



Report

EU Databases and Interfaces Study

Management Summary

Management Summary to Final Report

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Management Summary

Background (Chapter 4 of the Final Report)

The EU has been developing and passing legislation since 1991 [remember 91/440] specifically aimed at improving the conditions for rail transport to meet the needs of the Single European Market¹.

Quite different national economic, social and political objectives over the 150 years of European railway history (not to mention technical differences) resulted in differing practices in the various European states. The European Communities and subsequently the Union accordingly developed policies to provide for technical interoperability and the creation of a single market for rail services. Both of these policy strands require stakeholders within the industry to be able to exchange data easily, accurately, promptly and reliably.

Detailed requirements were set down, particularly in technical specifications for interoperability. The requirements identified the need for the key players to inter-operate and to pass data between each other in common structures as a series of interfaces and to reference some common databases.

The committee tasked with overseeing the implementation of this exchange of data was concerned with the overall consistency and impact of the legislation and the European Commission decided to ask consultants to review how existing and proposed systems would meet legislative requirements and provide for the needs of the industry.

The Commission's objectives for the study were 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 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.

The study was carried out in three phases.

Phase one data gathering (Chapter 5 of the Final Report)

The first phase was a data gathering exercise

- ▶ Reviewing all the legislation relating to TSIs and the requirement for databases and interfaces

¹ See Transport Policy in the European Union, Handley Stevens, Palgrave 2004 for an overview of policy development



- ▶ Reviewing the current status of readiness and the levels of sophistication of the IT estate amongst players
- ▶ Review of all relevant studies and reports
- ▶ Issuing a questionnaire addressed to each actor involved
- ▶ Carrying out interviews

The following legislation was analysed:

- ▶ 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
 - Register of Infrastructure (RINF)

Legislation concerning the role of Entities in Charge of maintenance (ECMs);

- ▶ All proposals for Registers especially those to be set up and maintained by ERA
- ▶ COTIF (including the CUV);
- ▶ GCU (not statutory, but custom and practice)

The identified requirements were extracted and analysed for their IT relevance. A full list of the requirements was set out and forms Annex 5 in the final report. This analysis revealed a total of 35 interfaces and databases which should be included in the study.

Questionnaires were sent to

- ▶ 27 National Safety Authorities
- ▶ 19 Vehicle keepers
- ▶ 37 Railway undertakings
- ▶ 23 Infrastructure managers
- ▶ 21 Industry associations

The analysis of the results of the questionnaires was included in the Interim Report and taken forward into the gap analysis and solutions in Phase Three.



An initial set of interviews took place with key stakeholders. The interviews were used to gather information of their preparation status for implementation of the TSIs and their views on the interfaces and databases.

The results of the questionnaire responses and the interviews showed that there was limited preparedness for implementation with most waiting for some clarity on the final specifications and any proposals for phasing of the implementation. The returns describing their experiences with their own projects provided the source information to derive the current state of the art and the return of experience with existing systems.

A table of the existing systems is included in the Final Report (ref 5.4).

Phase two gap analysis (Chapter 6 of the Final Report)

The second phase analysed the legislation and TSI databases and interfaces for issues and inconsistencies (termed gaps). In practice they were not just gaps in the legislative proposals but all issues due to inconsistencies and new requirements included in the legislation post dating TAF-TSI.

A picture was developed (termed “as-is”) showing all of the interfaces and databases included in the TAF-TSI legislation. This was then compared with the total required in all the legislation includes those items still in draft and the registers.

A set of sixteen gaps were identified and the details were described fully in Section 6 of the Interim Report.

The principle gaps were

- ▶ there is no coherent source of vehicle technical data
- ▶ the legislation does not yet provide for keepers receive no data on which to base vehicle maintenance
- ▶ supply of consignment data for freight vehicles is inadequately specified (the Wagon Order)
- ▶ little regard has been paid to existing applications

The third phase identified solutions to resolve each gap and evaluated the solution for its relative benefits as compared to the TAF solution.

Recommendations for resolving the gaps (Chapter 6)

As mentioned above the principal gap was that the legislation does not propose a coherent source of vehicle technical data. The statutory files are not well adapted to use for daily operations but there is no other source of data. The consultants consider that keepers should hold a full set of vehicle data and make it available.

Likewise keepers receive no data on which to base vehicle maintenance. The consultants consider railway undertakings should provide keepers with details of the performance of vehicles.



Supply of consignment data for freight vehicles is inadequately specified (the wagon order) and there is no bridge to the electronic consignment note system. A revision of the wagon order is proposed to make it much more sophisticated.

Little regard has been paid to existing applications. The consultants proposed that a number of messages should be based on existing interchanges which mirror many of the proposed TAF messages. This would simplify and speed up implementation as well as having the potential to save costs.

In sum, 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 to route messages.

The WIMO as such disappears; in its place is the exchange of data between stakeholders as required. Each stakeholder uses his existing operations management and commercial systems as at present without the need to hold additional data but with consistent message exchange.

For the RUs classed as SMEs, (Small and Medium-sized Enterprises), a simple set of exchanges based on path request/offer, interchange and train running information should be an adequate and simple approach.

As regards the exchange of data between RUs and IMs for timetable and operational control purposes the migration from UIC 407 to TAF xml is supported as is the mediation of RNE systems but with the need to ensure simple implementation especially for short term path bids and simple allocation of agreed train identifiers.

For infrastructure information: the infrastructure manager is to hold and maintain the files, creating appropriate bridges between asset based systems and systems designed for railway operations.

Phase Three Recommendations for the system and implementation (Chapter 7)

In the third phase the overall IT system solution is set out.

Vehicle Data

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.

pointer file to the master data 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;

central pointer files for the user railway undertaking traffic and journey data. 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.

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.

In order to show the outcome when the legislation is taken as a whole the consultants developed a future picture of the interface requirements (Chapter 7.3)as required by the complete legislation and revised it to show the situation that would apply based on the team's recommendations for simplifications. It is recommended that the picture be maintained as legislation changes. It is also recommended that the picture is made available via the EU or ERA web sites. For each interface a specific reference is made to the legislation from whence it was derived.

Technical Architecture (Chapter 7.4 to 7.8)

Phase three technical feasibility (Chapter 8)

The consultants examined the technical feasibility of their proposals. Using sizing assumptions and the message flows the feasibility of the solution was established including the probable response times.

Several possible database architectures which would fulfil the business requirements were examined. These were:

1. A central database
2. A database distributed nationally
3. A fully distributed database



These were evaluated and the proposed solution of a fully distributed system with centralised pointer files is the best possible option given all the different options and cost/performance factors involved.

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).

Phase three benefits analysis (Chapter 9)

Using the large body of cost data available to ATOS the consultants devised a methodology for evaluating the costs for different sizes of RUs and IMs. The benefits were also assessed based on a combination of staff savings, efficiency saving by a single way of working and improved customer perception of rail.

The consultants considered the potential benefits from this simplified approach and identified net benefits of €250M over five years of full operation. The benefits are split between staff savings, improved customer satisfaction, increasing the rail market share and saving in reduced IT costs as compared with the original TAF proposals. The benefits are also considered relative to the size of RU and IM.

Phase three governance (Chapter 10)

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.

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 (such as the HERMES Community) 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.

The governance structure which need to ensure:

- ▶ implementation meets the interoperability objectives;
- ▶ quality is monitored;

There must be a fair and equitable methodology for cost recovery of central administration costs. The operation is lean and low cost. The ongoing need for a central components group is included although the complexity and substantial cost base must be reduced to make it viable.



Phase three maximising industry support (Chapter 11)

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 team 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

Final summary of recommendations

The consultants interviewed a further number of key players and have taken on board the feedback they received. The main points made were:

- ▶ the best possible use needs to be made of existing investments;
- ▶ simplification is highly desirable especially for small and medium sized players;
- ▶ only phased implementation is possible;
- ▶ most of the benefits will only be achieved once most of the systems are in widespread use;
- ▶ the benefits and costs seem sometimes to fall differently on players and this needs to be taken into account.

These have been taken into account in the recommendations as follows:

- ▶ the consultants propose that existing investments in RU operations databases, the HERMES interchange message in current widespread use, RAILDATA and RNE interfaces and functionalities are fully exploited;
- ▶ the consultants propose simplification through the elimination of the need to hold wagon technical details in two databases (WIMO and RSRD), the elimination of a central WIMO to be replaced by RUs own operational databases supporting TAF message interfaces, the adoption of the xml version of the HERMES interchange message to replace/ be an alternative option for train composition and interchange. The team also propose a small subset including the HERMES interchange message for implementation by SMEs such as small RUs;
- ▶ the consultants suggest three phases for implementation to stagger the costs and enjoy some early benefits. The initial phase can be introduced quickly as it re-uses many of the existing systems. The second phase, two



years later, introduces the central indices to RSRD and RU operations systems and their interfaces as well as common handover and interchange processes and forecasts. Phase 3 completes the messages adding RINF, ECM and other new interoperability data;

The key changes proposed to TAF are as follows:

- ▶ RSRD to be the master source of wagon technical data and interfaces to NVR and ERATV to be defined
- ▶ New interface messages to and from RSRD
 - Performance data
 - Defects raised and cleared
- ▶ New central index system linking wagon number and pointer to RSRD database for each wagon
- ▶ New central index system linking wagon number with current previous and next RU's database and to LRU
- ▶ Addition of a modified version of H30 interchange message to be acceptable for implementation of TAF as an alternative to train composition + WIMO enquiries
- ▶ Addition of wagon search based on suitable security via the new index
- ▶ Clarification of the processes and messages to support incident data to the LRU for early advice to customers
- ▶ Enhancement of the wagon order message to support consignment information and variations for sub contractors in the RU chain
- ▶ Modifications to the interchange notice and sub notice to be replaced by standard handover and interchange messages
- ▶ New common processes for train composition and rules for how validation is to be applied and at what timeframe related to the starting point of the train in an RU and in relation to handover at borders between IM and the following IM
- ▶ New simplified train composition (envelope) suitable for sending to IMs where acceptable
- ▶ Revised train identity based on initially a simple TTID enhanced to full TTID when process proven and approved. Clarification of the process to resolve broken or missing ids in the chain

The processes to be followed and the role of messages to and from the IRNDB are to be proposed by the common working group and introduced via a CCM (change control process) into TAF. The coding structures should be compatible with RINF and use common coding for lines of route.

Some of the gaps are already known to ERA and will be resolved as part of its work programme. These are:

- ▶ RINF and its interfaces
- ▶ ECM messages to and from RSRD
- ▶ ERATV final definitions and interfaces



Proposed next steps

The proposed next steps are to discuss and approve the total package and to raise the individual components as change controls. In parallel, the specification for the new central indices can be prepared. Chapter 7 of TAF should be revised to include the phasing proposed based on three phases with proof of concepts at the beginning of each phase. For RINF the phasing should be based on geographical implementation with key lines such as corridors whereas for operational functionality it should be based on the functionality which gives the best benefits accruing through common ways of working.

Each Member State should then submit an updated implementation plan.