMO interface - 1 x Database -1 x if	None	Small - 1 x db - 1 x if	None
Wagon technical data avoidance of duplication in WIMO and RSRD. Changes to RSRD	Medium as reduces interfaces and database updates by one	None	Medium again as it reduces interfaces by one	None RSRD interfaces are neutral
Reduced requirement for changes to existing applications	Can use own version HERMES interchange message replacing need for separate Train Composition	Can use current RNE apps	Neutral will need RSRD	Neutral
Reuse of present investments	Reuse RAILDATA and HERMES investments	Reuse RNE investments	Nil	Nil



Benefit Category	Impact on RU	Impact on IM	Impact on keeper	Impact on ECM
Savings on ops costs – Interchange message	Saves border and planning costs (10% of staffing)	Neutral	None	None
Savings on ops costs – Type approval	Savings on approvals for own vehicles and examining of others (10% of approvals staffing)	Nil impact	Savings on approval costs	Nil impact
Savings on engineering costs/ improved reliability	Neutral	Neutral	2% of maintenance costs	2% of maintenance costs
Operational benefits – handover based on trusted data exchange and pre validation	Saving on handover staffing (30% international border costs)	Saving on handover staffing (30% international border costs)	Nil	Nil
Commercial benefits – enquiries by consignment	Improved customer satisfaction for interoperable traffic (+ 1 % revenues)	increased access fees for new traffic +0.5%)	Nil	Nil
Commercial benefits – enquiries by UTI	Improved customer satisfaction (+ 1 % revenues)	increased access fees for new traffic 0.5%)	Nil	Nil

In the savings below, annual salaries are assumed as:

Border and handover staff €20,000

Approval staff €30,000

Engineering staff €35,000



9.1.3.5 Calculations for staffing cost savings

(for RUs over five years (notional figures, per railway undertaking, by type of RU))

RU Savings over 5 years										
Category	R1 number	R1 saving	R2 number	R2 saving	R3 number	R3 saving	R4 number	R4 saving	R5 number	R5 saving
Saves border and planning costs (10% of staffing)	4	400000	2	200000	1	100000	0	0	0	0
Savings on approvals for own vehicles and examining of others (10% of approvals staffing)	1	100000	0	0	0	0	0	0	0	0
Saving on handover staffing (30% international border costs)	4	400000	2	200000	1	100000	0	0	0	0
Improved customer satisfaction (+ 1 % interop revenues)	1%	250000	1%	100000	1%	50000	1%	25000	1%	0
Total		1150000		500000		250000		25000		0

All these are figures per railway undertaking)



9.1.3.6 Calculations for staffing cost savings for IMs

(access charge revenues of an average of €3,000 per train for I1 and €800 for I2 leading to annual revenues of €250M for I1 and 50M for I2)

IM savings over 5 years				
Category	I1 number	I1 saving	I2 number	I2 saving
Saves border and planning costs (5% of staffing)	2	200000	1	100000
Saving on handover staffing (30% international border costs)	1	100000	0	0
Improved customer satisfaction (+ 0.3 % revenues)	0.3%	375000	0.3%	75000
Total		675000		175000

9.1.3.7 Calculations for staffing cost savings - keepers

Keeper savings over five years						
Category	K1 number	K1 Saving	K2 number	K2 saving	K3 number	K3 saving
Savings on approvals for own vehicles and examining of others (10% of approvals staffing)	1	150000	0	0	0	0
Savings on engineering costs/ improved reliability 2% saving	2	350000	1	175000	1	175000
Total		500000		175000		175000

9.1.3.8 Calculations for staffing cost savings - ECMs

ECM savings over five years				
Category	E1 number	E1 savings	E2 number	E2 savings
Savings on engineering maintenance	2	350000	1	175000
Total		350000		175000

9.1.3.9 Overall benefit impact

(one off investments over five years)

Note: the costs occur in the first five years from 2012 and the benefits mainly in



the following five years from 2016

Category	Category totals	Benefits - lower staffing costs/category	Benefits - lower IT costs/category	Total benefits over 5 years
R1	20	1150000	904428	41088560
R2	40	500000	753690	50147600
R3	75	250000	599021	63676537.5
R4	10	25000	60710	857104
R5	100	0	60710	6071040
I1	25	675000	55598	18264960
I2	35	175000	46332	7746620
K1	60	250000	67932	19075920
K2	70	175000	56610	16212700
K3	45	175000	48119	10040333
E1	50	262500	0	13125000
E2	100	87500	0	8750000
Overall total		142,000,000	113,056,374	255,056,374

9.1.3.10 Staged benefits.

Most benefits will only accrue when most of TAF TSI is implemented. The staged proposals being made provide priority for train composition and train reporting which will be seen in the quality of customer service. The staffing savings come from common procedures and electronic capture of quality data in a consistent form.

9.1.3.11 Sensitivity analysis

This section examines how the costs and benefits change under differing but plausible scenarios. The following scenarios have been considered:

- ▶ growth in traffic to match the expectations in the 2011 White Paper;
- ▶ effective collapse of individual wagonload traffic;
- ▶ increase in rail salaries compared with those in other industries.

The estimates below have been prepared based on current traffic levels and traffic patterns. The 2011 White Paper on transport sets out the objective of transferring thirty per cent of road freight moving over 300km to other modes by 2030. Unfortunately Eurostat figures do not provide a split at 300km. Figures suggest that there is some 600 bn tonne/km of road traffic moving over 500km. If we assume a gradual transfer, perhaps even back-loaded, and the role of shipping, that might mean a transfer of 100 bn tonne/km in 2020. Rail statistics are incomplete and not exactly comparable but such a transfer would increase rail traffic by some thirty per cent. This additional traffic would increase the benefits pro-rata without adding to costs appreciably.



Effective collapse of wagonload traffic. Wagonload traffic is under threat. New entrants do not offer comprehensive wagonload services (although some accept wagonload on the margin). Incumbent railway undertakings appear far from convinced that they can provide the quality and hold the costs which the market expects. This scenario assumes total abandonment of wagonload. Under those conditions, many of the benefits would be irrelevant (many of the applications are implicitly designed for the diversity of wagonload). Different, much less complex and much less costly solutions would be more appropriate for a wholly trainload network. This affects both the base case and the consultants' proposal. It is to be noted that the Commission considers that a wagonload system is important and are about to sponsor a study²⁸ on how to promote it.

Increase in rail salaries Experience of liberalisation suggests that rail salaries increase relative to other groups²⁹. The benefits that accrue from savings in rail operating staff will therefore be larger under this scenario.

²⁸ Service contract 271864 advertised in OJEU S165 of 30 08. 2011

²⁹ NTU Study on Regulatory Options on Further Market Opening in Rail Passenger Transport for the Commission 2010 - http://ec.europa.eu/transport/rail/studies/doc/2010_09_09_study_on_regulatory_options_on_further_market_opening_in_rail_passenger_transport.pdf.



10. Governance and financial aspects

10.1 Introduction

This section of the report responds to section I.2.3 C of the terms of reference, (Recommendations on governance and financial aspects).

Since all parts of the system must function properly for the benefits to be obtained, the mechanism for governance must apply to the whole system, the proprietary parts as well as the common parts. That implies overseeing systems which form parts of the players' business processes. This has obvious sensitivities.

However, a careful distinction is made in this report between the common parts of the system and the parts within the direct control of the individual players. The common parts are the index or pointer files and the software required to manage them. The data held by these common parts is not linked to any particular player, but it is essential to the operation of the system. It is appropriate therefore for these common parts to be managed as a whole by some impartial body or in an impartial way. The only parties involved in those pointer files are keepers and railway undertakings; infrastructure managers are not directly involved. Infrastructure managers and entities in charge of maintenance however have an interest in the wider aspects of the system and must therefore be involved in governance bodies.

10.1.1 Scope of the governance proposals

The first issue to consider in governance is the scope of the system to which the proposals for governance apply - the remit requires governance to be both for the sets of databases proposed in this report and for the wider system of data exchange within the industry. This implies that links to parties outside the industry (customers in particular) are outside the scope of the proposals for governance. Systems operated by, and links between, railway undertakings, infrastructure managers, entities in charge of maintenance and wagon keepers are all in scope however.

Governance is required to be appropriate for the development and implementation of the central databases and their interfaces and is to be on-going. The consultants' conclusion is that it must specifically include change control as the system develops to meet future needs.

Governance means both control and finance, and particularly the rules covering the sharing of costs and external support.

10.2 The most appropriate mechanism - criteria

10.2.1 Criteria for governance

Having postulated the scope of the governance, the next task is to consider what governance should be designed to achieve:

- ▶ governance should be directed towards ensuring that systems and databases in aggregate provide support for the rail mode, provide improvement in customer service, a reduction in costs, greater social and community benefits;
- ▶ governance should promote commercial initiatives and support the market economy;



- ▶ governance should ensure balance between the parties in the industry between new and incumbent companies, between small and large companies, between freight and passenger activities, between the various interests (infrastructure managers and railway undertakings, for example). It is acknowledged that making those judgements may be difficult. The governance mechanism and governance body will have to establish criteria which may include such concepts as fair return on capital.
- ▶ governance should ensure that the systems and any development of them are soundly conceived, represent value for money and employ tested and efficient IT practice.
- ▶ governance should foster cooperative arrangements, in particular joint development of IT solutions.
- ▶ governance should design and run any system for rewarding prompt, complete and accurate data and penalising those who do not live up to the standards.
- ▶ governance should provide an interface with legislators and public authorities on appropriate policy.

It would be desirable to provide the governance body with powers to develop its own criteria.

10.3 The most appropriate mechanism – options and constraints

10.3.1 Mechanisms to encourage data exchange

This section of the report considers the mechanism for ensuring that stakeholders utilise real-time data exchange system(s) throughout Europe. It considers the whole system, all the proprietary parts and the central common part.

10.3.1.1 The value of the voluntary approach

The railway community developed a number of real-time data exchange applications well before the advent of the TSIs and indeed the oldest of them are now over thirty years old. The voluntary approach has the merit that the participants develop systems that they consider appropriate. The systems therefore meet the perceived needs of the industry rather than an external perception. The voluntary approach does therefore bear examination.

The early applications were of course between integrated railways. The specifications were agreed centrally (i.e. within UIC bodies) and member railways implemented them. The first applications (which remain the most widespread today) were designed to reduce costs rather than to improve service quality or customer satisfaction. The prime application is interchange and essentially consists of passing consignment and wagon technical data between railway undertakings as the wagon moves forward. Surveys have shown that the applications have proved their value in reducing the time and staff input required to accept trains.



10.3.1.2 Problems with the voluntary approach

However, there are a number of problems with the industry-led approach, the applications were designed for the needs of the incumbents, implementation was slow and there was no mechanism to enforce data quality. The incumbents required data transfer systems to meet the needs of wagonload traffic, traffic which requires a significant volume of data to support the variety of freight on any one train. It might be observed that some of the present problems stem from the fact that many of the mandatory TSI systems are implicitly designed for wagonload traffic (in order to liberalise the market), but new entrants have no intention of moving wagonload traffic and certainly do not want to pay for sophisticated systems to cope with its complexities. In the past there were problems in that some transit railway undertakings were slow to implement applications, giving rise to holes in cover. Some undertakings provided national rather than international data (such as destination is “export via Grenzub”) and there was no effective way to remedy that.

The Strateco study³⁰ of 2001 identified poor data quality as a particular problem. Data may be absent, incorrect or arrive too late to be any use. Addressing the first two of these requires much tighter validation at the source of the data. The Strateco solution, putting all the data in a common database, seems a surprising solution; if data is suspect, the last thing to do is to share it.

The voluntary approach has not produced a satisfactory outcome: real time exchange of data between railway undertakings is still restricted to a limited number of messages and exchange with and between infrastructure managers is limited.

10.3.1.3 Alternatives to the voluntary approach

The consultants therefore come to the conclusion that the voluntary model has failed in that data exchange is neither comprehensive nor widespread. Furthermore the pattern of imposing obligations has already been set by the existing TSI. A measure of compulsion is therefore inevitable. The consultants noted that stakeholders welcomed the imposition of common standards, in particular on data definitions, process definition, confidentiality criteria, etc.

The mechanism for enforcing the TSIs is at present inadequate, they do not contain sections on enforcement. It may be that this could be remedied by requiring compliance with TSIs for the issue of safety certificates.

10.3.1.4 Conditions for a regulatory approach

The body of the report has proposed that the framework of the system is underpinned by legislation. This aligns with existing policy which has seen the various TSIs require the various actors to take action and to follow particular standards.

The costs of developing IT projects come out of railway undertaking, wagon keeper and infrastructure manager investment budgets. It would not be appropriate for Member States or the Commission to require railway undertakings to act as “independent operators behaving in a commercial manner”³¹ but then to dictate investment policies. Directing investment can only be appropriate where the railway community as a whole gains from it and where the full benefits can only be obtained if all the stakeholders play a full part. To the extent that the

³⁰ http://ec.europa.eu/transport/rail/studies/doc/2001_strateco.zip

³¹ Quotation from the third recital to Directive 91/440/EC op. cit.



European Union places requirements for public policy reasons on the railway community to take action which is demonstrably not in its financial interest, the railway community might reasonably look to the European Union for financial support.

In addition, it is clear that in order to ensure willing compliance there must be acceptance of the broad lines of the policy by stakeholders. A process which allows stakeholders to influence the requirements is therefore crucial. The system of governance and more particularly the process of developing the exchange of data must give a full role to stakeholders.

This also means that the system itself in aggregate must deliver benefits to the railway community. These benefits need not all be direct financial benefits but they must be such as to support submissions for investment funds.

10.3.1.5 Elements of the regulatory approach

To achieve this balance between forcing the industry to exchange data and allowing the industry itself to identify the most promising applications, it would seem appropriate for regulations to set up the principles of the whole system, in outline who is to supply what data and criteria for its availability and accuracy, arrangements for managing the common parts, the structure of decision making bodies and their powers of compulsion. Message structures and the details of applications would sensibly be left to specialists. These issues are taken further in the sections below.

10.3.1.6 Problems to be surmounted

Solutions for the same problems as before are required, prompt programming and implementation of the application, providing data in the field in good time and supplying complete, accurate and useful data. The first, implementing the application can be resolved by placing legislative obligations on the stakeholders. The remainder are much more difficult to police because of the many criteria and the work involved in monitoring compliance. Some progress might be made by agreeing common criteria for data validation (some stakeholders currently allow poor quality data to be input). These common standards must reflect the highest rather than the lowest standards. Once strict standards for accuracy and completeness of data are in place, the systems are likely to deliver better quality results throughout. There may also be room for bonus and penalty payments but any system to apply them would have to be simple and robust to be realistic.

10.3.2 Who should be involved

The mechanism of governance needs to be considered. What body is to take it on; is it to be added to the duties of existing bodies; is there a requirement for a continuous secretariat-like function; who is to have an input into the process; are there any existing models in the rail industry?

It might be sensible to consider who is to have an input first of all. What role should regulators and governmental bodies have? It is clear that there must be industry input but there remains the issue of whether that is exercised directly (and if so how is a choice to be made) or if trade associations should represent the industry. There is also the question of independent expert input. Coupled with those issues are the size of the body and the process by which it is to take decisions.



It is clear that stakeholders will prefer to be directly involved, the problem however will be to ensure all strands of opinion are represented and that the most numerous stakeholders (railway undertakings and vehicle keepers) do not drown out other views.

It seems to the consultants that regulator representation in some form is essential to ensure governance is taken seriously. It seems to the consultants too that the representation would better coming from a national regulator used to dealing with executive issues than from the ERA which is essentially an advisory body. It is desirable that the representative remains in post for a period to ensure he acquires expertise. A representative from the regulator currently holding the chair of the independent group of regulators might be the solution. It is desirable that the ERA is involved in the governance process to provide a bridge between the work and developments in its area.

10.4 The most appropriate mechanism – review of models

10.4.1 Models for governance

There are a number of existing international railway groups to achieve various tasks (such as the UIC special groups or such bodies as the Brussels Clearing Centre) but no international governance groups.

For example, the RAILDATA group (the RAILDATA group is primarily concerned with freight applications) is a special group of the UIC in accordance with Article 53 of the UIC Statutes and the UIC's A19 general guidelines. The RAILDATA group has a relatively simple structure; all members are equal in contributions and voting rights. Decisions are taken by simple majority except those judged to be "extraordinary". Extraordinary decisions include those involving additional budgets and require an 80% vote in favour. The simplicity of the RAILDATA model has much to commend it but it must be remembered that RAILDATA members are all railway undertakings with similar objectives; there are not the variety of trade-offs between different types of stakeholders that this report identifies. RAILDATA also has a fairly limited remit; it does not for example provide test data or much in the way of assistance to potential members. Obligatory membership of the UIC (required by RAILDATA) could not, of course, be part of any model.

The HIT Rail group manages the telecommunications links between European railway organisations. Again, the parties concerned have strongly aligned interests. HIT Rail is incorporated as a Dutch Besloten Vennootschap and therefore is managed in accordance with Dutch law. The size of a partner's shareholding therefore determines his influence on the organisation's policy although the mechanisms share all costs on a fair basis reviewed and agreed by all clients.

The most appropriate model for the issues in consideration is probably to be found outside the rail area however. The SESAR Joint Undertaking has a structure defined in the Annex to Regulation (EC) No 219/2007³². It is therefore a statutory corporation. Voting rights are dependent on financial contributions except that certain parties have defined minimum rights. SESAR is similar to rail in that there are trade-offs between the interests of the various parties. The SESAR model would seem to have a lot to offer. The SESAR model would also provide a precedent for any mechanism to provide EU finance.

³² COUNCIL REGULATION (EC) No 219/2007 of 27 February 2007 on the establishment of a Joint Undertaking to develop the new generation European air traffic management system (SESAR) OJEC L64 of 02. 03. 2007



10.4.2 Management of the common parts

Given a high-level governance body, there must still be some form of management entity to run the common part, amongst the options to manage this are:

- ▶ franchise model based on open tender for develop and operate for five to ten years. The franchise agreement (with the governance body) should reward success and penalise failure to perform. An embryonic 'shadow' company is needed to take over in the event the franchise company gets into trouble;
- ▶ appointment of an existing body with a similar mandate, relying on its management and organisational structure for technical competence and independence. The GCU Bureau might fulfil that criterion;
- ▶ direct management by the governance group;
- ▶ ERA subsidiary (not thought practicable);
- ▶ association set up by the governance body;
- ▶ newly created company set up by the governance body.

[It is understood by the consultants that the Commission and the ERA are reluctant to be directly involved.]

10.4.3 Evaluation of options

Of these options, the quasi-statutory nature of the proposed obligation to exchange data suggests that a model similar to the SESAR one. There are a number of existing international railway groups to achieve various tasks (such as the UIC special groups or such bodies as the Brussels Clearing Centre) but no international governance groups.

10.5 The most appropriate mechanism - recommendations

10.5.1 Mechanism of governance

Given the recommendation that the nature of the future exchange of data should be determined by statutory principles, it would seem logical to support that by a body similar to SESAR. Within that framework, the general principles outlined in the following paragraphs might be appropriate.

10.5.2 The basic structure

A three level structure is proposed. At the highest level is the general assembly of stakeholders. The general assembly meets annually and takes policy decisions. It also elects a representative governance group to execute its decisions. At the lowest level, the management team, of perhaps three staff, runs the system, keeps the files up to date and writes detailed instructions.

The whole organisation is best conceived as a statutory corporation formed under a Council Regulation. As an alternative a limited company formed under appropriate rules within a Member State might be considered (as existing railway organisations have been organised).

This structure does not exclude the governance group deciding to contract out the day to day work done by the management team to an outside organisation for reasons of administration or economy.



10.5.3 The general assembly

To join the governance body stakeholders will be required to make a financial contribution (see below). Subject that, all stakeholders are entitled to be represented at the general assembly. This should be called not less than annually to meet with all the interested players to review the results and effectiveness of the activities achieved and planned. It functions in a similar way to the RNE assembly. It must be open to all to participate. It will:

- ▶ present the quality report on the previous year;
- ▶ present the proposals for the next year covering budgets, changes and improvements;
- ▶ consider longer term strategic issues;
- ▶ decide on proposals for improving the fairness of the cost allocation;
- ▶ elect the governance group.

The general assembly should be left to decide its own rules of procedure and to design a mechanism to resolve disputes.

10.5.4 The governance group

The governance group supervises the running of the system on behalf of the general assembly of stakeholders. As such it:

- ▶ ensures smooth running of the central parts and makes recommendations for changes and improvements;
- ▶ publishes a bi-annual report on effectiveness;
- ▶ ensures fairness with open costing and charging and having regular review of the cost attribution methodology;
- ▶ tenders and outsource contracts for the central components;
- ▶ works with ERA on changes and improvements to the specifications.

The size of the group must be small enough to be dynamic and large enough to be representative. Twelve elected members are proposed, these should be elected through “electoral colleges” to ensure each group of interests is properly represented. Membership of trade bodies might provide the college structure. In that way members of the CER might elect two members, ERFA one member, EIM one member, RNE two members, UIP two members and the GCU one member). Two further places for a regulator and the ERA might be provided. The group might be left to elect its own chairman; it should not be prevented from co-opting a chairman, perhaps from one of the arbitrators on the OTIF list.

Independent members are desirable to ensure that governance keeps up with external factors. An expert in IT matters and an expert in governance are desirable. The manager (see below) is to be a member of the governance group ex officio.

Not included in this group are such interests as private suppliers of IT services to the railway community (such as JERID) and railway IT suppliers (such as the HERMES, ISR or ORFEUS group). It is considered that they might have too great a conflict of interest.

Periods in office are again a compromise between the need to gain familiarity (more with the process of governance, it is assumed that representatives will know their railway IT) and the need to be innovative. Five years is proposed.



The governance itself might take the form of meetings at a frequency appropriate to the business of the group.

10.5.5 The management team

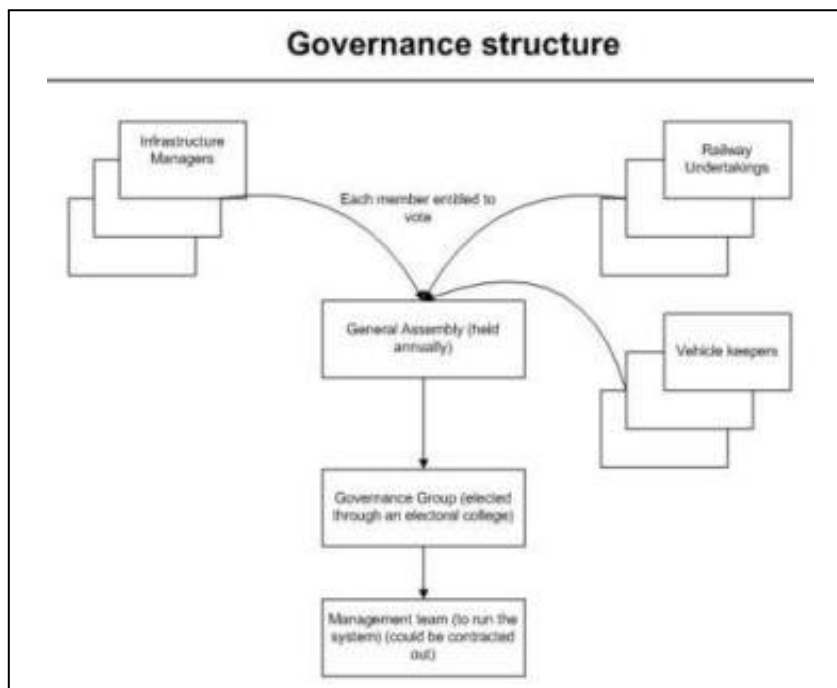
The management team is composed of three (or so) staff. It is to undertake the following tasks:

- ▶ handle any day to day issues with the operation of the central services that arise;
- ▶ maintain systems documentation and prepares user manuals;
- ▶ handle issues with new users including technical facilitation;
- ▶ prepare and make test data available;
- ▶ administer the financial side, collecting revenues and paying bills;
- ▶ deal with audit issues.

The management team is to be supervised by the governance group. This management task could be contracted out if the governance group and general assembly so decide.

10.5.6 The structure proposed

The structure proposed is shown below:



10.6 An appropriate business model

This section of the report considers the business model which is most appropriate for system.

10.6.1 Scope of the business model

The consultants believe that the whole process of data exchange is an essential component of the business of running an international railway; it cannot be seen



as a business in its own right. Indeed the more that it is seen as a necessary part of rail activities; the less it can be regarded as a stand-alone activity. The consultants therefore believe that the project should be considered in terms of an add-on to activities and its costs and benefits regarded as incremental.

10.7 Recovery of costs

This section of the report considers the recovery of costs. The costs of the system are made up of the costs of the proprietary and of the common part of the system (essentially just the pointer files).

10.7.1 The costs to be considered

The following cost areas are considered:

- ▶ the central components (excluding the ongoing costs associated with governance of the Common Interface and Reference files) includes governance and centralised IT proposed
- ▶ the IT costs to be implemented by each type of player as a delta to the IT costs that would have been incurred based on the original TAF TSI.

10.7.1.1 Cost recovery mechanisms for the proprietary parts of the system

The costs of the proprietary parts, those parts on the system under the direct control of a stakeholder, fall into two broad groups, the costs of setting up databases and programming message exchange and then the costs of the maintaining those databases and sending the messages. Development of the system essentially repeats the cycle.

The initial presumption is to have a loose system in which each player is responsible for his own database and in which costs were borne where they fall. That approach is simple and doesn't require external mechanisms. It may be that it represents crude justice in the sense that the benefits may not arise where the costs fall. It would have those running databases pay to set them up, and those sending messages pay for their programming. In the design proposed by the consultants, many of the proposed databases fall to be held by vehicle keepers. Keepers have suggested that there may be economies from programming maintenance if they are able to get details of vehicle performance. There may be scope for reducing costs by having common or similar databases so the IT costs can be shared. Railway undertakings have already programmed and are exchanging interchange messages.

10.7.1.2 Cost recovery mechanisms for the common parts of the system

The common parts, essentially the pointer files, are essential to the operation of the system but because they are common must be financed jointly. Fortunately, although important, they are not complex or likely to be costly. Whatever model is adopted is not therefore likely to be very contentious.

The following models are worth discussing

funding from all players based on size (traffic levels or turnover)

- ▶ advantages: for many size relates well to potential benefits and to ability to pay
- ▶ disadvantages: some RUs may have few benefits; difficulty in determining rail based turnover for businesses which do not account separately



funding from players based on a benefits model (difficult to ascertain)

- ▶ advantages: most logical and fair solution
- ▶ disadvantages: extremely difficult to calculate benefits owing to the need to disclose business cost information

funding from players based on nationally applied levy (registration model)

- ▶ advantages: Simple and could be fair as levy allocation could be agreed based on national market characteristics
- ▶ disadvantages: There are believed to be legal issues in establishing the basis for member states to raise such levies. (need to prove it encourages competition)

funding from players based on transactions used (discourages use)

- ▶ advantages: Transactions should relate to business volumes and therefore loosely to benefits. Easy to measure
- ▶ disadvantages: Discourages system use and therefore may have the effect of lowering quality

funding for change control based on sponsors gaining support or financing themselves (not thought practical)

- ▶ advantages: If the change only affects and benefits one player this has considerable logic
- ▶ disadvantages: De facto most changes affect most of the players and this is therefore almost certainly unfair

part funding from fines those failing to adhere to standards (can be used to credit the good players)

- ▶ advantages: Punishes poor quality. This can be seen as fair in that with message interchange the sender providing poor quality affects the benefits that can be achieved by the receiver.
- ▶ disadvantages: Normally the fines are set at modest amounts and therefore the money raised is also modest. Requires sophisticated statistics and administration to work successfully. (There is such a system in place for MERITS data and its main objective is to improve quality rather than raise money).

funding per train operated (indexed by distance), vehicle registered (operational), ECM maintainer registered

- ▶ advantages: The concept is simple and relatively easy to administer. Reasonably fair.
- ▶ disadvantages: There are some anomalies particularly for SMEs as the vehicles may not be in use or in use on interoperable services. For trains there are huge differences in the benefits relating to long distance international as against vehicles used only for short local trips.

Some of these alternatives, whilst superficially attractive, have problems. Models must achieve a fair balance between railway undertakings that use their own vehicles for intense domestic traffic (the Polish model, very few messages) and railway undertakings that handle a high volume of mixed traffic (the Alpine railways, very many messages).



10.7.1.3 A possible key for the common parts

It seems to the consultants that a reasonably fair model for the common costs might be one based on dividing the total costs of the pointer systems in two and then allocating half to railway undertakings in the ratio of their international traffic volumes and the other half to keepers in the ratio of fleet sizes. This would apply to both costs of development and operation. It is certainly crude but relatively simple and not too unfair. Messages sent to the pointer file would be at the expense of the sender. Replies from the pointer files would be subject to the cost key above.

10.8 Building on the existing estate

This section of the report considers how the proposals build on existing practices. There is clearly much sense in building on what already exists, costs can be reduced and lead-times improved.

The proposals have drawn extensively on existing HERMES applications to provide for exchange of data between the parties. In particular, HERMES messages have been proposed to supply railway undertakings with technical and traffic information on handover. This concentrates data movement and reduces the number of messages substantially. HERMES messages are also proposed for notifying wagon performance and for handover between infrastructure managers. In almost every case the HERMES applications will need modification to provide for changes in circumstances since the messages were designed but the changes for the most part are minor and existing programs can be reused. For that reason the consultants believe their proposals can be implemented quickly and at little cost. In that respect they offer significant advantages over the ERVID logic.

10.9 Costs and benefits for the various stakeholders

See Section 9.1 of the report (above) which deals with this issue.

10.10 Legal status of the system

This section of the report considers the legal status of the system. It makes a distinction between that part which is proprietary and that part which is common.

10.10.1 Legal status of the system – issues to consider

There are number of issues to consider in this area, they include physical and intellectual ownership, ownership of the data, liability for data, data quality and dispute resolution.

Given that some of the data is demonstrably safety-related, the governance body will clearly have to be able to satisfy itself and be able to demonstrate to others that the message exchange and data safeguards do not compromise rail safety.

10.10.2 Physical ownership

Consistent with the approach taken above it would seem inevitable that the physical equipment of the proprietary parts of the system must be owned by the individual players as being part of their management systems.

Ownership of the common parts is more difficult, it can be assumed however that the pointer files etc. will be hosted and so there will effectively be no equipment involved. Other central issues are treated below.



10.10.3 Intellectual property

To the extent that the message structures are specified in EU documentation, the specifications are in the public domain. It is understood that whilst the UIC reserves the copyright to UIC leaflets this does not prevent free use of messages to formats they define. Intellectual property in the messages does not appear to be an issue therefore. As far as the programs to manipulate data are concerned, individual players will retain the intellectual property of the solutions they design. Whilst saying that, there is clearly scope for stakeholders with similar businesses to cooperate in developing solutions. Agreements between stakeholders are outside the scope of this report.

Ownership of the common parts is more difficult, the issue essentially revolves around the intellectual property in the pointer file software. It would seem logical for that to be vested in the body managing the common parts and thus ultimately in the governance body.

10.10.4 Ownership of the data

The principle for the ownership of data has already been considered by the railway community and there is no reason to call it into question.

10.10.5 Liability for the data

Liability for data is a difficult area. The HERMES community considered the issue and concluded that the responsibility for data rested with the undertaking that first put it into the system. Undertakings that merely passed on data bore no responsibility for it. Whilst the principles behind that approach are clear, in practice it did not help attempts to improve data quality because it was not clear at what point incorrect data had been input and it was no-one's job to correct data. There would seem therefore to be a case to place prime responsibility for poor data on the immediate supplier. That would increase interest in supplying good data. It might be hoped that the proposals for common data validation criteria (above) will improve the basic data.

10.10.6 Dispute resolution

The governance body should set up mechanisms for amicable dispute resolution. They might include the use of arbitration by the International Chamber of Commerce or the OTIF arbitrators.

10.11 Implementation plan

The implementation plan is dealt with in section 8.4 (above) of this report.



11. Maximising industry support

The consultants have wide experience of the railway players in Europe and the factors that influence their investment decisions. The existence of European directives which impose timescales for implementation during times of real commercial hardship and government cutbacks with the financial crisis means there are double pressures on reducing spending – lack of growth and reductions in government support!

It is therefore imperative that as much willing support is obtained from the industry players themselves. There have been a number of working parties set up to look into the TAF TSI structures and which are developing proposals for modifications to be presented via the ERA at the end of 2011. Despite this the appetite to invest in TAF TSI and other message interfaces is low and no consolidated real plan yet exists.

In the opinion of the consultants there is a need to show that the proposed phasing is logical, that it builds on what is already working within the industry and that it will deliver benefits in phases as further investment takes place.

For the new and smaller players the consultants propose one small group of messages which will enable them to implement at much lower cost. Many of the small open-access RUs are already implementing the HERMES interchange message for example.

It is therefore important to obtain agreement to the revised proposal from the industry and this implies seeking support from:

- ▶ RUs and RAILDATA
- ▶ IMs with RNE and EIM
- ▶ keepers and the UIP
- ▶ ECMs
- ▶ ERFA and CER

To be successful the governance proposals will need to be properly estimated, budgeted and the cost allocation proposals set out.

The cost estimation method included in this report, if accepted, can be used to judge the impact on each type of player and help set a fair attribution method for the governance.



12. Annexes

12.1 Annex 1 The questionnaires

Part 1 – Policy and strategic issues

1	<p>What do you believe is the most effective way for railway undertakings to obtain the vehicle information they need to assess wagon suitability and run trains?</p> <ul style="list-style-type: none">a. vehicle information passed with the wagon from railway undertaking to undertaking as is the case with HERMES currentlyb. held in central files(s) to be extracted by interested parties,c. larger railway undertakings holding a copy of master file(s),d. held in a national register such as NVRe. another method. Please state on the right
2a	<p><i>National Safety Authorities should answer Question 2b instead</i></p> <p>If there were to be a comprehensive vehicle database containing the technical characteristics for all hauled vehicles (RSRD²) including technical-related data like maintenance information, how would you envisage changing your business practices?</p> <p>Would you</p> <ul style="list-style-type: none">a. require access to read it for validation of train composition message and save the need to store wagon technical data on your databaseb. Keep the data yourself and require the keeper to notify you of all changesc. Not trust it without regular safety audits of data qualityd. Prefer the data to be included in the composition as with HERMES messages nowe. Read and update the data on a future country NVR
2b	<p><i>This question is an alternative for National Safety Authorities only</i></p> <p>If there were to be a comprehensive vehicle database containing the technical characteristics for all hauled vehicles (RSRD²), including technical-related data like maintenance information, how would you envisage changing your processes?</p> <p>Would you</p> <ul style="list-style-type: none">a. Read only access for audit purposes granted specifically by the vehicle keeper on requestb. Read and write access to vehicle certification datac. Access on demand for incident investigationsd. No access is necessarye. Other please state



3	<p>How should entities in charge of maintenance, (ECMs) be supplied with information on which to base maintenance?</p> <ul style="list-style-type: none">a. journey data for each journey,b. summary distance data on a daily basis,c. some other system,d. no data – base maintenance only on time elapsed.
4	<p>How should entities in charge of maintenance, (ECMs) be supplied with information on defects discovered during a journey on which to base repairs?</p> <ul style="list-style-type: none">a. RU supplies data for each journey,b. summary defect data on a daily basis,c. some other system. E.g. email,d. no data – base repairs on paper only.
5	<p>Who should be responsible for collating the data for maintenance purposes? :</p> <ul style="list-style-type: none">a. the wagon keeper,b. the railway undertaking with the GCU contract.c. a specialist information service provider,d. the ECM itself,e. some other party – please suggest,f. not needed – base maintenance on time elapsed.
6	<p>After maintenance has taken place how should an ECM notify both repairs to known defects or other defects discovered but not fixed?</p> <ul style="list-style-type: none">a. notify the wagon keeper only by message,b. notify both the wagon keeper and any hiring RU by message,c. update the RSRD only – other parties to be given accessd. update the ECM’s own system only,e. not needed – base maintenance on paper records only.
7	<p>With what frequency should data related to maintenance be provided? ÷</p> <ul style="list-style-type: none">a. near real time,b. daily,c. some other interval,d. on request.
8	<p>What data should be provided to wagon keepers for fleet management purposes (as distinct from maintenance)?</p> <ul style="list-style-type: none">a. journey data provided by railway undertakings,b. summary mileage data, (loaded and empty) provided by railway undertakings,c. defect datad. no data – the provision raises conflicts of interest.



9	<p>How should traffic monitoring services for customers be organised? ÷</p> <ul style="list-style-type: none">a. a central system for all customers,b. a system requiring enquiries to be fed through the lead carrier,c. customers making their own arrangements with each carrier,d. fleet-based system, customers/wagon keepers fit GPS/AVI equipment,e. another system (give details).
10	<p>How should wagon monitoring services for wagon keepers be organised? ÷ Please give multiple answers such as d and e if you think they are appropriate and maybe future solutions such as InteGRail like projects</p> <ul style="list-style-type: none">a. a central system for all keepers,b. a national system requiring enquiries to be fed through the “registering country”,c. keepers making their own arrangements with each carrier,d. fleet-based system, wagon keepers fit GPS/AVI equipment,e. other wagon based technical solutions (e.g. data recorders),f. no system, conflict of interest.
11	<p>How should information on infrastructure capability and availability be provided to railway undertakings?</p> <ul style="list-style-type: none">a. a central database, accessible to all accredited parties,b. a separate system maintained by each infrastructure manager, accessible to interested railway undertakings,c. a separate system maintained by each infrastructure manager, with extracts and updates sent at intervals to interested railway undertakings,d. a separate system maintained by each infrastructure manager, with responses to individual path requests sent to railway undertakings,e. some other mechanism.
12	<p>Do you believe that there would be benefits in linking the proposals for an infrastructure register with the obligation to publish a Network Statement because much of the data is related?</p> <ul style="list-style-type: none">a. yes, I would like to see a shared structure,b. yes, but I would keep them separate but provide for linkages for integrity purposes,c. no, I see no benefits in this idea.



13	<p>How should information on temporary infrastructure restrictions be held and distributed? ÷</p> <ul style="list-style-type: none">a. integrated with a central or local infrastructure register, from which all accredited parties could draw data,b. integrated with a central or local infrastructure register, with updates sent to all registered parties as they occur,c. held in a separate system, with updates sent to all registered parties as they occur,d. held in a separate system and used to validate individual path requests,e. some other mechanism. Please describe
14	<p>Do you believe that exchange of safety-related wagon-specific data (such as brake characteristics) should be included in the TAF TSI messages with the appropriate checks?</p> <ul style="list-style-type: none">a. I would support holding safety-related wagon-based data in a central database,b. I would prefer a standard message interface to other RU data or IM's own data,c. safety-related data should not be included in TAF TSI messages. <i>Please state why you are against including this</i>
15	<p>Which areas (if any) of safety-related data exchange should be included in the TAF TSI? List those you agree with</p> <ul style="list-style-type: none">a. temporary infrastructure restrictions,b. vehicle defects,c. vehicle restrictions,d. maintenance-done data,e. incident data,f. vehicle mileage data,g. other data (please specify),h. none of these.
16	<p>The TSIs require a set of registers and databases. What criteria do you think are appropriate for the provision of these databases? Please differentiate between the databases if appropriate.</p> <ul style="list-style-type: none">a. should be provided by a regulatory body,b. must be under the control of the industry,c. should be provided by an industry association (if necessary set up for the purpose),d. competition in the supply of the database is desirable,e. other criteria (please describe).



17	<p>Accordingly, what would be your preference for the provision of these databases? Please differentiate between the databases if appropriate.</p> <ul style="list-style-type: none">a. as a single European solution,b. as multiple national solutions in a similar way to the NVR,c. supplied by private sector/ industry players e.g. RAILDATA,d. other (please describe).
18	<p>What service groups should the TAF TSI operations and vehicle messages apply to?</p> <ul style="list-style-type: none">a. they should only apply to international and multi-RU services; single RU services should be excluded,b. they should apply to all services,c. other differences (please specify).



Part 2 – IT Systems and databases

12.2 Infrastructure register

Questions for Infrastructure Managers (plus CER, EIM & RNE)]

1	<p>Do you have a structured electronic register of railway locations, network connectivity (rail links between locations), and infrastructure capability (information indicating the type of traffic allowed on each part of the network) compatible with the TSI?</p> <ul style="list-style-type: none">a. yes, the data is maintained by our organisation,b. yes, the data is maintained by another organisation (please state which), and we receive regular extracts and/or updates,c. no, the data is held by another organisation (please state which), and we have direct access to it,d. no, the data is maintained by our organisation in paper documents,e. no, we work from paper documents provided by another organisation (please state which),f. no, the data is maintained by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which),h. no, we do not use an infrastructure register (if so, please ignore the rest of this section).
2	<p>Please provide the following details about the infrastructure register(s) that you use:</p> <ul style="list-style-type: none">a. name of systemb. system owner,



3	<p>Does your infrastructure register contain: the following information (listed in the draft RINF specification. Please indicate which data fields are not held currently.</p> <ul style="list-style-type: none">a. section of line,b. TSI category of line,c. gauge (GA/GB/GC, or other classification),d. axle load (in combination with permitted speed),e. line speed,f. train length,g. conditions for running trains with specific systems to enhance performance level (e.g. vehicle body tilting),h. location and type of nominal track gauge transition sections,i. minimum distance between track centres,j. maximum gradients,k. minimum radius of horizontal curve,l. nominal track gauge,m. maximum cant,n. rail inclination for plain line,o. compatibility with braking systems and any limitations on their use on which compatibility depends,p. usable length of platforms,q. nominal interval between distance markers,r. location and type of fixed installations for servicing trains,
4	<p>The objective of the Infrastructure TSI is to enable the interoperability of vehicles on the European rail network and to ensure bids to run trains with specified rolling stock are compatible with the infrastructure , The data elements mandated for the infrastructure registers are seen as key to this</p> <p>What is your timeframe to add the missing fields?</p> <ul style="list-style-type: none">a. within three yearsb. within five years,c. no firm plans,d. not intending to provide
5	<p>What benefits would make you more likely to provide this data?</p> <ul style="list-style-type: none">a. reduction in the costs of assessing if trains are compatible with our infrastructureb. reduction in network management costsc. other reasons (please give details).



6	<p>Do you believe your system is up to date technically and represents a modern state-of-the-art solution? Please list the technologies that you believe are indicative</p> <ul style="list-style-type: none"> a. modern database, b. modern updating technologies using web services and interfacing to hand held or engineering data sourcing, c. support for modern messaging structures - xml, d. modern analysis technologies, e. business intelligence, f. data mining.
7	<p>Interfaces to support the TSIs for RST, OPE, ENE and CCS have been specified. Do your systems have the ability to support these interfaces either now or in the near future?</p>
8	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none"> a. data quality (accuracy, completeness, timeliness of the data) is improved, b. the data is used by the engineering function as a fundamental source for engineering activities c. the data is used by the operations function for planning and running trains and validating compatibility with the consignment note.
9	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none"> a. problems with obtaining and keeping up to date some data elements with customers(please specify), b. data quality (accuracy, completeness, timeliness of the data) is problematic, c. it has proved difficult to integrate with other systems, d. technical incompatibility with systems e. different data formats f. performance, reliability and availability are problematic.
10	<p>Have you linked the infrastructure database to your Network Statement?</p> <ul style="list-style-type: none"> a. yes - the detailed technical data is linked to the database, <ul style="list-style-type: none"> ▶ the experience is beneficial in that it more efficient to keep up to date, ▶ the experience is that there is too little shared data to be really beneficial, b. no - they are held separately.



11	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. easier for RUs to ask for paths and services,b. the system can be used by clients to determine new commercial opportunities,c. essential for calculating access charges,d. other, please list the areas.
12	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. the system provides a common referencing system shared by civil engineering, signalling, track and electrification engineers,b. the system provides a source for planning engineering work and capturing real engineering measured data improving quality and consistency of engineering data,c. the system helps in reducing engineering costs by providing a reference structure for planned compared with actual costs of engineering,d. other benefits from the system.
13	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. the system provides basic source of track geography for train planning,b. the system provides GPS source for train tracking and monitoring,c. the system provides an essential link between operations staff and engineering staff for temporary closure of track section, engineering restrictions (see section below on IRNO etc.d. other benefits from the system.



12.3 Infrastructure restrictions

[Questions for IMs & RUs (plus CER, EIM, RNE RAILDATA and X-Rail)]

1	<p>Do you have a structured electronic record of infrastructure restrictions:</p> <ul style="list-style-type: none">a. yes, the data is maintained by our organisation,b. yes, the data is maintained by another organisation (please state which one), and we receive regular updates,c. no, the data is held by another organisation (please state which), and we have direct access to it,d. no, we work from paper documents provided by another organisation (please state which),e. no, the data is maintained by our organisation in paper documents,f. no, the data is maintained by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation),h. no, we do not provide details infrastructure restrictions (if so, please ignore the rest of this section).
2	<p>Is the infrastructure restrictions data integrated with your infrastructure register data, or is it held separately?</p> <ul style="list-style-type: none">a. yesb. no
3	<p>If held separately, please provide the following details about the infrastructure restrictions system that you use:</p> <ul style="list-style-type: none">a. name of system,b. system owner,



4	<p>Does your infrastructure restrictions data contain the information listed in Annex B of the TAF TSI (see below). Please indicate which data fields are <u>not</u> held currently.</p> <ul style="list-style-type: none"> a. line segment or station identity, b. reason & start/end time of restriction, c. speed restriction, d. train length restriction, e. train/axle weight restriction f. brake type, g. traction type, h. dangerous goods, i. exceptional consignments, j. livestock, k. train control system, l. train radio system,
5	<p>What benefits would make you more likely to provide any missing data</p> <ul style="list-style-type: none"> a. reduction in the costs of managing access to the network b. reduction in the costs of day-to-day network management c. contribution to the costs from network users who share in the benefits d. other reasons (please give details).
6	<p>Do you believe your system to be up- to-date technically and to represent a modern state of the art solution? Please list the technologies that you believe are indicative:</p> <ul style="list-style-type: none"> a. modern database, b. modern updating technologies using web services and interfacing to hand held or engineering data sourcing, c. support for modern message structures - xml, d. modern analysis technologies <ul style="list-style-type: none"> ▶ business intelligence, ▶ data mining,
7	<p>In its current form, has your system the capability to support the real-time TAF TSI messages that are involved with RU train preparation and acceptance of a train formation by the IM?</p> <ul style="list-style-type: none"> a. No will need considerable enhancement b. Yes (but will needs some changes) c. Yes with minor changes only
8	<p>Do you foresee any problems in the provision of information to RUs via the TAF TSI messages, such as availability of the system, and planned downtimes?</p>



9	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improved,b. the data is used by the engineering function as a fundamental source for engineering activitiesc. the data is used by the operations function for planning and running trains and validating compatibility with the infrastructure,d. other positive experiences.
10	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping up to data some data elements (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. it has proved difficult to integrate with other systems, due tod. Technical incompatibility with systemse. Different data formatsf. performance, reliability and availability are problematic,g. other negative experiences.
11	<p>Have you linked the infrastructure restrictions database to your online Network Statement?</p> <ul style="list-style-type: none">a. yes the detailed technical data is linked to the database,<ul style="list-style-type: none">▶ the experience is beneficial in that it is more efficient to keep up to date,▶ the experience is that there is too little shared data to be really beneficialb. no they are held separately
12	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. Easier for RUs to ask for paths and servicesc. Can be used by RUs and others to determine new commercial opportunitiesd. Essential for calculating access chargese. Other (please list the areas)



13	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. the system provides a common referencing system shared by civil engineering, signalling, track and electrification engineers,b. the system provides a source for planning engineering work and capturing real engineering measured data thus improving quality and consistency of engineering data,c. the system helps in reducing engineering costs by providing a reference structure for planned compared with actual costs of engineering,d. other benefits.
14	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. the system allows us to advise users of new restrictions much more quickly so there are fewer access refusalsb. the network is much easier to manage because trains are not delayed by unknown restrictionsc. the system provides an essential link between operations staff and engineering staff for temporary closure of track section, engineering restrictions (see section below on IRNO etc.d. other benefits.



Vehicle register

[For vehicles keepers including RUs, some IMs, ECMs, CER, and UIP]

1	<p>Do you have a structured electronic register of railway vehicles?</p> <ul style="list-style-type: none">a. yes, the data is maintained by our organisation,b. yes, the data is maintained by another organisation (please state who), and we receive regular extracts and/or updates,c. no, the data is held by another organisation (please state which), and we have direct access to it,d. no, the data is maintained by our organisation in paper documents,e. no, we work from paper documents provided by another organisation (please state which),f. no, the data is maintained by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation),h. no, we do not use a vehicle register (if so, please ignore the rest of this section).
2	<p>Which role(s) do you fulfil in relation to these vehicles? (more than one may apply):</p> <ul style="list-style-type: none">a. owner,b. keeper,c. hirer,d. operator,e. maintainer (ECM),f. infrastructure manager,g. safety authority,h. regulator,i. registration entity,j. other (please specify).
3	<p>Please provide the following details about the vehicle register that you use:</p> <ul style="list-style-type: none">a. name of system,b. system owner,
4	<p>Is the system fully compatible with the TAF TSI and TAP TSI data structure?</p>



5	<p>Does your vehicle register contain the information listed in http://www.era.europa.eu/Document-Register/Pages/Recommendation-on-specification-of-ERATV.aspx (see below)? Please indicate which data fields are <u>not</u> held currently.</p> <ul style="list-style-type: none">a. vehicle type code, description, manufacturer,b. conformity with TSIs (and sections not complied with),c. member state authorisations, validity periods and any restrictions,d. max design speed (loaded/empty),e. use in fixed, predefined or general formation,f. dangerous goods for which vehicle is suitable,g. kinematic gauge (interoperable and/or other),h. temperature, altitude, weather range,i. fire safety category,j. permissible payload by line category,k. design mass (empty, normal payload, exceptional payload),l. static axle load (empty, normal payload, exceptional payload),m. maximum cant deficiency or lateral acceleration,n. braking systems (eddy current, magnetic, regenerative),o. vehicle length,p. minimum horizontal curve radius,q. type of end coupling,r. axle bearing condition monitoring,s. energy supply system,t. noise characteristics,u. passenger-related characteristics (seats, toilets, PRM facilities)v. level of ETCS equipment fitted,w. type(s) of radio system fitted,x. compatibility with train detection systems.y. braking profiles, (not in the recommendation)
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6	<p>Does your vehicle register contain the information specific to each vehicle as listed in NVR Common Specification, Annex 1? (see below) Please indicate which data fields are <u>not</u> held currently.</p> <ul style="list-style-type: none"> a. European Vehicle Number, b. authorising Member State and safety authority, c. year of manufacture, d. EC declaration of verification, e. rolling stock register reference, f. list of restrictions, g. vehicle owner, h. vehicle keeper, i. entity in charge of maintenance, j. withdrawal date, k. list of Member States where the vehicle is authorised, l. authorisation number, m. authorisation date and validity period.
7	<p>For those fields that you do not currently have in your system, what is your timeframe to add them?</p> <ul style="list-style-type: none"> a. within three years,(within the SEDP timeframe for the TAF TSI) b. within five years, c. no firm plans, d. no intention of providing the absent data.
8	<p>Do you believe your system is up to date technically and represents a modern state of the art solution? Please list the technologies that you believe are indicative</p> <ul style="list-style-type: none"> a. modern database, b. modern updating technologies using web services and interfacing to hand held or engineering data sourcing, c. support for modern message structures - xml, d. modern analysis technologies <ul style="list-style-type: none"> ▶ business intelligence, ▶ data mining.
9	<p>Please list the main external interfaces of the system which are relevant to implementing the interfaces required by the legislation i.e. to ECMs or RUs</p>
10	<p>Do you anticipate any difficulties in providing data for instance at weekends or during planned down times, or because your system does not operate 24x7?</p> <ul style="list-style-type: none"> a. no b. yes (state why)



11	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improved,b. the data is used by the engineering function as a fundamental source for engineering activitiesc. the data is used by the operations function for planning and running trains and validating compatibility with the infrastructure,d. successful integration with other systemse. other positive experiences.
12	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping up to data some data elements (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. it has proved difficult to integrate with other systems, due tod. technical incompatibility with systemse. different data formatsf. performance, reliability and availability are problematic,g. other negative experiences.
13	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. essential for wagon keepers to have a catalogue of vehicles to be able to offer wagon information to customers,b. essential to have vehicle data to be able to supply it to railway undertakings and ECMs,c. other benefits.
14	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. the system provides a common referencing system shared by RU, keepers and ECMs,b. the system provides a source for planning maintenance work and capturing real engineering defects and repairs,c. the system helps in reducing engineering costs by providing efficient data exchange in a common format with partners and suppliers,d. other benefits.



15	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. the system is required for safe operation of trains, validating actual wagon status with operational plan,b. the system provides an essential link between operations staff and engineering staff for temporary defects, inspection planning,c. the system provides a basic source of wagon data for service planning,d. the system provides a basic reference data for train tracking and monitoring,e. other benefits.
16	<p>What is your experience of using your system? For example</p> <ul style="list-style-type: none">a. problems with data exchange (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. difficult to integrate with other systems,d. performance, reliability and availability are problematic.



12.4 Consignment notes

[Questions for Railway Undertakings (plus CER & CIT & RAILDATA)]

1	<p>Do you have an electronic system for processing consignment notes which would enable the TAF TSI Wagon Order Message to be generated (more than one answer may apply):</p> <ul style="list-style-type: none">a. yes, the data is processed by our organisation,b. yes, the data is processed by another organisation (please state which), and we receive regular extracts and/or updates,c. no, the data is processed by another organisation (please state which), and we have direct access to it,d. no, the consignment notes are processed manually by our organisation,e. no, we work from documents provided by another organisation (please state which),f. no, the data is processed by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation),h. no, we do not use electronic consignment notes (if so, please ignore the rest of this section).
2	<p>Please provide the following details about the consignment note processing system that you use:</p> <ul style="list-style-type: none">a. name of system,b. system owner,
3	<p>Does your system contain: the consignment note data listed in TAF Annex 3? (see below and see SEDP deliverable 2 Appendix F) Please indicate which data are not held currently</p> <ul style="list-style-type: none">a. consignor and consignee,b. contract and payer details,c. booking and consignment numbers,d. description of the goods,e. gross mass [weight] and volume,f. dangerous goods information,g. wagon number,h. UTI identification,i. additional instructions,j. origin location/time,k. destination location/time,l. routeing information.



4	<p>For those fields required for the TAF TSI Wagon Order message that you do not currently have in your system, what is the timeframe to add these key fields?</p> <ul style="list-style-type: none">a. within three years, (SEDP timescale)b. no firm plans,c. no intention to provide this data as we do not interchange traffic with other RUs.
5	<p>Do you believe your system to be up to date technically and to represent a modern state of the art solution? Please list the technologies that you believe are indicative</p> <ul style="list-style-type: none">a. modern database,b. modern updating technologies using web services and interfacing to hand held data sourcing,c. support for modern message structures – xml,d. modern analysis technologies,<ul style="list-style-type: none">▶ business intelligence▶ data mining
6	<p>Do you anticipate any problems in providing data at certain times, such as planned outages, or your system not being operated 24x7?</p> <ul style="list-style-type: none">a. Nob. Yes (state why)
7	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improved,b. the data is used by the commercial function as a fundamental source for commercial activitiesc. the data is used by the operations function for planning and running trains and validating compatibility with the infrastructure,d. other benefits.
8	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping up to date some of the data (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. it has proved difficult to integrate with other systems, due to<ul style="list-style-type: none">▶ Technical incompatibility with systems▶ Different data formatsd. performance, reliability and availability are problematic,e. other negative experiences.



9	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. faster consignment process, more convenient for customers,b. data is more accurate, fewer disputed charges,c. simplifies automated consignment trackingd. other (please list the areas)
10	<p>Where have you found financial benefits?</p> <ul style="list-style-type: none">a. quicker billing thus improving cash flowb. saves re-collecting data for traffic received from other railway undertakings,c. data is more accurate, less need for amendment,d. allows “follow-on” savings of staff in yards and terminals,e. other (please list the areas).
11	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. basic source of consignment data for wagon movement,b. essential link between operations staff and commercial staff for service management,c. speeds up the movement of traffic and eliminates delay,d. GPS source for wagon tracking and monitoring,e. other benefits.



Train paths

[Questions for IMs and path allocation bodies (plus EIM & RNE)]

1	<p>Do you have a system for managing and allocating individual train path request and response data (more than one answer may apply):</p> <ul style="list-style-type: none">a. yes, the data is recorded by our organisation,b. yes, the data is recorded by another organisation (please state who), and we receive regular extracts and/or updates,c. no, the data is recorded by another organisation (please state which), and we have direct access to it,d. no, the data is maintained by our organisation in paper documents,e. no, we work from paper documents provided by another organisation (please state which),f. no, the data is maintained by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation),h. no, we do not handle train path data electronically (if so, please ignore the rest of this section).
2	<p>Please provide the following details about the train path allocation system that you use:</p> <ul style="list-style-type: none">a. name of system,b. system owner,
3	<p>Is the system broadly compatible with the needs of the TSIs applicable? (TAF, TAP and OPE)</p> <ul style="list-style-type: none">d. No significant enhancement will be necessarye. Yes and interfaces to Pathfinderf. Yes but no interface to Pathfinderg. Yes but lacks support for late modifications to pathsh. Yes including support for late changes



4	<p>Does your system contain the train path data listed in TAF Annex 4) (see below and see SEDP deliverable 2 Appendix F)? Please indicate which data fields you do <u>not</u> hold currently:</p> <ul style="list-style-type: none">a. train ID,b. lead RU ID,c. responsible RU,d. responsible IM,e. origin locationf. origin departure timeg. destination locationh. destination arrival times,i. intermediate location arrival/departure/passing times,j. train length (max),k. train weight (max),l. train speed (max),m. train activities (at intermediate locations),n. recovery times,o. max axle weight,p. max weight per metre,q. exceptional gauging,r. dangerous goods permissions,s. braking system,t. loco IDsu. traction type,v. command & control system,w. on board radio equipment,x. vehicle IDs,y. exceptional gauge,z. dangerous good indicator,aa. livestock indicator. <p><i>Note: items a-aa above are part of planned path data. Actuals may be held in a train operations system</i></p>
5	<p>Do you have plans to add the mandatory fields within the TAF and TAP messages related to path request and allocation that you do not currently have in your system?</p> <ul style="list-style-type: none">a. yes, within three years (within SEDP period)b. yes, within five years,c. no firm plans,d. no intention to provide this data.



6	<p>Which of the following train pathing TAF (& TAP) messages does your system handle?</p> <ul style="list-style-type: none">a. path request (from RU to IM),b. offered path (from IM to RU),c. path not available (from IM to RU),d. path confirmed (from RU to IM),e. offered path refused (from RU to IM),f. path cancelled (from RU to IM).
7	<p>Do you believe your system is up to date technically and represents a modern state of the art solution? Please list the technologies that you believe are indicative:</p> <ul style="list-style-type: none">a. modern database,b. modern updating technologies using web services and interfacing to hand held data sourcing,c. support for modern message structures – xml,d. modern analysis technologies,<ul style="list-style-type: none">▶ business intelligence,▶ data mining,
8	<p>Please list the main external interfaces of the system which will be used to support TAF TSI and TAP TSI style messages.</p> <ul style="list-style-type: none">a. Path requestb. Path offerc. Others (please list)
9	<p>Do you anticipate any problems in maintaining the messages at any time due to system management processes, e.g. planned down time; your system is not 24x7 etc?</p> <ul style="list-style-type: none">a. Nob. Yes (state why)
10	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improved,b. the data is used by the operations planning function as a fundamental source for timetable activities with customers (RUs)c. the data is used by the operations function for planning and running trains and validating compatibility of the bid with the path,d. other positive experiences.



11	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping up to date some data elements with customers (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. it has proved difficult to integrate with other systems, due to<ul style="list-style-type: none">▶ technical incompatibility with systems▶ different data formatsd. performance, reliability and availability are problematic,e. other negative experiences.
12	<p>Have you linked the system to your customers and also to your Network Statement?</p> <ul style="list-style-type: none">a. yes, the detailed technical data is linked to the database,<ul style="list-style-type: none">▶ the experience is beneficial in that it keeping it up to date can be done more efficiently,▶ the experience is that there is too little shared data to be really beneficial,b. no, they are held separately,c. yes, linked to customers.
13	<p>What is your experience of using your system?</p> <ul style="list-style-type: none">a. problems with data exchange (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. difficult to integrate with other systems,d. performance, reliability and availability are problematice. Other problems, (please specify).
14	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. much easier for RUs to ask for paths and servicesb. much quicker turn-round of RU path requestsc. can be used by applicants to test new service patterns,d. essential for calculating access charges,e. other, please list the areas.
15	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. provides a source for planning engineering work and allows consistency of engineering possession planning,b. other, benefits (please specify).



16	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. basic source of train planning work,b. source for access billing, train tracking and monitoring,c. essential link between operations and commercial for train tracking and performance data,d. other benefits.
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12.5 Management of train operations

[Questions for RUs and IMs (plus CER, RAILDATA, X-Rail, EIM & RNE)]

1	<p>Do you have a system for managing and recording train operation on your infrastructure network? (more than one answer may apply):</p> <ul style="list-style-type: none">a. yes, the data is recorded by our organisation,b. yes, the data is recorded by another organisation (please state which), and we receive regular extracts and/or updates,c. no, the data is recorded by another organisation (please state which), and we have direct access to it,d. no, the data is maintained by our organisation in paper documents,e. no, we work from paper documents provided by another organisation (please state which),f. no, the data is maintained by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation),h. no, we do not handle train movement data electronically (if so, please ignore the rest of this section).
2	<p>Please provide the following details about the train operations management system that you use:</p> <ul style="list-style-type: none">a. name of system,b. system owner,



3	<p>Does your system contain the following train operating data? Please indicate what data fields you do not currently hold:</p> <ul style="list-style-type: none">a. train ID, (note: if not in UIC leaflet 419 format, it should be considered to be absent)b. RU ID,c. origin schedule and actual departure time/date,d. destination schedule and actual arrival time/date,e. intermediate location schedule and actual arrival/departure times/date, (some systems may record arrival time and dwell time rather than two times)f. intermediate location schedule and actual passing times/dates,g. on-the-day changes to schedule data such as: -<ul style="list-style-type: none">▶ change of origin,▶ change of destination,▶ change of route,▶ change of timings,h. record of:<ul style="list-style-type: none">▶ cancellation including location, time/date and reason,▶ reinstatement after previous cancellation report,▶ reasons for late running.i. train consist details<ul style="list-style-type: none">▶ loco IDs▶ traction type,▶ vehicle IDs,▶ vehicle order from front or rear of train▶ braking system,▶ exceptional gauge,▶ exceptional gauging,▶ dangerous goods details▶ braking system,▶ command & control system fitment▶ on board radio equipment fitment▶ livestock present indicator.
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4	<p>How is information maintained in the system?</p> <p>Train consists</p> <ul style="list-style-type: none">a. online manual entry,b. automatic links to daily diagrams,c. default formationsd. electronic train interface before departure. <p>Train running</p> <ul style="list-style-type: none">e. online manual entry,f. automatic links to signalling,g. GPS tracking <p>Train delays</p> <ul style="list-style-type: none">h. manual entryi. automatic links to on-train fault monitoring equipmentj. links to signalling and track systems
5	<p>Please list the main external interfaces of the system which are broadly compatible with those required by TAF and TAP e.g. with RUs and IMs.</p> <p>Do you support?</p> <ul style="list-style-type: none">a. Train consists (composition)b. Train runningc. Delay recording and explanations
6	<p>Please indicate if you anticipate any problems supporting the TAF or TAP messages at any particular times, such as planned outages, or your system is not 24x7</p> <ul style="list-style-type: none">a. Nob. Yes (state why)
7	<p>Do you believe your system is up to date technically and represents a modern state of the art solution? Please list the technologies that you believe are indicative:</p> <ul style="list-style-type: none">a. modern database,b. modern updating technologies using web services and interfacing to mobile hand held data sourcing,c. support for modern message structures – xml,d. modern analysis technologies<ul style="list-style-type: none">▶ business intelligence▶ data mining



8	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improved,b. the data is used by the commercial function is a fundamental source for contract and billing activitiesc. the data is used by the operations function for running trains and validating delay data and communicating performance to customers,d. other positive experiences.
9	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping some data elements up to date (please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. it has proved difficult to integrate with other systems, due tod. technical incompatibility with systemse. different data formatsf. performance, reliability and availability are problematic,g. other negative experiences.
10	<p>Have you linked the train running database to your engineering function to analyse performance and thus improve engineering quality?</p> <ul style="list-style-type: none">a. yes, the experience is beneficial in that it can be kept up to date more efficiently,b. yes, however the experience is that there is too little shared data to be really beneficialc. no, they are held separately
11	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. easier for RUs to monitor their servicesb. easier to manage network traffic due to visibility of information at all levels in our organisationc. essential for calculating and/or checking access chargesd. other (please list the areas).
12	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. Provides vital data concerning the use of the infrastructure linking to maintenance planning and forward prediction of wear,b. Provides train-kms data which can be applied to the vehicles on the trains for use in planning vehicle maintenance workc. helps in reducing engineering costs by providing a source of costs compared with volumes of traffic,d. other benefits.



13	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. basic source of train running data both current and historical, thus enabling performance measurementb. GPS data source linking trains and improving tracking and monitoringc. essential link between operations staff and engineering staff for temporary closure of track section, engineering restrictions (see section below on IRNDB etc.,d. other benefits.
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Vehicle operations

[Questions for RUs, Keepers (plus CER & UIP)]

1	<p>Do you have a system for managing vehicle loading and movement data (more than one answer may apply):</p> <ul style="list-style-type: none">a. yes, the data is recorded by our organisation,b. yes, the data is recorded by another organisation (please state which), and we receive regular extracts and/or updates,c. no, the data is recorded by another organisation (please state which), and we have direct access to it,d. no, the data is maintained by our organisation in paper documents,e. no, we work from paper documents provided by another organisation (please state which),f. no, the data is maintained by our organisation using commercial office IT products such as MS Office,g. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation),h. no, we do not handle vehicle operational data electronically (if so, please ignore the rest of this section).
2	<p>Please provide the following details about the vehicle operational system that you use:</p> <ul style="list-style-type: none">a. name of system,b. system owner,
3	<p>Which of the following vehicle operational data (as listed in SEDP Deliverable 2, Specification 2 - WIMO) does your system contain:</p> <p><i>(note : it is essential that RUs differentiate between where they hold this for all wagons they move, and where they only hold part of the data for private owner wagons or other RU's wagons)</i></p> <ul style="list-style-type: none">a. temporary vehicle restrictions (including speed restrictions),b. defects,c. distance counter,d. load category (empty/loaded/discharged (tanks only)e. current load weight,f. dangerous goods information,g. other consignment data (please specify).



4	<p>Do you have any general comments on TAF TSI messages, such as message data that is expensive and/or difficult to provide but in your opinion does not seem to meet any operational, safety, or commercial need? Please classify the data in the categories below</p> <ul style="list-style-type: none">a. difficult to collect,b. difficult to code,c. difficult to update,d. uncertain of its relevance
5	<p>For those mandatory fields needed for TAF TSI and TAP TSI that you do not currently have in your system, do you have plans to add them?</p> <ul style="list-style-type: none">a. yes, within three years (the SEDP timescale)b. yes, within five years,c. no firm plans,
6	<p>Does your system handle the train movement events supported by TAF messages as listed in TAF Annex 1 (see below and see SEDP deliverable 2 Appendix F)? Please indicate which events you do not currently support :</p> <ul style="list-style-type: none">a. train composition (from RU to IM),b. train accepted (from IM to RU),c. train not suitable (from IM to RU),d. train ready (from RU to IM),e. train position (from IM to RU),f. train at start (from RU to IM),g. train running information (from IM to RU),h. train running forecast (from IM to RU),i. train running interrupted (from IM to RU),j. train running information enquiry/response,k. train delay enquiry/response,l. train identity enquiry/response,m. train running forecast enquiry/response,n. trains at reporting location enquiry/response.



7	<p>Does your system handle: the vehicle movement events supported by TAF messages as listed in TAF Annex 1 (see below and see SEDP deliverable 2 Appendix F). Please indicate which events you do not currently support.</p> <ul style="list-style-type: none">a. wagon release,b. departure from origin,c. intermediate yard arrival,d. intermediate yard departure,e. exception event (with reason),f. revised estimated time of arrival at interchange/destination,g. interchange received,h. interchange accepted/refused,i. arrival at destination,j. delivery of consignment,k. wagon estimated time of interchange/ arrival,l. wagon alert (if committed customer delivery time will be missed),m. wagon rerouting enquiry/response. <p>Please give other movement events that are supported, (if any)</p>
8	<p>Please indicate if you anticipate any problems supporting the TAF or TAP messages at any particular times, such as planned outages, or your system is not 24x7</p> <ul style="list-style-type: none">a. Nob. Yes (state why)
9	<p>Do you believe your system is up to date technically and represents a modern state of the art solution? Please list the technologies that you believe are indicative:</p> <ul style="list-style-type: none">a. modern database,b. modern updating technologies using web services and interfacing to hand held or engineering data sourcing,c. support for modern message structures - xml,d. modern analysis technologies,<ul style="list-style-type: none">▶ business intelligence▶ data mining
10	<p>How is information maintained in this system ?, For example:</p> <ul style="list-style-type: none">a. online entry by freight staff in yards and terminalsb. by staff in data centresc. GPS/AVI messagesd. in some other way (please give details).



11	<p>Do you anticipate any problems supporting the TAF and TAP messages at any particular times such as system planned downtime, or your system is not a 24x7 system?</p> <ul style="list-style-type: none">a. Nob. Yes (state why)
12	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improved,b. the data is used by the commercial function as a fundamental source for contract and billing activities and dispute resolutionc. the data is used by the operations function for running trains and validating delay data and communicating performance to customers,d. other positive experiences.
13	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping up to data some data elements with customers(please specify),b. data quality (accuracy, completeness, timeliness of the data) is problematic,c. it has proved difficult to integrate with other systems, due to:<ul style="list-style-type: none">▶ technical incompatibility with systems▶ different data formatsd. performance, reliability and availability are problematic,e. other negative experiences.
14	<p>Have you linked the vehicle operations database to your engineering function to analyse performance links to engineering quality</p> <ul style="list-style-type: none">a. Yes - the experience is beneficial in that keeping it up to date can be done more efficiently,b. Yes - the experience is that there is too little shared data to be really beneficial,c. No - they are held separately.



15	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. easier to monitor services and transit times,b. can be used by our customers to track their consignmentsc. essential for billing based on placement report at destinationd. much easier to arrange wagon supply as empty wagons can be automatically destined to new loading pointse. essential for calculating costs indicators,f. essential for calculating service performanceg. other, please list the areas.
16	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. the system provides vital data concerning the use of the wagon fleet linking it to maintenance planning and forward prediction of wear,b. the system provides a source for planning maintenance thus improving quality and consistency of maintenance datac. the system helps in reducing maintenance costs by allowing maintenance to be based on wagon performanced. other benefits (please give details).
17	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. the system provides a basic source of vehicle distance-run datab. the system provides an essential link between operations staff and engineering staff for defects and maintenancec. the system provides GPS data source linking trains and improving tracking and monitoringd. the system provides other benefits.



Vehicle maintenance/repair

[Questions for wagon keepers, (incl. RUs and some IMs) UIP, CER, & ECMs]

1	<p>Do you have a system for managing vehicle maintenance and repair data? (more than one answer may apply):</p> <ul style="list-style-type: none">a. yes, the data is recorded by our organisationb. yes, the data is recorded by another organisation (please state which), and we receive regular extracts and/or updatesc. no, the data is recorded by another organisation (please state which), and we have direct access to itd. no, the data is maintained by our organisation in paper documentse. no, we work from paper documents provided by another organisation (please state which)f. no, the data is maintained by our organisation using commercial office IT products such as MS Officeg. no, we work from electronic documents (e.g. Word, Excel, Access etc), provided by another organisation that uses a commercial office IT product (please state which organisation)h. no, we do not handle vehicle technical and maintenance/repair data electronically (if so, please ignore the rest of this section).
2	<p>Please provide the following details about the vehicle technical data system that you use:</p> <ul style="list-style-type: none">a. name of systemb. system owner.
3	<p>Annex 2 Index 2 of the TAF TSI defines the wagon data elements, (administrative and technical) for inclusion in the Rolling Stock Reference Database (RSRD) and see SEDP deliverable 2 Appendix F. Are there any data elements you do not currently support?</p>
4	<p>Does your system contain: the following vehicle maintenance and repair information? Please indicate what is not available</p> <ul style="list-style-type: none">a. temporary vehicle restrictions (including speed restrictions)b. current/planned maintenance actionsc. historic maintenance actionsd. date/time of next maintenancee. kms to next maintenancef. current defectsg. fault records (details of defects dealt with together with the repair work done)h. distance counter (kms run).



5	<p>The EC Regulation relating to ECM certification requires various parties to exchange maintenance data; does your system have any agreed formats of data to support external interfaces to other parties?</p> <ul style="list-style-type: none">a. Yesb. No (state why formats are different)
6	<p>Assuming that your system eventually becomes linked with others for exchange of maintenance and repair data, do you anticipate any problems supporting such links at any particular times, such as planned outages, or your system is not 24x7</p> <ul style="list-style-type: none">a. Nob. Yes (state why)
7	<p>Do you believe your system is up to date technically and represents a modern state of the art solution? Please list the technologies that you believe are indicative:</p> <ul style="list-style-type: none">a. modern databaseb. modern updating technologies using web services and interfacing to hand held or engineering data sourcingc. support for modern message structures – xmld. modern analysis technologies<ul style="list-style-type: none">▶ business intelligence▶ data mining.
8	<p>What are the positive experiences of using your system?</p> <ul style="list-style-type: none">a. data quality (accuracy, completeness, timeliness of the data) is improvedb. the data is used by the commercial function as a fundamental source for defect and claims contract and billing activitiesc. the data is used by the operations function for running trains and validating train consists datad. other positive experiences.
9	<p>What are the negative experiences with your system?</p> <ul style="list-style-type: none">a. problems with obtaining and keeping up to date some data elements (please specify)b. data quality (accuracy, completeness, timeliness of the data) is problematicc. it has proved difficult to integrate with other systemsd. technical incompatibility with systemse. different data formatsf. performance, reliability and availability are problematicg. other negative experiences.



10	<p>Have you linked the vehicle maintenance database to your engineering function/ sub contractors to analyse performance links to engineering quality?</p> <ul style="list-style-type: none">a. Yes - the experience is beneficial in that it can be kept up to date more efficientlyb. Yes, but the experience is that there is too little shared data to be really beneficialc. No, they are held separately.
11	<p>What is your experience of using your system? For example:</p> <ul style="list-style-type: none">a. problems with data exchange (please specify)b. data quality (accuracy, completeness, timeliness of the data) is problematicc. difficult to integrate with other systemsd. performance, reliability and availability are problematic.
12	<p>What are your expectations in terms of maintenance data supplied by external organisations (keepers, RUs)?</p> <ul style="list-style-type: none">a. greater range of data relevant to maintenance is neededb. defect codes need to be standardisedc. more fields need to be completedd. greater accuracy is needede. earlier supply of data.
13	<p>Where have you found commercial benefits?</p> <ul style="list-style-type: none">a. easier for keepers to monitor maintenance qualityb. can be used by RUs to determine service delivery responsibilitiesc. essential for calculating cost indicatorsd. other, please list the areas.
14	<p>Where have you found engineering benefits?</p> <ul style="list-style-type: none">a. the system provides vital data concerning the use of the wagon fleet linking it to maintenance planning and forward prediction of wearb. the system provides a source for planning maintenance thus improving quality and consistency of maintenance datac. the system helps in reducing maintenance costs by allowing maintenance to be based on wagon performanced. other benefits (please give details).



15	<p>Where have you found operational benefits?</p> <ul style="list-style-type: none">a. the system provides a basic source of vehicle distance-run datab. the system provides an essential link between operations staff and engineering staff for defects and maintenancec. the system provides GPS data source linking trains and improving tracking and monitoringd. other benefits (please give details).
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Other Issues

1	Are there any material facts that you consider that the study team ought to take into account in the course of its work?
2	What would you like see emerge from this study?
3	Is there anything else that you would wish to add?



12.6 Annex 3 Interviews

Due to the commitment to confidentiality this section only lists the interviewees and dates.

ORR (UK)	30 th March
UIP	11 th April
SNCF & RFF	2 nd May
ERA	20 th May
Network Rail	31 st May
Complete Rail Systems	31 st May
Trenitalia & RFI	11 th July
CFR SA and Romanian OTFs	13/14 th July
PLK	25 th October
CD Cargo	26 th October
BLS	1 st November
NMBS Logistics	3 rd November
Prorail	4 th Novemebr



12.7 Annex 4 Terms of Reference

The full Terms of Reference for the Consultant are contained in the contract: -

MOVE/MAR/2010/D2/214-1/S12.579462/ERVID

The following is an extract from this document.

1.2. Purpose of the contract

Before taking any decision on the technical aspect of a real-time data exchange system, there is a need for a detailed overview on data requirements which arise from the European Railway Regulatory Framework, including Safety and Interoperability Directives (and the related secondary legislation e.g. technical specifications for interoperability), on market needs for real time data exchange, and on existing IT applications in operation or being developed in Europe. The study will determine if these applications make it possible to fulfil the requirements. The study will then recommend a real-time data exchange system from the technical, governance and financial aspects. Finally, the study will examine the technical and economic feasibility of it.

The consultancy study is linked to the mandate given to a Task Force established by the European Commission following the 51st meeting of the Rail Interoperability and Safety Committee (RISC). Member States agreed to set up a task force to examine current developments and future needs for telematics applications in the railway sector, in particular in the context of meeting the legal requirements for stakeholders.

The Task Force will be assisted by a Consultant contracted by the European Commission that will carry out the detailed work of examination on behalf of the Task Force. Liaison with the Task Force will be maintained via a series of bi-monthly meetings, plus telephone and e-mail contact.

The study will consist of the following four phases (1.2.1 to 1.2.4). The contractor will inform the Task Force and will assist the Commission in the work of the Task Force by, among others, making available its technical know-how.

1.2.1. Fact finding (Phase 1)

The study will depict the existing situation in terms of rail-related IT applications in operation or being developed in Europe, including the TAF TSI-related projects².

Moreover, the analysis shall include the return of experience (REX) and a state of the art concerning the technical, financial and governance aspects of these projects. It will examine market needs for real time data exchange. Furthermore, other transport-related European/transnational projects and initiatives e.g. ERTMS, SESAR, e-Freight, InteGRail will also be analysed.

This will be carried out with a view to support the recommendation(s) from the technical, governance and financial perspectives as indicated in section 1.2.3.

1.2.2. Assessment of the EU Requirements fulfilment (Phase 2)

The study shall list all requirements which are imposed by the EU rail-related legislation and market needs which imply an exchange of data and describe what specific data is required as well as where, when and how it will be delivered/exchanged. Then the study will determine if and how the applications



identified and described (in particular TAF TSI) in section I.2.1 allow the required data exchange.

I.2.3. Recommendation(s) (Phase 3)

A. Needs for new telematics applications to support the required data exchanges

Based on the above, the study shall list and define the data necessary to discharge their legal obligations under the Interoperability and Safety Directives, but which are not yet covered by works and systems already mandated by existing European Rail legislation and the related needs for telematics applications which will allow stakeholders to source. In this context it should be especially ensured that the recommendations will be compatible with the National Vehicle registers (NVR) (and the Virtual Vehicle Register search engine which will be hosted at the European Railway Agency) and with the Register of Vehicle type (ERATV which will be hosted at the European Railway Agency) on the one hand, and with the implemented parts of the TAF and TAP TSIs on the other hand.

B. Technical aspects

The study will describe the recommended real time data exchange system(s) which fulfils the requirements/needs for telematics applications identified in A. The description of the system(s) will be detailed enough to support technical discussions in the Task Force, among others:

- Determine the sources of the required data as well as the processes and technologies required to keep it up to date. In addition, identify the mechanisms required to allow stakeholders to ensure data quality
- Specify who will be operating the recommended system(s) and under what conditions
- Specify the hosting requirements for the telematics applications e.g. file sizes, reliability & availability, response times, archiving, disaster recovery etc
- Specify the functional capabilities required within the telematics applications e.g. the ability to calculate vehicle distance travelled, build vehicle trips, measure data quality etc.
- Determine how the recommended system(s) will interface with other activities and systems already mandated by EU existing legislation, such as the TAF TSI Common Components, the TAF TSI Common Interface, the TAF TSI Location Reference File, the TAF RSRD, the Vehicle Registers and other registers, etc.
- Determine the appropriate access and security mechanisms in particular in relation to the different databases; evaluate possible conflict with ownership rights and confidentiality of data

C. Governance and financial aspects

Based on the results of the fact finding exercise on existing applications in section I.2.1, the study will recommend options in terms of governance in order to support discussions in the

Task Force, in particular:

- Evaluate the most appropriate mechanism including regulatory and voluntary approaches, for ensuring that all stakeholders utilise the real-time data exchange system(s) throughout Europe.
- Review and recommend governance structures for the development, implementation and operation of the IT system and delineate stakeholder involvement.
- Determine appropriate business model.



- Determine the most appropriate costs recovery model for developing and running the platform; consideration will be given to other developments for cost recovery.
- Make sure that each proposal builds, as far as possible, upon existing IT systems as currently available within companies.
- Provide for each decision an appropriate evaluation of the costs and benefits involved with a particular emphasis on market opening and access to SMEs.
- Specify the legal status of the system(s).
- Prepare an overall implementation plan.

1.2.4. Technical and economic feasibility

The study will determine the technical and economic feasibility of the recommended system(s).



12.8 Annex 5 Detailed List of Requirements

OPE TSI	Reference	Comment
<p>It must also be possible to identify <u>operational restrictions</u> applicable to the vehicle.</p> <p>Further requirements are specified in Annex P.</p>	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS</p> <p>4.2.2.3. Vehicle identification</p>	<p>Operational restrictions is not defined in the OPE-TSI, it is absent from the glossary on page 157. Does it include temporary restrictions due to defects? Does it include miles available before maintenance?</p> <p>Safer to assume it encompasses everything that limits what a vehicle is capable of in terms of traversing the network on a train.</p> <p>Looking at the letter markings for FRS these would seem to relate mainly to commercial use, except for the letter defining wagons as suitable for the UK (letter f, ff, and fff)</p>
<p>The Railway Undertaking must ensure that vehicles are not loaded beyond their <u>axle load limit</u>. They must also ensure that vehicles are not loaded beyond the axle load limit of any part of the planned route (unless the Infrastructure Manager(s) concerned have authorised the movement).</p>	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS</p> <p>4.2.2.4. Freight vehicle loading</p> <p>4.2.2.4.2. Axle loading</p>	<p>This is an internal matter for the RU when loading the wagon. Most RUs will have systems that validate the consignment weight against the carrying capacity of the wagon.</p> <p>It is therefore essential that the technical characteristics are maintained in a current state, and therefore regularly checked against the NVR</p>
<p>Train Composition requirements must take into account the following elements:</p> <ul style="list-style-type: none"> ▶ the vehicles ▶ <u>all vehicles in the train</u> must be in compliance with all the requirements applicable on the routes over which the train will run; ▶ <u>all vehicles on the train</u> must be fit to run at the maximum speed at which the train is scheduled to run; ▶ <u>all vehicles on the train</u> must be currently within 	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS</p> <p>4.2.2.5. Train composition</p>	<p>Therefore the RU must have: -</p> <ul style="list-style-type: none"> ▶ access to the relevant Network Statements, and preferably be able to formalise these in software so that each vehicle can be checked as compliant against the route restrictions imposed. E.g. axle weight. ▶ system (usually IT) to check wagon speed at current state of load against the train speed. Note that brake force impacts in this. E.g. the UK MGR wagons are capable of up to 60 mph, but due to their brake force, can only run in trains of them at 45



<p>their specified maintenance interval and will remain so for the duration (in terms of both time and distance) of the journey being undertaken;</p>		<p>mph as the brake force is insufficient for the max speed.</p> <ul style="list-style-type: none"> ▶ access to maintenance information on the vehicles. Many RUs have systems that have access to this for their own vehicles, but not necessarily for wagons received in interchange.
<ul style="list-style-type: none"> ▶ the combination of vehicles forming a train must comply with the technical constraints of the route concerned and be within the maximum length permissible for forwarding and receiving terminals ▶ the Railway Undertaking is responsible for ensuring that the train is technically fit for the journey to be undertaken and remains so throughout the journey 	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS 4.2.2.5. Train composition</p>	<p>Question is whether Network Statements include length limits for terminals. Life will be difficult if they do not as separate files of these will have to be maintained.</p> <p>If the TAF TSI process is followed, the technical constraints have been advised to the RU in the Path message, or advised as part of the Long Term plan for paths</p>
<ul style="list-style-type: none"> ▶ the weight of the train must be within the maximum permissible for the section of route, the strength of the couplings, the traction power and other relevant characteristics of the train. Axle load limitations must be respected. 	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS 4.2.2.5. Train composition</p>	<p>A combination of Network Statement route limits as advised in the Path parameters, plus technical limits for vehicles in terms of traction power, and coupling strengths.</p>
<ul style="list-style-type: none"> ▶ the maximum speed at which the train can run must take into account any restrictions on the route(s) concerned, braking performance, axle load and vehicle type. 	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS 4.2.2.5. Train composition</p>	<p>Network statements will define Line Speed and maxima for each type of train, and axle loads etc. What is not certain is the source for weight/brakeforce limits for train speed.</p> <p>The TAF TSI shows that the Path details advise the maximum speed, and other limits.</p>
<ul style="list-style-type: none"> ▶ the kinematic gauge of each vehicle (inclusive of any load) in the train must be within the maximum permissible for the section of route 	<p>4.2.2. SPECIFICATIONS RELATING TO TRAINS 4.2.2.5. Train composition</p>	<p>The Path details contain information for kinematic gauge, (Exceptional Load data). Relies on Network Statement to derive the data</p>
<p>The train composition must be described in an</p>	<p>4.2.2. SPECIFICATIONS</p>	<p>However, Appendix U has not yet been written so nothing is</p>



<p><u>harmonised train composition document</u> (see Appendix U)</p>	<p>RELATING TO TRAINS 4.2.2.5. Train composition</p>	<p>defined at present. The assumption is that this to be a document to be carried in hard-copy by the driver (like the Romanian "Aratarea Vagoanelor"?)</p>
<p>The first and last vehicles (including any traction units) in any train must have the automatic brake operative.</p>	<p>4.2.2.6. Train braking 4.2.2.6.1. Minimum requirements of the braking system</p>	<p>An IT system recording defects can be used to check for a defect of this type. Note inoperative brake is a data field in HERMES Train preparation rules will normally enforce a physical check anyway. (Brake Testing)</p>
<p>The Infrastructure Manager must decide whether to:</p> <ul style="list-style-type: none"> ▶ provide the Railway Undertaking with the information necessary for calculating the required braking performance for the route(s) concerned, including information on the braking systems which can be accepted, and on the conditions of their use, or ▶ alternatively provide the actual performance required. 	<p>4.2.2.6. Train braking 4.2.2.6.2. Brake performance</p>	<p>Most IMs will probably provide brake tables, and define the table for a particular line section in the Network Statement. The alternative is ambiguous, as "actual" surely means the <u>minimum actual</u> performance required by the train for its declared weight and speed. The minimum actual performance is calculated and provided in the Path Details data, and then presumably used to validate the Train Composition message</p>
<p>The Railway Undertaking is responsible for ensuring that the train has sufficient braking performance by providing braking rules for its staff to follow.</p>	<p>4.2.2.6. Train braking 4.2.2.6.2. Brake performance</p>	
<p>The data required for safe and efficient operation and the process by which this data must be forwarded must comprise:</p> <ul style="list-style-type: none"> ▶ the train identification ▶ the identity of the Railway Undertaking responsible for the train ▶ the actual length of the train ▶ if a train carries passengers or animals when it is not scheduled to do so ▶ any operational restrictions 	<p>4.2.2.7.2. Data required</p>	<p>The RU has to calculate the length of the train, detect any operational restrictions on the vehicles, and presence of DGs on the train, then advise this to the IM.</p>



<p>with an indication of the vehicle(s) concerned (gauge, speed restrictions, etc.)</p> <ul style="list-style-type: none"> ▶ information the Infrastructure Manager requires for the transport of dangerous goods <p>The Railway Undertaking must define a process in order to ensure that this data is made available to the Infrastructure Manager(s) prior to the departure of the train.</p>		
<p>The Infrastructure Manager must:</p> <ul style="list-style-type: none"> ▶ provide a means of <u>real time recording</u> of the times at which trains depart from, arrive at or pass appropriate predefined reporting points on their networks and the delta-time value; ▶ provide the specific data required in relation to train position reporting. Such information must include: <list of data to be provided> 	<p>4.2.3.4.2. Train reporting 4.2.3.4.2.1. Data required for train position reporting</p>	<p>Real-time recording, whilst not mandating telematics, would be uneconomic without an IT system.</p>
<p>The Infrastructure Manager must have a process, which enables an indication of the estimated number of minutes of deviation from the scheduled time a train is scheduled to be handed over from one Infrastructure Manager to another.</p> <p>This must include information on service disruption (description and location of problem).</p>	<p>4.2.3.4.2. Train reporting 4.2.3.4.2.2. Predicted hand over time</p>	<p>Real-time recording combined with comparison to schedule provides deviation data. Most train management systems have software supporting this requirement.</p>
<p>The Railway Undertaking must define the procedures to supervise the transport of dangerous goods. These procedures must include:</p> <ul style="list-style-type: none"> ▶ existing European standards as specified in EC directive 96/49 for 	<p>4.2.3.4.2. Train reporting 4.2.3.4.3. Dangerous goods</p>	<p>Advice of DGs is included in the TAF TSI Train Composition message.</p> <p>Drivers will need information on the DGs being conveyed and the action to be taken in emergency. Emergency action can be either in the form of a</p>



<p>identifying dangerous goods on board a train</p> <ul style="list-style-type: none"> ▶ advice to the driver of the presence and position of dangerous goods on the train ▶ information the Infrastructure Manager requires for transport of dangerous goods L 359/24 EN Official Journal of the European Union 18.12.2006 ▶ determination of, in conjunction with the Infrastructure Manager, lines of communication and planning of specific measures in case of emergency situations involving the goods 		<p>hard-copy manual, or as part of a train document carried by the driver for the train concerned. Such documents can be generated by an IT system and be specific to the DGs being conveyed, whereas a manual has to cover them all in one book.</p>
<p>The Infrastructure Manager and the Railway Undertaking shall have processes in place to monitor the efficient operation of the all the services concerned.</p> <p>Monitoring processes shall be designed to analyse data and detect underlying trends, both in terms of human error and system error. The results of this analysis shall be used to generate improvement actions, designed to eliminate or mitigate against events which could compromise the efficient operation of the TEN.</p>	<p>4.2.3.4.4. Operational quality</p>	<p>Performance measurement is a matter for IMs and RUs to decide, but is better discussed in the trade associations.</p>
<p>Data pertaining to the running of a train must be recorded and retained for the purposes of:</p> <ul style="list-style-type: none"> ▶ Supporting systematic safety monitoring as a means of preventing incidents and accidents. ▶ Identifying driver, train and infrastructure performance in the period leading up to and (if appropriate) immediately after an incident or accident, to 	<p>4.2.3.5. Data recording</p>	<p>There is a lot in here if the need to monitor driver performance is included. Apart from drivers, most IT systems in this domain will already be recording the information. There are likely to be national mandates on rail safety reporting</p>



<p>enable the identification of causes related to train driving or train equipment, and supporting the case for new or changed measures to prevent recurrence.</p> <ul style="list-style-type: none"> ▶ To record information relating to the performance of both the locomotive/traction unit and the person driving, including working time. 		
<p>It must be possible to match recorded data to:</p> <ul style="list-style-type: none"> ▶ the date and time of the recording ▶ the precise geographic location of the event being recorded (distance in kilometres from a recognisable location) ▶ the train identification ▶ the identity of the driver 	<p>4.2.3.5. Data recording</p>	<p>Most systems have date/time stamps on message updates, so can determine the interval between a time and date entered for the occurrence of an event, and when it is reported to the system.</p> <p>The other requirement is somewhat unclear. Presumably an out-of-course event can take place between "recognised locations" which are normally the schedule timing points.</p> <p>Note that none of the TAF TSI messages from RU to IM include driver name or identity.</p>
<p>However, there is an operational requirement for certain infrastructure related data items to be made available to a Railway Undertaking and conversely for certain rolling stock related items to be made available to an Infrastructure Manager. In both cases the data concerned must be complete and accurate.</p>	<p>4.8. INFRASTRUCTURE AND ROLLING STOCK REGISTERS</p>	
<p>The requirements for the conventional rail infrastructure related data items with regard to the Traffic Operation and Management subsystem, and which must be made available to railway undertakings, are specified in Annex D. The Infrastructure Manager is responsible for the correctness of the data.</p>	<p>4.8. INFRASTRUCTURE AND ROLLING STOCK REGISTERS 4.8.1. INFRASTRUCTURE</p>	



<p>The following rolling stock related data items must be available to infrastructure managers. The keeper (vehicle owner) is responsible for the correctness of the data:</p> <ul style="list-style-type: none"> ▶ whether the vehicle is constructed from materials which can be hazardous in case of accidents or fire (e.g. asbestos) ▶ length over buffers 	<p>4.8. INFRASTRUCTURE AND ROLLING STOCK REGISTERS 4.8.2. ROLLING STOCK</p>	<p>Does the RSRD hold this information?</p>
<p>A. General case To perform the mission the train preparer shall enter and/or confirm the following sets of data:</p> <ul style="list-style-type: none"> ▶ train data, ▶ additional data. <p>Train data refer to rolling stock characteristics and include:</p> <ul style="list-style-type: none"> ▶ train running number, ▶ maximum train speed, ▶ ERTMS train category, ▶ train length, ▶ deceleration data, ▶ power supply, ▶ loading gauge, ▶ axle load, ▶ train fitted with airtight system, ▶ list of STM available. 	<p>ANNEX A1: ERTMS/ETCS OPERATING RULES 9.2.1. ENTERING DATA</p>	<p>ERTMS not part of the study</p>
<p>In case of a trainset, before confirming default data, the train preparer shall ascertain that technical conditions of rolling stock allow the use of already stored data.</p> <p>For a trainset, the train preparer has to check the status of the equipment of rolling stock that can have an impact on train data:</p> <ul style="list-style-type: none"> ▶ after the preparation of the train in the departure station, ▶ after each case the composition of the train is 	<p>ANNEX A1: ERTMS/ETCS OPERATING RULES 9.2.1. ENTERING DATA 9.2.1.1. Other trains</p>	<p>ERTMS not part of the study</p>



<p>modified (in a station or elsewhere),</p> <ul style="list-style-type: none"> ▶ after a technical problem that leads to modify the data. <p>If there are no specific restrictions, the train preparer shall validate each data displayed on the DMI.</p> <p>If there are specific restrictions, the train preparer shall:</p> <ul style="list-style-type: none"> ▶ determine the new data according to a technical document, ▶ correct this data, ▶ validate the new data. 		
<p>To enter train data, the train preparer shall use the train data form</p>	<p>ANNEX A1: ERTMS/ETCS OPERATING RULES 9.2.1. ENTERING DATA 9.2.1.1. Trainset</p>	<p>ERTMS not part of the study</p>
<p>If a change in the data is required during the journey, the driver shall take into account the new data.</p> <p>If the adhesion factor has to be changed national rules apply.</p>	<p>ANNEX A1: ERTMS/ETCS OPERATING RULES 9.2.2. CHANGES OF DATA</p>	<p>ERTMS not part of the study</p>
<p>The driver shall:</p> <ul style="list-style-type: none"> ▶ determine the new data according to a technical document, ▶ check the conformity of the train to its ERTMS category, ▶ correct this data, ▶ validate the new data. <p>He shall do the same for each data to be changed if necessary.</p>	<p>ANNEX A1: ERTMS/ETCS OPERATING RULES 9.2.2. CHANGES OF DATA 9.2.2.1. Trainset</p>	<p>ERTMS not part of the study</p>
<p>The train preparer shall modify the train data form or shall produce a new one each time the characteristics of the train are modified.</p> <p>If there is no train preparer the driver shall update the</p>	<p>ANNEX A1: ERTMS/ETCS OPERATING RULES 9.2.2. CHANGES OF DATA 9.2.2.2. Other</p>	<p>ERTMS not part of the study</p>



<p>train data form. To enter new train data, the driver shall:</p> <ul style="list-style-type: none"> ▶ use the new train data form, ▶ correct the data, ▶ validate the new data. 	trains	
<p>INFORMATION TO WHICH THE RAILWAY UNDERTAKING MUST HAVE ACCESS IN CONNECTION WITH THE ROUTE(S) OVER WHICH HE INTENDS TO OPERATE</p>	ANNEX D	
<p>3.1.1. Country 3.1.2. Line segment identification code: national code 3.1.3. Line segment extremity 1 3.1.4. Line segment extremity 2 3.1.5. Times of opening for traffic (times, days, special arrangements for holidays) 3.1.6. Lineside indications of distance (frequency, appearance and positioning) 3.1.7. Type of traffic (mixed, passenger, freight ...) 3.1.8. Maximum permissible speed(s) 3.1.9. Any other information which is necessary for safety reasons 3.1.10. Specific local operational requirements (including any special staff qualifications) 3.1.11. Special restrictions for dangerous goods 3.1.12. Special loading restrictions 3.1.13. Model of temporary works notice (and way to obtain it) 3.1.14. Indication that Line segment is congested (art. 22 of Directive 2001/14/EC)</p>	<p>Annex D PART 3. SPECIFIC LINE SEGMENT INFORMATION 3.1. General Characteristics</p>	<p>The question is - is this all in the Network Statement? Some states have comprehensive details, others not. Questions of compatibility of coding structures and sheer manageability. It was bad enough trying to manage data within a railway, if you then have to make requests for data on routes you are not familiar with, using different coding structures, etc. The people doing it don't have PhDs.</p>
3.2.1. EC verification for	Annex D	Question is - is this considered



<p>Infrastructure TSI</p> <p>3.2.2. Date of putting into service as an interoperable line</p> <p>3.2.3. List of possible specific cases</p> <p>3.2.4. List of possible specific derogations</p> <p>3.2.5. Track gauge</p> <p>3.2.6. Structure gauge</p> <p>3.2.7. Maximum axle load</p> <p>3.2.8. Maximum load per linear metre</p> <p>3.2.9. Transversal track forces</p> <p>3.2.10. Longitudinal track forces</p> <p>3.2.11. Minimum radius of curvature</p> <p>3.2.12. Gradient percentage</p> <p>3.2.13. Gradient location</p> <p>L 359/86 EN Official Journal of the European Union 18.12.2006</p> <p>3.2.14. For brake system that does not use wheel-rail adhesion, accepted braking effort</p> <p>3.2.15. Bridges</p> <p>3.2.16. Viaducts</p> <p>3.2.17. Tunnels</p> <p>3.2.18. Comments</p>	<p>PART 3. SPECIFIC LINE SEGMENT INFORMATION</p> <p>3.2. Specific Technical Characteristics</p>	<p>as part of the Network Statement, or as the basis for the Infrastructure database</p>
<p>3.3.1. EC verification for Energy TSI</p> <p>3.3.2. Date of putting into service as an interoperable line</p> <p>3.3.3. List of possible specific cases</p> <p>3.3.4. List of possible specific derogations</p> <p>3.3.5. Type of power supply system (e.g. none, overhead, third rail)</p> <p>3.3.6. Power supply system frequency (e.g. AC, DC)</p> <p>3.3.7. Minimum voltage</p> <p>3.3.8. Maximum voltage</p>	<p>Annex D</p> <p>PART 3. SPECIFIC LINE SEGMENT INFORMATION</p> <p>3.3 Energy subsystem</p>	



<p>3.3.9. Restriction related to power consumption of specific electric traction unit(s)</p> <p>3.3.10. Restriction related to the position of Multiple Traction unit(s) to comply with contact line separation (position of pantograph)</p> <p>3.3.11. How to obtain electrical isolation</p> <p>3.3.12. Contact wire height</p> <p>3.3.13. Permissible contact wire gradient in relation to the track and the variation of the gradient</p> <p>3.3.14. Type of pantographs approved</p> <p>3.3.15. Minimum static force</p> <p>3.3.16. Maximum static force</p> <p>3.3.17. Location of neutral sections</p> <p>3.3.18. Information on operation</p> <p>3.3.19. Lowering of pantographs</p> <p>3.3.20. Conditions applying with regard to regenerative braking</p> <p>3.3.21. Maximum allowable train current</p>		
<p>3.4.1. EC verification for CCS TSI</p> <p>3.4.2. Date of putting into service as an interoperable line</p> <p>3.4.3. List of possible specific cases</p>	<p>Annex D PART 3. SPECIFIC LINE SEGMENT INFORMATION</p> <p>3.4. Control-Command and Signalling subsystem</p>	
<p>1. This annex describes the number and linked marking applied in a visible manner on the vehicle to identify it uniquely in operation. It does not describe other numbers or markings eventually engraved or fixed in a permanent manner on the chassis or the main components of the vehicle</p>	<p>ANNEX P VEHICLE IDENTIFICATION</p> <p>General remarks:</p>	<p>no comment</p>



during its construction.		
3. This annex is subject to changes due to the future evolution of RIC and future implementation of the TAF TSI and TAP TSI.	ANNEX P VEHICLE IDENTIFICATION General remarks:	no comment
A Vehicle Keeper Marking (VKM) is an alphanumeric code, consisting of 2 to 5 letters (1). A VKM is inscribed on each rail vehicle, near the vehicle number. The VKM denominates the Vehicle keeper as registered in the <u>Rolling Stock Register</u> .	ANNEX P.1 KEEPER'S ABBREVIATION MARKING Definition of the Vehicle Keeper Marking (VKM)	no comment
Register of Vehicle Keeper Markings and procedure for allocation The register of VKM is public and updated on a real time basis.	ANNEX P.1 KEEPER'S ABBREVIATION MARKING Definition of the Vehicle Keeper Marking (VKM)	no comment
<u>This aspect is still unresolved and will be specified in a future version of this TSI.</u> A CWA <CEN Working Agreement> is being developed in this area. Once it has been introduced, its suitability as a means by which application of this CWA will assume compliance with requirements of this TSI, will be assessed by the ERA and the EC Until this CWA has been developed, Railway Undertakings and Infrastructure Managers must liaise to jointly establish bilateral or multilateral agreements, taking into account of existing standards (such as UIC Fiche 419-1 and 419-2 OR) already in use and the development of ERTMS/GSM-R and of ERTMS/ETCS, to facilitate the unhindered passage of trains from one Infrastructure Manager's operating area to another	ANNEX R TRAIN IDENTIFICATION	Train Identification proposals will affect trains passing over 2 or more IM networks, and may affect others



Conventional freight rolling stock TSI		
<p>The entity responsible for the maintenance of the wagon shall ensure that reliable information about maintenance processes and data specified to be made available in the TSIs are available for the operating RU, and demonstrate on request of the operating RU that these processes ensure the compliance of the wagon with the Essential Requirements of Directive 2001/16/EC as modified by Directive 2004/50/EC.</p>	<p>4.2.8. MAINTENANCE: MAINTENANCE FILE 4.2.8.1.2. Management of the Maintenance File.</p>	<p>Key information relating to maintenance due is needed by RUs to meet train checking mandates in the OPE-TSI</p>
<p>The Rolling Stock Register shall contain the following mandatory data for all freight wagons, which are in accordance with this TSI as listed in Annex H. If the Member State of registration changes, the contents of the Rolling Stock Register for that wagon shall be passed from the original State of registration to the new State of registration.</p>	<p>4.8. INFRASTRUCTURE AND ROLLING STOCK REGISTERS 4.8.2. ROLLING STOCK REGISTER</p>	<p>Annex H has a big list, including wagon number. Register of Rolling Stock has now been replaced by ERATV, but this is not wagon specific, yet Annex H has wagon number as the first item of the list, (plus registration data), so one has to assume the data will reside partly in the NVR and partly in the ERATV. DG data also for inclusion, but this related to the load in the wagon, however, no explanation of the data is given in the annex.</p>
Noise TSI		
		<p>Nothing of significance to the study in this TSI</p>
<p>As far the subsystem rolling stock regarding noise emitted by rolling stock is concerned, the following information shall be included in the rolling stock register: -</p> <ul style="list-style-type: none"> ▶ pass-by noise (basic parameters 4.2.1.1 and 4.2.2.4), ▶ stationary noise (basic parameters 4.2.1.2 and 4.2.2.2), ▶ starting noise (basic parameters 4.2.2.3), 	<p>4.8. Infrastructure and rolling stock registers 4.8.2. Rolling stock register</p>	<p>Register of Rolling Stock now superseded by ERATV (ERA Recommendation on content of ERATV, Annex 2 - TSIs to be amended</p>



<ul style="list-style-type: none"> ▶ interior noise in the driver's cab. 		
Energy TSI		
Several requirements for data related to OHL to be included in the Infrastructure Database		<u>Nothing of significance to the study in this TSI</u>
Under abnormal conditions the maximum permissible train current (see Annex C) can be lower. <u>The Infrastructure Manager shall give notice of the variation to the Railway Undertakings.</u>	4.4. Operating rules 4.4.2. Management of power supply 4.4.2.3. Management of power supply in case of danger	This would seem to be an ideal candidate for inclusion in the Infrastructure Restrictions Notice database
In certain situations involving pre-planned works, it may be necessary to temporarily suspend the specifications of the energy subsystem and its interoperability constituents defined in chapters 4 and 5 of the TSI. In this case, the Infrastructure Manager shall define the appropriate exceptional operating conditions needed to ensure safety. The following general provisions apply: <ul style="list-style-type: none"> ▶ the exceptional operating conditions not complying with the TSIs shall be temporary and planned, ▶ <u>railway undertakings operating and companies working on the line shall</u> be given notice of these temporary exceptions, of their geographic location, their nature and the means of indication. 	4.4. Operating rules 4.4.3. Execution of works	This would seem to be an ideal candidate for inclusion in the Infrastructure Restrictions Notice database
ECM Certification		
		ECMS and VKs were in their early stages when the TAF TSI was written. The duties of ECMs demand they exchange information with RUs and others, but there is nothing mandated for IT/telematics although messages to pass this



		data, plus a single RSRD would provide the ideal means of ensuring they can maintain the vehicles correctly.
2. All parties involved in the maintenance process shall exchange relevant information about maintenance in accordance with the criteria listed in sections I.7 and I.8 of Annex III.	Article 5 Relationships between parties involved in maintenance process	Exchange of relevant data - how will actors discharge this requirement? At what points should the data be exchanged - train formation?
3. Following contractual arrangements, a railway undertaking may request information for operational purposes on the maintenance of a freight wagon. The entity in charge of the maintenance of the freight wagon shall respond to such requests either directly or through other contracting parties	Article 5 Relationships between parties involved in maintenance process	RU request of maintenance status
4. Following contractual arrangements, an entity in charge of maintenance may request information on the operation of a freight wagon. The railway undertaking or the infrastructure manager shall respond to such requests either directly or through other contracting parties.	Article 5 Relationships between parties involved in maintenance process	ECM request of operational data
5. All contracting parties shall exchange information on safety-related malfunctions, accidents, incidents, near-misses and other dangerous occurrences as well as on any possible restriction on the use of freight wagons.	Article 5 Relationships between parties involved in maintenance process	Exchange of safety related malfunctions/restrictions
7.1 The organisation must have procedures to define reporting channels to ensure that, within the entity itself and in its dealings with other actors, including infrastructure managers, railways undertakings and keepers, information on all	Annex III I. Management function requirements and assessment criteria 7. Information	Requires ECM to have procedures to support the prompt/clear exchange of information both internally and to other actors This clause is not very clear of the nature of the information to be exchanged, and any enhancement is better related



<p>relevant processes is duly exchanged and submitted to the person having the right role both within its own organisation and in other organisations, in a prompt and clear way.</p>		<p>to the previous clauses.</p>
<p>5. To keep the maintenance file updated throughout the lifecycle of a freight wagon, the organisation must have procedures to:</p> <p>(a) collect at least the relevant information in relation to:</p> <ul style="list-style-type: none"> (i) the type and extent of operations effectively performed, including, but not limited to, operational incidents with a potential to affect the safety integrity of the freight wagon; (ii) the type and extent of operations planned; (iii) the maintenance effectively performed; 	<p>Annex III II. Requirements and assessment criteria for the maintenance development function</p>	<p>Procedure to collect info to support management of the Maintenance File</p>
<p>7. When the documentation process is applied to the maintenance development function, the traceability of at least the following elements needs to be guaranteed:</p> <ul style="list-style-type: none"> (a) the documentation relating to the development, assessment, validation and approval of a substitution in the course of maintenance; (b) the configuration of vehicles, including, but not limited to, components related to safety; (c) records of the maintenance performed; (d) results of studies concerning return on experience; (e) all the successive versions of the maintenance file, including risk assessment; (f) reports on the competence and supervision of maintenance delivery and fleet maintenance 	<p>Annex III III. Requirements and assessment criteria for the fleet maintenance management function</p>	<p>Traceability of various elements -component configuration/records of maintenance performed</p>



management; (g) technical information to be provided to support keepers, railway undertakings and infrastructure managers.		
2. The organisation must have a procedure for the composition of the work package and for the issue and release of the maintenance order.	Annex III II. Requirements and assessment criteria for the maintenance development function	Depot Management - composition of work package against workshop capability
3. The organisation must have a procedure to send freight wagons for maintenance in due time.	Annex III II. Requirements and assessment criteria for the maintenance development function	Maintenance Planning
4. The organisation must have a procedure to manage the removal of freight wagons from operation for maintenance or when defects have been identified.	Annex III II. Requirements and assessment criteria for the maintenance development function	Maintenance Planning - see 3 above
6. The organisation must have a procedure to issue a notice to return to operation, taking into account the release to service documentation	Annex III II. Requirements and assessment criteria for the maintenance development function	Maintenance Planning - see 3 above
		9. When the information process is applied to the fleet maintenance management function, at least the return to operation, including restrictions on use relevant to users (railway undertakings and infrastructure managers), needs to be communicated to interested parties.
Control, Command, Signalling TSI		
		<u>Nothing of significance related to the study</u>
Telematic Application,		



rolling stock – freight wagons TSI		
		<p>Decisions made post development of the SEDP mean that absence of central WIMO, and dropping of Trip Plans, means enhancements are necessary to the TAF TSI architecture</p>
<p>The contents of the databases must be accessible, based on structured access rights depending on privilege, to all IMs, RUs and fleet managers, in particular for purposes of fleet management and rolling stock maintenance They must contain all transport critical technical data such as:</p> <ul style="list-style-type: none"> ▶ identification of rolling stock, ▶ technical/design data, ▶ assessment of compatibility with the infrastructure, ▶ assessment of relevant loading characteristics ▶ brake relevant characteristics ▶ maintenance data, ▶ environmental characteristics. 	<p>2.3.3. General Remarks</p>	<p>Reference to "fleet managers" would seem to indicate keepers and ECMs were not around when this was written, however, the intent is clear, but how access is to be provided is not specified.</p>
<p>The wagon order is primarily a subset of the consignment note information. It must be forwarded to the RUs involved in the transport chain, since it could become an input for an ad hoc path request (Chapter 4.2.2: Path request). The content of the wagon order must show the relevant information which is needed for an RU to effect transportation during its responsibility until handover to next RU. Therefore the content is dependent on the role to be performed by the railway undertaking: Origin-, Transit- or Delivery RU (ORU,</p>	<p>4.2.1.2 Wagon Orders</p>	<p>Wagon Order only applies to consignments conveyed by two or more RUS. This is normally wagonload traffic. Question arises on trainload traffic shared between RUs. Some RUs are merely subsidiaries of a single RU, e.g. DB Schenker</p>



<p>TRU, and DRU):</p> <ul style="list-style-type: none"> ▶ wagon order for the Origin Railway Undertaking (ORU), ▶ wagon order for the Transit Railway Undertaking (TRU), ▶ wagon order for the Delivery Railway Undertaking (DRU). 		
<p>The train path defines the requested, accepted and actual data to be stored concerning the path of a train and the characteristics of the train for each segment of that path.....this information must be updated whenever a change occurs</p>	<p>4.2.2 Path Request, 4.2.2.1 Preliminary Remarks, Long Term Planning</p>	<p>Long Term planning is not part of the TAF TSI messages, but clearly any changes need to be advised to RUs which use the path. The Path Details message could be used for this purpose as an unsolicited message to the RUs</p>
<p>As an information support for the formulation of the path request, the RU can consult the <u>relevant Network Statement</u> to check whether the data of the train in mind comply with the infrastructure. <u>Data such as dangerous goods information also has to be taken into account.</u></p>	<p>4.2.2 Path Request, 4.2.2.2, Path Request Message</p>	<p>Rather vague on this requirement. It would be better supported by IT systems to work out route compliance and also timings</p>
<p>The keepers of the wagons must give the RUs access to the technical wagon data.</p>	<p>4.2.2 Path Request, 4.2.2.2, Path Request Message</p>	<p>But doesn't say how! No messages are defined between RU and keepers, or ECMs for that matter</p>
<p>For the preparation of the train, the RU must have access to the infrastructure restriction notices, to the technical wagon data (Rolling Stock Reference Databases, Chapter 4.2.11.3: The Rolling Stock Reference Databases), to the dangerous goods reference file and to the current, updated information status on the wagons (Chapter 4.2.12.2: Other databases: The Wagon and Intermodal Unit Operational Database). This applies to all wagons on the train.</p>	<p>4.2.3. Train preparation 4.2.3.1. General remarks</p>	<p>Having access is all well and good, but could merely be access to hard-copy documents. The TAF TSI has lots of messages, but none to support access to IRN or RSRD databases.</p>
<p>.....At the end <i><of train preparation></i> the RU must</p>	<p>4.2.3. Train preparation</p>	<p>this is the train consist as accepted by the IM where the</p>



send the train composition to the next RUs.....	4.2.3.1. General remarks	train starts its journey
Depending on the contractual agreement between the IM and the RU and on regulatory requirements, the IM may also advise the RU if the train composition is acceptable for the booked path. This is effected with this <i><train accepted></i> message	4.2.3. Train preparation 4.2.3.3. Train Accepted Message	This message is therefore not mandatory, yet where does a train get checked that it is within the authorised limits for the infrastructure?
If the train is not suitable for the previously agreed path, the IM may inform the RU, with this <i><train not suitable></i> message. In this case the RU must recheck the train composition.	4.2.3. Train preparation 4.2.3.4. Train Not Suitable Message	By use of "may" this means this message is therefore not mandatory, but it is the only point in the TAF TSI that any check on train suitability is made
When the RU learns about a service disruption during the train running operation for which it is responsible, it must immediately inform the IM concerned.	4.2.5. Service disruption information 4.2.5.1. General remarks	The relevant TAF TSI message is not for use by RUs, (Train Running Interruption)
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. The detailed formats are defined in Annex A, Index 1.- <ul style="list-style-type: none"> ▶ 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, (described separately in Chapter 4.2.9: Interchange reporting) 	4.2.8. Wagon movement 4.2.8.1. Preliminary remarks	Presumably this is the stuff to be recorded in the WIMO
This event <i><wagon arrival in yard></i> must be stored in the	4.2.8. Wagon movement	



Wagon and Intermodal Unit Operational Database.	4.2.8.4. Wagon Yard Arrival message	
This event <i><wagon departure from in yard></i> must be stored in the Wagon and Intermodal Unit Operational Database.	4.2.8. Wagon movement 4.2.8.5. Wagon Yard Departure message	
This event <i><wagon exception></i> must be stored in the Wagon and Intermodal Unit Operational Database.	4.2.8. Wagon movement 4.2.8.6. Wagon Exception message	
<p>The interchange reporting describes the messages attached to the transfer of responsibility for a wagon between two railway undertakings, which occurs at interchange points. It also commands the new RU to make an ETI calculation and to follow the process as described in Chapter 4.2.7 (Shipment ETI/ETA).</p> <p>The following messages must be exchanged:</p> <ul style="list-style-type: none"> ▶ Wagon Interchange Notice, ▶ Wagon Interchange Notice/Sub ▶ Wagon Received At Interchange, ▶ Wagon Refused At Interchange <p>The information data of these messages must be stored in the Wagon and Intermodal Unit Operational Database</p>	4.2.9. Interchange reporting 4.2.9.1. Preliminary remark	Interchange delivery does not have a message, it is assumed by issue of I/C receipt, or refusal
In the case of Open Access there are no interchange points. At a handling point the responsibility for the wagons does not change. Therefore there is no special message exchange needed. But derived from the running information of the train at this reporting point, the wagon or intermodal unit related information — regarding location and	4.2.9. Interchange reporting 4.2.9.1. Preliminary remark	What this means is that if an operator is entirely self-contained and does not interchange wagons, and TAF TSI messages, the WIMO must still be updated based on train running events passed from the IM.



<p>date/time of arrival and departure — must be processed and stored in the Wagon and Intermodal Unit Operational Database.</p>		
<p>The entries of these databases <IRNs> are based on segments in line with the relevant Network Statements with the addition of restriction information. These databases must be accessible via the common interface (4.2.14.1: General architecture and 4.2.14.7: Common interface). For this the IMs must install and fill-in Infrastructure Restriction Notice Databases. The structure of such a database is outlined in Annex A, Index 2.</p>	<p>4.2.11.2. The Infrastructure Restriction Notice Databases</p>	
<p>The keeper of a rolling stock is responsible for the storage of the rolling stock data within a Rolling Stock Reference Database. The Information that must be included in the individual Rolling Stock Reference Databases is described in detail in Annex A, Index 2. They must contain all items for:</p> <ul style="list-style-type: none"> ▶ identification of rolling stock, ▶ assessment of the compatibility with the infrastructure, ▶ assessment of relevant loading characteristics, ▶ brake relevant characteristics, ▶ maintenance data, ▶ environmental characteristics 	<p>4.2.11.3. The Rolling Stock Reference e Databases</p>	<p>TAF TSI defines an RSRD for each VK, but a group of VKs is considering developing a common system. In the UK, for instance, the Rolling Stock Library holds information on all vehicles suitable for operation over Network Rail lines</p>
<p>The Rolling Stock Reference Databases must allow easy access (a single common access provided via the common interface) to the technical data to minimise</p>	<p>4.2.11.3. The Rolling Stock Reference e Databases</p>	<p>No telematic messages or methods define</p>



<p>the volume of data transmitted for each operation.</p>		
<p>This data shall include temporary data, such as restrictions, current and projected maintenance actions, kilometres and fault counters, etc.; and all data that could be considered as 'status' (temporary speed restrictions, brake isolated, needs for repair and fault description, etc.,).</p>	<p>4.2.11.4. The Rolling Stock Operational Data</p>	<p>This temporary but technical data has to be supplied by ECM, VK and also the user of the vehicle, (an RU).</p>
<p>For use of the operational rolling stock data, three different entities must be considered taking into account the different parties responsible for rolling stock during transport operation:</p> <ul style="list-style-type: none"> ▶ Railway Undertaking as Duty holder during its transport control, ▶ Keeper of rolling stock, and ▶ User (Hirer) of rolling stock. 	<p>4.2.11.4. The Rolling Stock Operational Data</p>	<p>And also the ECM presumably. ECMs were not around when the TAF TSI was written.</p>
<p>For all three different parties the operational rolling stock data must be accessible by the authorised user, down to his predefined authorised level, using the single key given by the wagon ID (wagon number).</p>	<p>4.2.11.4. The Rolling Stock Operational Data</p>	
<p>To allow for the tracking of train and wagon movements, the following databases, updated at each relevant event in real time, must be installed. Authorised entities such as keepers and fleet managers must have access to the data relevant to fulfil their functions, according to contractual conditions.</p> <ul style="list-style-type: none"> ▶ Wagon and Intermodal Unit Operational Database, ▶ Trip plan for wagon/intermodal unit. 	<p>4.2.12. Various reference files and databases 4.2.12.1. Reference files</p>	<p>Trip plans not taken forward into the SEDP. Presumably too difficult and costly.</p>



Decision 2007/756/EC (National Vehicle Registers)		
<p>The NVR shall be used with the following purposes:</p> <ul style="list-style-type: none"> ▶ <u>record of authorisation,</u> ▶ <u>record of the EVN allocated to vehicles,</u> ▶ looking for Europe-wide, brief information related to a particular vehicle, ▶ follow up legal aspects like obligations and juridical information, ▶ <u>information for inspections mainly related to safety and maintenance,</u> ▶ enable contact with the owner and keeper, ▶ <u>cross-check some safety requirements before issuing Safety Certificate,</u> ▶ <u>follow up a particular vehicle.</u> 	<p>ANNEX 3. OPERATING MODE 3.1. The use of the NVR</p>	<p>This seems to indicate that the NVR is the master source for EVN; therefore any other number recorded against a vehicle for the EVN is wrong. Certainly its use for operational purposes is not present as a use.</p>
Directive 2008/115/EC (Safety)		
<p>1. Each vehicle, before it is placed in service or used on the network, shall have an entity in charge of maintenance assigned to it and this entity shall be registered in the NVR in accordance with Article 33 of the Railway Interoperability Directive.</p> <p>2. A railway undertaking, an infrastructure manager or a keeper may be an entity in charge of maintenance.</p>	<p>Article 14a Maintenance of vehicles</p>	<p>This indicates that the master record for the ECM for a wagon is in the NVR. Any different entry in another database is therefore incorrect</p>
<p>5. Based on a recommendation by the Agency, the Commission shall, by <u>24 December 2010</u>, adopt a measure establishing a system of certification of the entity in charge of maintenance for freight wagons.</p>	<p>Article 14a Maintenance of vehicles</p>	<p>So the duties and data requirements are in the ERA recommendations, (see above on ECM Certification)</p>
Directive (Proposal) - Single European Railway Area		



<p>1. The infrastructure manager shall, after consultation with the interested parties ☒ , including the regulatory body referred to in Article 55, ☒ develop and publish a network statement obtainable against payment of a ☒ fee ☒ which ☒ shall ☒ not exceed the cost of ☒ publication of ☒ that statement. ☐ The network statement shall be published in at least two official languages of the Union. <u>The content of the network statement shall be made available free of charge in electronic format through the web portal of the European Railway Agency. i</u></p>	<p>Article 27 Network Statement</p>	<p>No definition of "electronic format". A PDF file will suffice to meet this mandate. Note role of ERA in making the electronic version available. It is not a requirement of the IMs</p>
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International rail organisations

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CFR SA (Romania)

Network Rail

PLK (Poland)

Prorail (Netherlands)

RFF (France)

RFI (Italy)

Railway undertakings

NMBS Logistics (Belgium)

BLS (Switzerland)

CD Cargo (Czech Republic)

CFR Marfa (Romania)

SNCF

Trenitalia

Wagon keepers

Other organisations

UIP