Handbook for the European Performance Regime (EPR) Guidelines for actual and potential users

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European Performance Regime

A joint project by UIC / RNE

1. Introduction

1.1 What is the EPR?

The European Performance Regime (EPR) is a system of quality monitoring in terms of punctuality and delay causes, which supports performance improvement in international train traffic and foresees the possible application of financial penalties to bad performance. Data – originally collected from national monitoring systems and combined into international train run information in the TIS-system[1] – is checked for completeness and correctness. Delay causes are validated by the responsible partners. A calculation procedure measures the performance and the effects of delays on other parties involved in a train run. Finally, it enables the users to introduce an incentive system, in which poor performance is penalised and good service rewarded. It is important to highlight that the system aims to enhance performance, not to compensate damage.

EPR is the outcome of 10 years of railway testing and consensus building. At first, the project partners identified the similarities and differences between national monitoring systems, before defining the optimal system for international use; operational test-runs were carried out in 2007 and 2008. The EPR model was developed in 2009 and described in the EPR Handbook 2009.

During a pilot application in 2010-2012 the procedures were described in detail and the EPR IT modules were built upon the basis of the already existing RNE tool "Train Information System" (TIS). Both were tested in practice and adapted according to the test findings. The EPR model was tested with real data collected during the pilot application.

The outcomes of the pilot application are described in this Handbook.

The EPR has been designed for international traffic, but its principles can be transposed also for national traffic.

EPR knowledge and consensus building have required an enormous amount of work and financing from railways. Also other stakeholders, such as EU corridor organisations, CIT, CER, EIM, Regulatory Bodies, etc have given their valuable attention and support to EPR development. It has not been a simple task to fulfil the pre-agreed systems attributes: fair, simple and without administrative burden. The EPR project sponsors, RNE and UIC, consider that this has now been achieved and that a big thank you should go to all stakeholders – and more particularly to the participating railways – and to the project team.

1.2 EPR within the framework of EU legislation

The compatibility of the EPR with EU legislation (Dir. 2001/ 14, Reg. 913/2010, Dir. 2012/34[2]...) has been continuously checked.

With the introduction of the Freight Corridors Regulation 913/2010 a new potential EPR applicant appeared. The implementation of the EPR – even without any financial consequences –

[1] Reference to TIS additional info (section in the handbook or website)

[2] Directive 2012/34 contains the so-called "Recast" of Railway Packages and was published on December 14th 2012.

could help to fulfil the requirement to promote compatibility between the performance schemes along the freight corridors.

Representatives of the corridor organisations were invited to the EPR advisory group meetings from 2011 on and asked for their requirements and expectations towards EPR. Among other things, they expressed the following wishes:

- Delivery of statistical data for quality improvements
- Reliability and accuracy of EPR data, especially if implemented on compulsory basis
- Little effort with dispute resolution
- Increase the EPR train sample
- Keep the EPR system as simple as possible

RNE – as service provider of choice for the corridor organisations – asked to take these expectations into consideration as far as possible and look for a flexible approach when introducing an EPR.

The requirements for data quality were already part of the EPR procedures. However, the project considered that a more flexible approach during the implementation phase could be envisaged in order to satisfy the specific needs of different corridors.

This has been taken care of by designing the EPR as a 4-step procedure, of which each offers its own advantages for performance management. They can be introduced step after step.

1.3 Good reasons to introduce an EPR

- Reliability of train run information increases thanks to data quality checks; high data quality is in fact a basic pre-requisite to perform effective quality checks and improvements
- Awareness of the need to harmonise procedures increases because mismatches are made visible through the analysis of exclusion reasons
- Responsibility gaps for delays in border areas are closed by international validation
- Negotiations about improvement actions are facilitated because discussions about correctness of delay coding are already settled during validation
- The reporting provides information about the impact of delays on other actors
- A financial incentive system, in which poor performance is penalized and good service rewarded, is provided
- It allows RUs to run through several countries without being subject to several performance schemes on the way
- The EPR can be introduced step-wise, taking care of different conditions on international corridors

1.4 Structure of the Handbook

The EPR Handbook describes the EPR process, its preconditions, the necessary procedures to be followed and the tools which support the process. After having read the main body of the Handbook potential EPR users should know how to apply EPR.

There are several additional documents which will be useful once a decision to introduce the EPR has been made (e.g. User guides for tools). These are listed in Section 10, "Referenced documents".

Results of the pilot application, which are not essential for new users, but seem to be worth saving for further developments of the EPR in the future are annexed to the Handbook.

2. Prerequisites

2.1 Contracts/agreement to be signed

With regard to the provisions of Article 11 in Directive 2001/14 imposing the establishment of a performance scheme for the use of the national infrastructure, there is no obligation for the member states to introduce a European performance regime.

So, European regulations do not provide any specific prerequisites for the implementation (and a *fortiori* the commercial implementation) of the EPR model. Thus, in the absence of specific legal provisions and without any specific national provisions, the commercial implementation of the EPR model should be made on a contractual basis.

It means that the EPR could, in theory, be based on totally different principles from those which govern each National Performance Regime (NPR). It will be different when the Recast is implemented in the national laws of the member states[3] . In the end, both systems (NPR and EPR) should be based on the same principles.

Currently, a prerequisite for managing two different PR (Performance Regime) systems in parallel is to define the scope of application of each one and to develop interfaces between the freight corridors and national networks (this kind of differentiation could also be applied to passenger traffic) – this point could be added to EPR contracts between IMs and RUs.

According to the above principles, the legal prerequisites should be:

- that the IM offers the implementation of the EPR to all the RUs involved (in the international train path), whilst recognising that acceptance by the RU is not an obligation; this means that an IM could not refuse to enter into an agreement with a specific RU. According to the principles mentioned above, the IM has to offer EPR to all RUs.
- without prejudice to the requirements of different types of contract, that the general principles should be added in each network statement of each IM involved in the process

In addition, the EPR Legal Working Group (LWG) has pointed out that two types of contract will be required:

[3] The deadline for implementation of the Directive 2012/34 (Recast) is June 2015

- One between RNE – as service provider- and the IMs: this concerns the IT aspects and analyses of data quality, based on RNE's contract model for TIS (including exchange of data);
- The other one between the IMs and RUs: this concerns commercial and financial aspects of EPR implementation (for example: definition of the services and trains objects of the EPR; data confidentiality or agreement to share the data). **Templates for the contract can be found in Section 10 "Referenced documents".**

2.2 Organisational/ technical pre-requisites

In order to make the application of the procedures described in this handbook possible, the following technical/organisational pre-requisites must be fulfilled by every EPR partner.

2.2.1 Partnership in the Train Information System (TIS)

Every IM participating in the EPR process has to be a partner in the RNE Train Information System (TIS). TIS is a web based tool which supports international train management by delivering real-time train data concerning international passenger and freight trains. TIS is fed by the IMs' national systems connected to it[4].

Consequently, each IM must be able to provide TIS with the following information:

- EPR trains´ planned timetable (Contracted timetable), actual timetable (Running Advice), and train cancellations (see Section 4.3 for details)
- Delay causes according to the UIC Leaflet 450-2

The above data must be fully complete and correct. They must be sent according to TIS rules. The completeness and correctness of information sent to TIS by the national system is a crucial pre-requisite for the possibility to apply the system described in this document.

2.2.2 Access to EPR tools

Every partner (IM and RU) participating in the EPR process will be provided with a user account providing access to the EPR validation tool.

In addition, IMs and RUs will be granted access to the calculation tool and the reporting system according to the rules governing access to such tools, especially in terms of confidentiality protection.

The use of the tools does not imply any specific technical requirements to be fulfilled, except for an up-to-date web browser.

[4] For more information see: http://www.rne.eu/index.php/tis_operations.html

2.3 Application of a validation procedure

Every IM must make sure that a validation procedure for delay codes exists. In the absence of a national solution the EPR validation tool may also be used for national codes. For international codes the application of the EPR validation tool is mandatory (see Section 5).

2.4 Human resources

Every EPR applicant has to organise the allocation of human resources to the tasks described in 3.2.1 (Company level). In addition the resources for the tasks described in 3.2.2 are required once *per* traffic route/ corridor. They need to be agreed upon before the EPR process can be started.

3. General description of the EPR process

3.1 Process

The EPR consists of the following steps, which are described in detail in Sections 4 to 7:

Picture 1 – EPR 4-step procedure

3.1.1 Step 1: Data Collection:

In this step, the EPR system is fed by the national monitoring systems and supported by TIS. Data are delivered to the TIS by the IMs by means of the following messages:

- Message 2090 “Contracted timetable (CTT)”
- Message 2002 “Running advice”
- Message 2003 “Cancellation”
- Message 2005 “Delay code information”

Data quality checks are necessary to ensure the completeness and correctness of information. Mainly this is done by automatised functions, but the attention of a human supervisor is also needed. Train runs that are not in line with the data quality requirements are marked as “Excluded” in the EPR tool. They are excluded from the further EPR procedure.

3.1.2 Step 2: Delay code validation

A specific tool to support the following steps of the process has been developed. The delay code validation phase is handled through the EPR tool validation page.

Delays are coded by the IM including delay causes as provided for in UIC Leaflet 450-2. Following the EPR attribution rules described in Section 4.5 these delay minutes are attributed

either to a specific IM or RU or defined as "External". The companies to whom the delays are attributed need to have the possibility to disagree with the delay code attribution.

The EPR validation tool provides this possibility. Since validation procedures often exist at the national level between IMs and RUs running on their network the tool offers a choice to validate all delay codes or only those attributed to partners "across the borders", the so-called "international codes".

Every EPR partner is allowed to validate only delays attributed to him, but is able to see all delay codes for EPR trains where this partner is involved in.

The validation is possible for a specified period (currently 40 days after the end of a month). After that, untreated codes are automatically accepted. If no agreement has been found on disputed delay codes the train runs are excluded from the further EPR procedure. Reports on such cases can be provided *via* the reporting platform to enable improvement actions for future months.

3.1.3 Step 3: Calculation/ Reporting:

At the end of the validation phase the data for non-excluded trains are (re)-calculated in the EPR tool calculation page. The results are displayed in 4 tablets:

- Segment overview: segments are the lowest level of EPR calculations with the most detailed information. They are defined by EPR points and can be either station segments (starting station or between arrival and departure at an EPR point) or line segments (departure from one EPR point until arrival at the next).
- Section overview: sections are the area of a single IM. They consist of several segments. This tablet is mainly used to provide necessary information for the "adapted cooperation model" (see Section for the description of the models).
- Train overview: provides information about train run related calculation results such as "worst point" or the size of the "cake" (see 6.2.5.8 in the Annexe for a definition of the "cake").
- Company overview: shows the financial outcome of the EPR calculations for each company involved in the EPR.

In each entry the train numbers are linked to the train information page in TIS so that the complete train run can be called up.

Data can be filtered in the tool and exported into MS Excel files for further analysis. For to database performance reasons, the export function is restricted which makes it complicated to carry out analyses involving a large amount of data. To facilitate analyses of the calculations results, the data are also provided through an online reporting tool.

3.1.4 Reporting platform

The data on which the EPR results are based are accessible through the EPR tools in the TIS environment.

In order to facilitate data export and analysis RNE also provides the data through an online reporting platform, where customised analyses can be made. Besides these individual reporting functionalities standardised reports can be made available there; these cover three fields of interest:

- Data quality: among other things, excluded trains incl. reasons for exclusion, validation statistics
- Performance report (mainly punctuality & delay causes information – overlapping with RNE performance management)
- EPR calculation results (caused & suffered delays, payments/ receivables, undocumented minutes/ recovered time , etc)

The reporting tool for EPR purposes is Oracle Business Intelligence), which is managed by RNE. More details can be asked to RNE[5].

3.1.5 Step 4: Billing/ Invoicing

The payments and receivables in the tablet "Company overview" are the basis for collecting the *malus* (payments) and distributing them as *bonus* (receivables).

3.2 Actors involved

3.2.1 Tasks at company level

3.2.1.1 Contact partner for data quality issues (CDQ)

Every IM needs to nominate a contact partner for data quality issues. This person has to investigate and resolve cases where train runs are excluded from the EPR due to data quality problems related to data delivery by that IM. The task can include coordination of bilateral actions if the problem originates from two adjoined IMs using different procedures.

The task is not purely technical but also needs some understanding of the procedures leading to a data delivery to TIS.

An estimation of HR highly depends on the already-achieved stability of data quality. It is also influenced by the number of different reasons for exclusions concerning the company. When setting up a new relation by IMs not yet involved in other EPR traffic routes, 8 hours per week can be expected; later only an occasional involvement will be needed.

3.2.1.2 Contact partner for delay code validation (CDV)

Every EPR partner (IM and RU) needs to provide resources to validate the delay codes attributed to them. In addition IM partners need to react to disputed delay codes.

The workload depends on several factors:

- International only, or also national validation

[5] http://www.rne.eu/it-service-desk.html

- Availability of information in national systems
- Usage of international codes
- Punctuality level
- Number of monitored trains

It is recommended to include the first-level validation (agreeing/ disputing of newly attributed codes) into the operational business where the national coding/ validating is also done.

A second-level validation by coding experts will be useful to deal with disputed cases occurring due to different interpretation of delay codes. Such coding experts should be available as contact partners for the performance coordinator.

Estimation of resources:

During the pilot application the usage of international codes was not homogeneous. Some IMs did not apply international codes at all. But even where they were applied, one hour per day was fully sufficient for first-level validation.

For second-level international validation 4 hours per week should be planned on average.

The time required for national validation depends on national characteristics.

3.2.1.3 Contact partner for performance

From every company a contact partner for performance issues is required. Their task is to analyse performance reports and take care of internal company solutions if poor performance is triggered by company-internal causes. They are the direct contact partner of the performance coordinator.

This task is part of performance management on a corridor and should be integrated into this position.

A workload estimation cannot be based on practical experience gained during the pilot application because this task was not implemented there. We estimate a bandwidth of 1 to 3 days per month and corridor.

3.2.2 Tasks at corridor/ traffic route level

3.2.2.1 The EPR Corridor Coordinator (EPR-CC)

The EPR Corridor Coordinator is a task working within the EPR data collection process step. The EPR-CC investigate the data quality on "their" EPR traffic routes and coordinate possible improvements with the company contact partners regarding data quality issues and the EPR system manager. The EPR-CC coordinates the update of the EPR trains list (see Section 4.1), steers the temporary suspension of the EPR validation activities (see 4.1.4) and takes care of the manual exclusion of train runs after agreement between the involved company partners.

The EPR-CC needs resources in day-to-day business. The amount depends on how many train runs the supervised traffic routes contains and the stability of data quality achieved there. Experience gained during the pilot application shows that a minimum of 8 hours *per* route and week should be considered.

3.2.2.2 The Performance Coordinator

The Performance Coordinators produce performance reports for the EPR trains, provide them through the reporting tool and analyse bottlenecks and obstacles to better performance in cooperation with the company contact partners for performance.

They also organise the dispute resolution on their corridor, monitor the disputed cases after dispute resolution and organise necessary follow-up actions.

A workload estimation cannot be based on practical experience gained during the pilot application because this task was not implemented there. Based on the experience of performance management on RNE corridor 2 we estimate a bandwidth of 3 to 5 days *per* month and corridor.

The performance coordinator could be chosen from the company contact partners for performance (in turns or permanently).

3.2.3 Tasks at general level

3.2.3.1 EPR System Manager

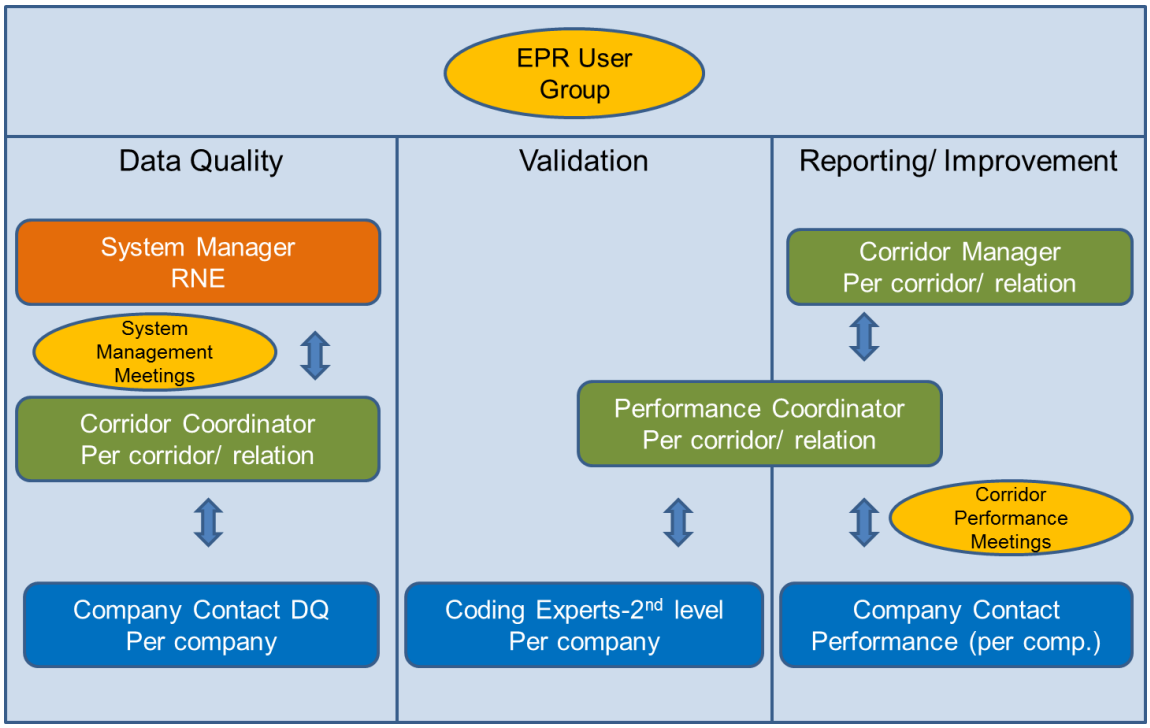
The EPR System Manager (SM) keeps the EPR tools running and up to date, uploads the EPR train list, inserts EPR points in the system, checks/ unchecks exclusion rules and administrates user access to the EPR tools.

When there are new releases of TIS or EPR, the SM also takes care that the calculation procedures are carefully checked to avoid the re-appearance of bugs removed during the pilot application phase.

The EPR SM is situated at the RNE Joint Office. This function is integrated in the system administration of TIS.

3.3 Proposed structure of EPR organisation

The EPR procedures are mainly carried out in day-to-day business by people in charge of the duties described in Section 3.2. The following picture describes the relationships between these duties in 3 action fields: data quality, delay code validation and performance improvement.



Picture 2 – Overview of the proposed EPR structure

Please note that the intention here is to describe functions not positions: in fact, they can be carried out by the same person and/or be integrated into already-existing functions. A rough estimation of required time can be found in Section 3.2.

3.3.1.1 System management meetings

Regular meetings are required between the system manager at RNE and the corridor coordinators to analyse data quality, deduct improvement actions and develop user requirements together, if system development is needed.

We propose to use already existing meeting structures for this task. The system management meetings could be held within the framework of the TIS Technical Board meetings.

3.3.1.2 Performance management meetings

In performance management regular meetings to agree on improvement actions and monitor their successful implementation are necessary. Here synergies with already existing or soon to be implemented meeting structures (like the RNE corridor meetings or the future RFC organisations) should also be used as far as possible. If an EPR is implemented on traffic routes not integrated in one of the existing corridors, performance meetings have to be organised between the involved partners.

3.3.1.3 EPR user group meetings

The project team recommends implementing an EPR user group, consisting of representatives of companies actively participating in the implementation of the EPR.

The main tasks of this user group are:

- Communication and experience exchange between the different traffic routes/ corridors where the EPR is applied
- Definition of specific tasks to develop/ adapt the EPR scheme or system; the tasks shall be carried out by experts from the companies in projects/ sub-groups.

User group meetings could be organised by RNE (subject to acceptance by the RNE decision-making bodies).

Further development/ major changes to the EPR scheme can be requested by corridor or performance coordinators and will be handled in the user group meetings.

3.3.1.4 Stepwise implementation

The implementation of the described process will require some time and resources which will be different depending on how accurately the preconditions are already fulfilled by the involved parties. Therefore a flexible approach to the implementation of an EPR is recommended.

It is possible to introduce the phases of the EPR in a stepwise way starting with data consolidation, going on to validation and performance reporting and finally applying financial consequences.

This allows the corridor organisations some flexibility in accordance with different levels of implementation of the RFCs, and gives some flexibility to other users in accordance with their common goals.

In addition, this approach allows more time for experience-gathering before taking a final decision.

4. Data collection

4.1 EPR trains List

The EPR system, as described in this Handbook is virtually applicable to all trains running on the European network, which would be the ideal long-term aim in the EPR project team's view. However, from a practical point of view and following a step-by-step approach regarding the application of the system, it is necessary to limit the sample of trains included in the system by drafting an "**EPR trains list**". This list of trains must be agreed by all partners and communicated to the system manager (RNE) who will use it to feed the EPR IT tool. For this purpose, the list must contain specific information in a specific format (see 4.1.1).

During the project and pilot application phases, the definition of the EPR trains list was strongly influenced by two main factors:

- EPR early implementing partners: only trains operated by the EPR implementers were chosen
- Data quality: only trains for which operational data has shown a certain minimum level of data quality have been included in the list

In future, in view of an adoption of the EPR on the European scale, all IMs and all RUs will be called to deal with a wider sample of trains.

IMs must consequently ensure a minimum common standard level of data quality, much higher than nowadays. Basic criteria for the trains´ selection must be anyhow set as a guideline to simplify and speed up the daily practice as well as to limit individual self-ruling (4.1.2).

The EPR corridor trains list must be kept updated in order to allow a coherent comparison of the scheduled traffic with the operational data by the TIS system and the EPR tool. A procedure is needed to ensure correct and constant updating as well as to detect the relevant responsible partner for each phase of the updating process (4.1.3).

In case of exceptional events that make it counterproductive to continue the monitoring of specific trains on a certain line/route, a suspension procedure can be activated (4.1.4).

4.1.1 Content of the train list

Once agreed by the partners, the train list must contain the following information:

- Train number
- Validity period
- Origin/destination points
- Origin/destination IMs
- Name of the Corridor line/group

The format of the list is specified by the system manager (RNE) and currently is an MS Excel file.

4.1.2 Criteria for choosing the sample of trains

While the choice of the train list is up to the autonomous decision of the partner, it is advisable to follow some specific criteria which should fulfil both operational and commercial requirements, in order to set up a train list corresponding to a state-of-the-art business snapshot.

- Operational criteria
  - Periodicity: the sample of EPR trains should be set by selecting trains with a high number of runs during a certain timetable (the higher the periodicity, the better the data quality to be expected).
  - Land area coverage: the sample of EPR trains must cover, as much as possible, the whole corridor area
- Commercial criteria
  - Market share 1: the sample of EPR trains should reflect the current quota of every partner on a specific corridor
  - Market share 2: the sample of EPR trains should reflect the share of each transport type on a specific corridor
  - Sample consistency: the sample of EPR trains must be meaningful in comparison with the number of international trains operated on every corridor.

4.1.3 Procedure to update the trains list

The EPR trains list updating can take place:

- During the period of validity of a certain timetable as a consequence of minor variations on the services schedule, both for passengers and freight, such as changes of train numbering, train cancellations, re-routings *via* a different corridor, etc.
- During the period of validity of a certain timetable, at the intermediate timetable setting in June and/or at other intermediate timetable re-settings (according to the international deadlines fixed by the relevant RNE related Handbook)
- At the timetable change

The procedure applied in all circumstances is the same, although the partner who starts the procedure may be different. The abbreviations for the involved parties refer to Section 3.2.

The EPR-CC is responsible for steering the updating procedure but does not start it.

Inputs, adaptations and renewing for the EPR trains list update must be given to the EPR-CC by the concerned partners (CDQs), both RUs and IMs, in due time, before the intermediate timetable setting in order to allow a preliminary data quality check in the RNE EPR test environment, when available.

All information must be made available at the earliest opportunity to promptly ensure that timetables match at border stations.

In case of changes to the traffic schedule with an expected impact on the EPR and on data quality (such as train cancellations, re-numberings, routings *via* a different corridor, etc.…), information must be given promptly to the EPR-CC and to all CDQs. In case of train re-numbering, the new path numbers must be communicated while in case of train cancellation, in order to keep the fixed "benchmarking" levels, a proposal to replace the cancelled trains should be made. To this purpose, whenever feasible, a preliminary check on the data quality should be made in the EPR test environment.

The EPR-CC prepares the updated list of trains for that specific corridor or traffic route and communicates it to all corridor CDQs for their approval. The CDQs approve the updated EPR corridor trains list. Other CDQs and the EPR system manager are informed at the same time; the latter also imports the updated list into the EPR tool.

4.1.4 Procedure for the "suspension" of EPR validation activities

Railway operation is an activity typically subject to changing daily circumstances. Only individual partners, particularly the IMs, are aware of the real network status and availability, operational restrictions, occurred accidents, unforeseen extraordinary maintenance works, unplanned rolling-stock unavailability and any other extraordinary events that have a palpable impact on the EPR, both in terms of data quality and as regards keeping to agreed benchmarking parameters.

In such cases, considering the concrete situation as well as on the basis of the perspectives and technical possibilities to restore the normal network condition and operational state, a proposal to "suspend" the validation activity can be brought forward.

Naturally, the initiative is up to the partner who first detects the abnormal event. A clear picture must be made available to other concerned partners to allow:

- a clear understanding of the status-quo;
- the identification of interested services (passenger and/or freight) and parties;
- and, as much as possible, reliable prediction of service resumption times;
- if necessary, the planned milestones description.

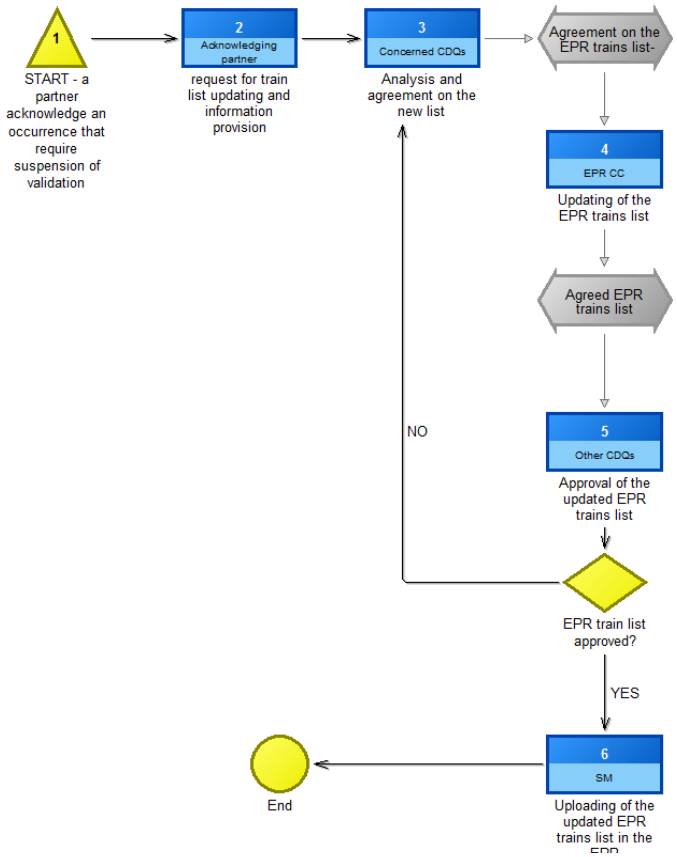
Based on the information given and provided that constant updating should be ensured, the decision to suspend the EPR validation activity must be formally agreed by all the corridor partners (CDQs). The EPR-CC will play a coordinating role, steering the related process as described below.

As soon as the abnormal event occurs, prompt information must be given to other concerned CDQs, including all the above-mentioned elements, by the partner who first detected the abnormal event.

Depending on available perspectives to restore normal operational conditions, a proposal of validation activity suspension can be made.

Interested parties (CDQs), on the basis of the given information and after adequate evaluation, agree on the proposal, and communicate their decision to the EPR-CC who, even if not directly concerned, will play a coordinating and information-gathering role.

Whenever the conditions for the "suspension" occur, trains for which the suspension has been agreed must be taken out of the EPR system and may not be considered in the following procedures. In fact, this concerns cases of extraordinary conditions, departing from normal operational management, for which the application of the EPR principle would have no sense (whose goal is to promote railway service performance improvement).



Picture 3 - train list update process in case of suspension

The EPR-CC prepares the updated list of trains for the whole corridor and communicates it to the EPR SM. The EPR SM imports the updated list into the EPR tool.

Validation activities on the concerned list of trains can be reactivated:

- When planned at the moment of suspension, if this was possible according to the information available at that time or
- As soon as the abnormal event ends, when prompt information must be given to other concerned EPR partners for the re-starting of the normal EPR validation activities. In this case, interested parties have to agree to re-start the validation and communicate their decision to the EPR-CC.

The EPR-CC will update the EPR trains list and inform the EPR SM who imports the updated list into the EPR tool.

4.2 Set-up of EPR points

EPR processes and financial results are influenced by the setting up of the EPR points, which are those points where, for EPR purposes, a train's performance is measured and data must be made available. EPR points are a sub-set of TIS points and, as a consequence, a sub-set of national measuring points (see Annex 4.1 for details).

In order to allow a properly working EPR calculation, at least for trains included in the EPR trains list, data quality at such measuring points must be the best. Complying with the quality levels for TIS data provision provided for in the Service Level Agreements and accepted by the IMs (normally agreed at 90%) does not ensure a sufficiently high quality level.

As a basic condition and minimum requirement to allow the application of the EPR, the following points are obligatory:

- Departure (train's origin) and arrival (train's final destination) stations
- Border station(s), that is the handover point(s) between IMs'
- Any other IM-IM handover point other than border-station
- RU-RU handover point(s) (where the responsibility for the transport is shifted from one RU to another cooperating partner RU).
- Additional EPR points may be added for important stations.

The density of EPR points, i.e. the number of EPR (measuring-recording) points along a certain railway infrastructure section, was very heterogeneous on the corridors used during the pilot application.

The longer the in-between segment is (that is the longer the distance between two EPR points is) the lower the level of information on the real train performance will be; on the contrary a high density of EPR measuring-recording points ensures an optimum level of knowledge of the real train performance.

The other way round, a long distance between measuring-recording points can hide undocumented delays and/or can allow for untraced delay recoveries: in fact, an undocumented delay can be "hidden" by a delay recovery.

For each EPR point a single responsible partner-IM and a responsible partner-RU must be clearly identified. The identified IM will be fully responsible for the provision of all the needed train data (see Section 4.3). The identified RU will be held responsible for the delay caused at such a point, if coded with an RU-related delay code.

As a logical consequence of the above-mentioned concept, normally, the Infrastructure Manager on whose ground a certain station/border-station is located will be defined as "responsible IM" in TIS-EPR.

The identification of responsible IM and RU in the EPR segment (part of the line between two EPR points) can be derived from the identification of responsible IM and RU for each point.

As a default, the IM/RU responsible for a point is also responsible for the previous segment. Exceptions to this rule are possible and must be agreed by the involved partners.

The procedure to fulfil the requirements set in this section of the Handbook is as follows:

- The concerned IMs select the EPR points along a line. Intermediate EPR points are proposed by IM or RU and decided by the responsible IM, handover or border points are agreed by the involved IMs. RUs' handover points are decided by the IM with the agreement/proposal of the RU(s)
- Once the EPR points have been selected, the involved partners check whether it is necessary to make exceptions to the rule described above or to regulate the responsibility for segments
- The agreed EPR points and allocation of responsibility are communicated to the system manager who applies the decision taken to the tool
- No changes to the EPR points and/or segments configuration shall be applied without agreement and, in any case, modifications in the tool may be applied only by the SM; detailed information on EPR points, segments and responsibilities must be kept updated in a suitable format (currently an MS Excel file – see Section 10 "HOP-file").
- IMs and RUs are represented by their respective CDQs

4.3 Relevant data

Not all possible TIS-messages are used by the EPR system. The relevant messages sent by national systems to TIS are described in this section.

4.3.1 Message 2090: Contracted timetable (CTT)

Message 2090 delivers the planned route of the train run and the planned time for the arrival/ departure/ run through (hereafter called "status") in stations on that route. It is the timetable which was contracted between the IM and the RU.

The provision of the CTT in due format and timeframe is crucial to EPR as these timetables create the foundation / reference value to any delay monitoring.

From the experience of the pilot application the most common shortcomings connected to this message are:

- Unilateral adjustments without harmonisation on the connecting network
- Use of the same number for different trains on different parts of the originally planned path
- Change of the train number for operational reasons.

If a change of train number on part of the path is known in advance and the new train number is reserved only for specific international numbers the CTT can be merged in the TIS tool.

Most of these cases are detected automatically by the exclusion rules and lead to non-consideration in the EPR calculations.

4.3.2 Message 2002: Running advice

Message 2002 delivers a comparison between the planned time at a certain station/ status and the actual time when the train arrives at that station/ status. The difference – expressed in minutes – is called Delta-t value or lateness.

Data delivery is only required for a small sub-set of points – the so-called EPR points – but for those it is absolutely mandatory.

Even just one missing running advice at one of the EPR points leads to an exclusion of the train because the segment calculations cannot be done correctly. Therefore it is required to choose every EPR point with care after a thorough check of data availability for that point (see also Section 4.2). Single missing running advices can be manually delivered through the sending functions of the TIS tool.

4.3.3 Master station concept

In large stations such as shunting yards which consist of several substations, problems with the availability of CTT or running advice information have been experienced, since not every part of the station is equipped with automatic data recording devices.

Train starts or ends in a different part of the station than planned and CTT and running advice do not fit together.

To overcome these problems a TIS function – the "master station concept" – has been implemented. Several substations can be assigned to a "master station" – if information for the master station is missing, it is replaced by existing information from one of the substations. The description of how the concept works exactly can be found in Annex 4.2.

4.3.4 Message 2003: Cancellation

Message 2003 has indirect consequences for the EPR. If all involved IMs are sending the message, the train will not be considered in the EPR procedure. If one or more are not sending it the train will appear among the EPR trains but will be excluded by automatic exclusion rules. The sending of message 2003 will prevent not-running trains from being considered as excluded trains due to incomplete data.

4.3.5 Message 2005: Delay code

Message 2005 is delivered when a train incurs its first or an additional delay above a pre-defined national threshold. Among other things, it contains a code describing the reason why the train was delayed. Possible causes are described in the UIC leaflet 450-2. While the "Running advices" are only important at EPR points, the delay code message has to be sent for all points where a delay is registered in the national system. It is not required for such points to be known TIS points or even EPR points. If a point is not known in the TIS system the delay is attributed to the next known point using the actual time of message 2005 and the actual time delivered with message 2002.

The codes delivered with message 2005 have to comply with those defined in UIC leaflet 450-2. At a national level a more detailed coding system can be applied – it is only required that the national codes can be translated with a n:1 relation into the 450-2 codes.

If an IM codes takeover delays at borders (delay of incoming trains) such information should not be sent to the TIS system, because it was already coded before. Otherwise it would be counted twice in the EPR calculations.

The EPR validation tool provides a function to modify delay code information within the validation tool without feedback to the national systems. It is possible to delete messages, change the delay code or change the attributed delay minutes. Access to this function is restricted to the IM responsible for the point where the delay occurs.

4.4 Measuring rules

4.4.1 Rounding of delta-t values (lateness)

In automatic systems the delta-t values are mostly calculated in seconds but displayed and delivered to TIS in minutes. The calculations consider the delivered delta-t values in minutes; seconds are not taken into account. The rules for rounding are not the same for every IM; at the moment among the Early Implementers two different methods are being applied. Since the differences between the methods are not relevant, no harmonisation is required.

4.4.2 Measuring and rounding of delays

4.4.2.1 Measuring of delays

The difference between lateness (or delta-t value) at two subsequent points (or in a single point between arrival and departure) is called “delay”.

Two different methods are applied to measure delay minutes (the methods are described in Annex 4.4.2). A mandatory harmonisation has not been considered necessary. Indeed, the more the measuring is complete and precise, the less the IMs lose in terms of undocumented delays and recovered time, therefore the incentive for more precise data collection lies in the EPR monitoring system itself.

Thresholds for delays

As regards delay coding, different thresholds are also applied. In this case too, no harmonisation is necessary, as the incentive for lower thresholds (and thus more precise data collection) lies in the system itself. It is recommended to use a maximum threshold of 3 minutes if Method 1 for delay coding is applied (see Annex 4.4.4) and 5 minutes for Method 2.

Rounding of delays

If the delays are calculated from data delivered by automatic systems, they are calculated in seconds but displayed and delivered to TIS in minutes. As for the delta-t values the rules for rounding are not the same for every IM. This difference has a very small impact on EPR results therefore it is left to the IM to decide which rule to apply.

Non-coded delays (undocumented minutes) are calculated and rounded by the EPR calculation procedures.

4.4.2.2 Shortcomings

Due to different operational behaviours, misalignments in data delivery sometimes occur and lead to data incorrectness. Such issues are explained in detail in Annex 4.3.

4.5 Coding of delays

4.5.1 General rules

Coding of delays is without any exception the task and responsibility of the Infrastructure Manager. Some IMs give access to the coding system to the RU, but normally only to check the correctness of coding. The changing of codes is always done by the IM – in most cases following a predefined validation procedure.

For 5 codes (40, 41, 70, 71 and 84) the treatment in the national systems is not the same as in the international context. Nationally they are treated as “external”, internationally they are attributed to a specific company.

The actual company which is in charge of validating a delay code is deduced in the EPR validation tool following the rules described in this table:

Code (UIC 450-2)	Description	Attribution according to EPR rules
1x, 2x, 3x	Delay caused by the Infrastructure Manager (operational/planning management, infrastructure installation, civil engineering)	IM responsible for the point in the TIS-topology (TIM)
40	Delay caused by next IM	IM from the closest CTT after the actual time of the delay different from the TIM (NTIM)
41	Delay caused by previous IM	IM from the closest CTT before the actual time of the delay different from the TIM
5x, 6x	Delay caused by the Railway Undertaking (commercial and rolling stock)	The Railway Undertaking from the CTT for the point of occurrence (RUCTT)
70	Delay caused by next RU	RU from the closest CTT after the actual time of the delay different from the RU at the point of occurrence
71	Delay caused by previous RU	RU from the closest CTT before the actual time of the delay different from the RU at the point of occurrence
80-83, 89, 90	External causes	TIM (only for validation, in calculation "external")
84	External causes (on next network)	NTIM (only for validation, in calculation "external")
91-92	Secondary delays	TIM
93-94	Secondary delays	RUCTT
95	Secondary delays	TIM (only for validation, for calculation purposes the train is excluded)

Table 1 – delay codes attribution (in validation)

Some rules have to be followed to avoid redundantly coded minutes or the wrong attribution of responsibility, especially at IM handover stations. See details in Annex 4.5.

4.5.2 Treatment of secondary delay causes

A special detail for delays caused by another RU than the one operating the train has to be considered throughout the network.

The UIC Leaflet 450-2 states in Chapter 6 – Delay causes:

- "In case the delay is caused by the RU, the consequences for other trains have to be coded as secondary delays.

- For an IM and external causes primary causes are applicable on the whole network of the IM.
- If delays could not be traced back to the primary cause secondary causes have to be used."

Several IMs do not register secondary delays, but trace them back to the incident that finally led to the secondary delay and attribute it to that incident/ code. The national systems are able to distinguish if such a delay was caused by the train to which the delay code refers or by a different train.

Message 2005 does not contain any distinction between caused and suffered delays or a data field for the company responsible for a delay.

An example illustrates this below.

The engine of train 4000 (belonging to RU A) breaks down and the train is delayed by 50`. Because of this incident, trains 3500 and 47001 (respectively belonging to RU B and RU C) are delayed. The IT systems would record the situation as shown in Table 2.

National system				
Train	Cause	Minutes	C/S	RU
40000	64	50	C(aused)	A
3500	64	20	S(uffered)	B
47001	64	30	S	C

⇨

TIS			
Train	Cause	Minutes	RU
40000	64	50	A
3500	64	20	B
47001	64	30	C

Table 2 – example of attribution of secondary delays

If train 47001 was an EPR train RU C would be burdened with 30 minutes due to an engine breakdown although it suffered those 30 minutes because of the engine breakdown of a different train/ different company.

In order to avoid the occurrence of such cases in the EPR it was agreed *not* to send delays occurring in the cases of track occupation, turnarounds and connections, with the code referring to the original primary cause (as was done in the example above) but as secondary causes using codes 91, 92, 93 and 94 as provided for in Leaflet 450.2.

This solution does not fully support quality improvement but is driven by system conditions. To code all caused delays according to the party that originally caused the incident would serve the quality improvement idea better. In the long term it is recommended to adapt the systems (by sending the code of the company that caused the incident with Message 2005) and subsequently adapt the EPR model.

4.5.2.1 Influence of coding behaviour

Every IM codes delays according to national rules and practices. The way the delays are coded influences attribution to the partners in the different networks. During the pilot application the main focus was on procedures and tools – so it is advisable to analyse the detailed coding methods applied along a corridor in order to keep a fair treatment.

4.6 Exclusion rules

The application of financial penalties being the final outcome of the EPR process, it is necessary for all information used to apply the calculation rules described in Section 6.1 to be fully correct and reliable; therefore a very high data quality level is a pre-requisite for a correct application of the EPR model. Among the trains included in the EPR trains list, those who actually run are monitored through TIS and the EPR tool.

The next step is the validation of the delay causes (see next chapter) allocated by the national responsible parties. However, only trains that fulfil specific requirements of data completeness and correctness can be considered in the validation phase. Among the trains that have entered the validation phase, only those whose related delay causes are agreed by all partners are allowed to enter the calculation tool.

Therefore, a list of exclusion rules has been created and is applied in the EPR tool. Some rules are applied all along the validation period. When the validation period has expired, additional rules are applied to further filter the reliable trains. The order in which the rules are applied is reflected by the list below:

- Rules applied during the validation period
    - Timetable not fitting at the borders
    - Train run not complete
    - Missing CTT on part sections
    - Train run partly cancelled
    - Inconsistent running advice at EPR points
    - Missing running advice at EPR points

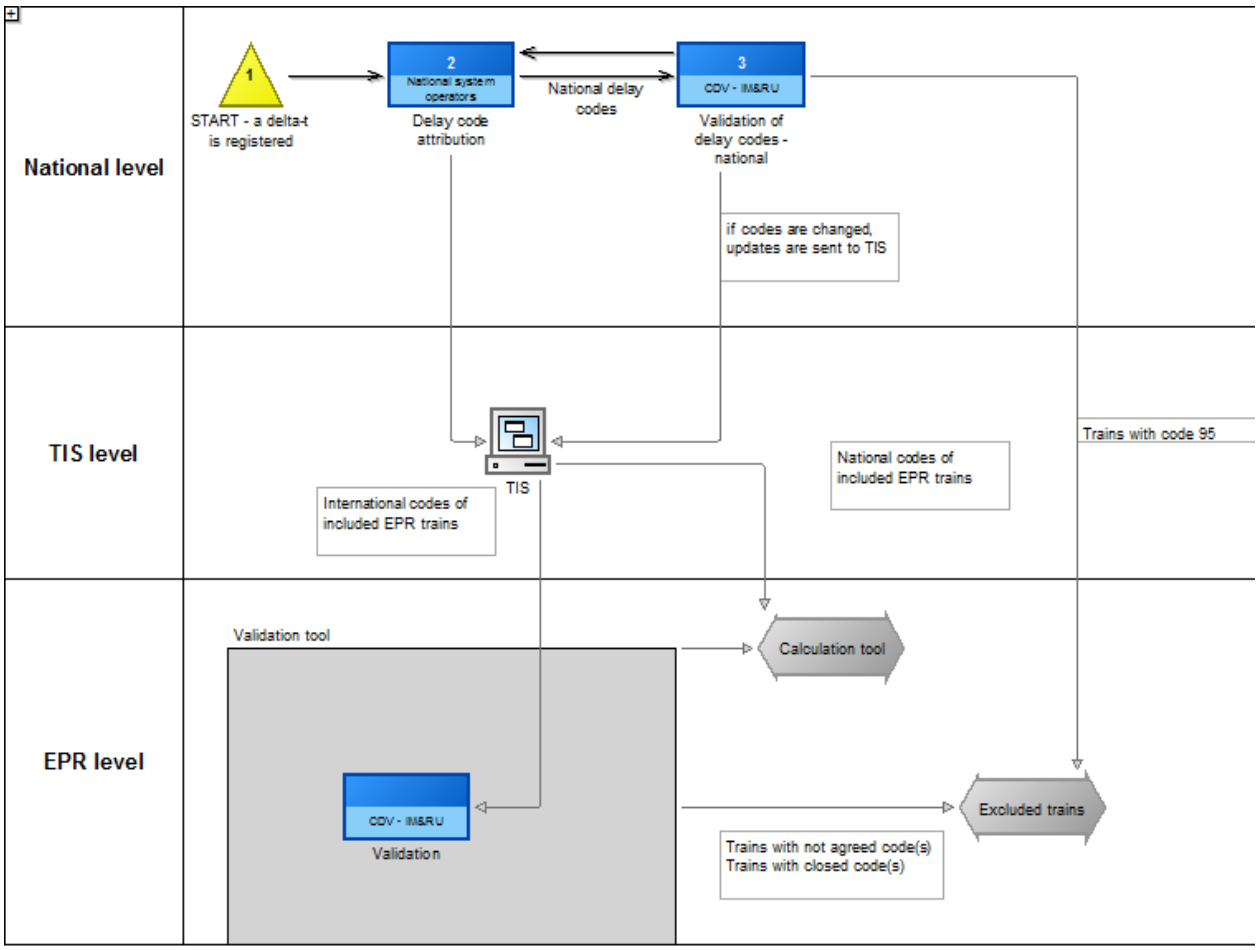
- Rules applied at the end of the validation period
    - Train runs containing delay code 95
    - Train runs containing a closed delay code
    - Train runs containing a still disputed (not agreed) delay code
    - Trains with delays without any responsible company

In addition, in case of data problems not covered by the above occurrences, manual exclusion is allowed if proposed by one responsible party and agreed by the concerned partners.

Cancelled trains (i.e. trains for which the UIC message 2003 has been sent) are, of course, not included in the validation phase.

The tool applies the described exclusion rules following a priority sequence. If an exclusion rule is applied, the tool does not check the following rules (this means that an “excluded” train might be affected by one or more problems.

5. Delay code validation



Picture 4 – overview of the validation process

The validation process ensures that the data used for the EPR calculations are accepted by all involved partners.

5.1 Subject of validation

The EPR validation process only refers to delay code information delivered with Message 2005. The other relevant messages (2090 – CTT and 2002 – Running advice) do not leave any room for disputes. Data coming from these messages is technically checked by the system. Train runs with wrong, missing or inconsistent data are excluded from the EPR calculation under pre-defined exclusion rules (see Section 4.6)

The validation procedure takes place in two phases:

- National validation
- International validation

5.2 National validation

The involved partners deal with the codes that refer to delays caused in the national area (1x, 2x,3x,5x,6x,8x,9x – see Table 1 for details). This phase is normally supported by a national validation tool. An IM can also decide to use the international (EPR) validation tool for national purposes.

The process starts with the creation of delay code information in a national system. A code is filled in by the IM (national staff) and put to the notice of parties to whom the code is attributed. This happens mainly through access to automatic systems, but in some cases also through reports. At the same time the delay code information is sent to TIS with a message 2005 – delay code.

A national delay code validation phase normally follows, during which the code and the linked minutes are accepted or negotiated between the IM and the party made responsible for the code. This may lead to:

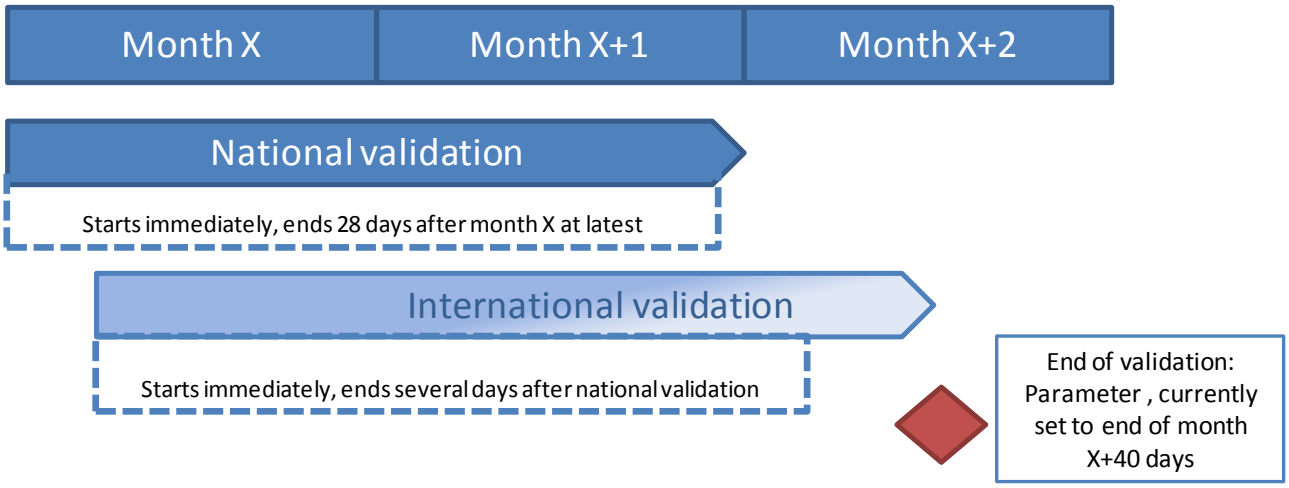
- **A changed code**
  The IM updates the code in the national system; a message 2005 with the status update is sent to TIS.
- **An unsolved situation**
  The IM updates the code in the national system with code 95; a message 2005 with the status update is sent to TIS. Depending on national dispute resolution the situation may be clarified before the end of the international validation, in which case the code is updated and a message sent to TIS. Otherwise the code 95 will lead to an exclusion of the complete train run from EPR.

5.3 International validation

During international validation only the codes that refer to delay caused by events outside the national area (4x, 7x and 84) are treated. This phase is supported by the EPR validation tool.

The validation is done through the EPR validation page within the EPR tool (see **EPR Validation tool User guide**). On this website each EPR participant (CDV) can see the codes attributed to it and either accept it or dispute it. A bilateral or multilateral discussion will follow. If the partners find an agreement the code will be updated in the validation tool and in TIS. There is no information flow back to the national systems. If no common decision is reached, the case can be marked as closed. Disputed and closed delay code cases will be excluded from the EPR at the end of the validation phase.

5.3.1 Duration of the validation period



Picture 5 – overview of the validation phases

International validation can start immediately after the train run. Its duration depends on the duration of national validation processes, which are described in Annex 5.1. Currently the longest national validation period ends 28 days after the train run. Since, due to national validation, additional international codes can be attributed until this national validation period expires, additional days are needed to finalise the international validation.

The duration of the validation period is defined as a parameter in the EPR validation tool and is currently set to 40 days after the train run.

5.3.2 End of validation

At the end of the validation the data for all delay codes which are not “disputed” or “closed” are set to “accepted” automatically and the “Final EPR calculation list” is produced.

Changes for these trains are not possible any more.

A precondition for the transfer is that the train run has not been excluded due to other defined exclusion rules.

Data are available now for performance reporting and calculation of penalties.

5.3.3 Monitoring of disputes/ Dispute resolution

In a performance regime with financial consequences, not-agreed codes must not be considered for penalty calculation. Therefore train runs including delays coded with 95 or disputed/ closed at the end of validation are excluded from the further proceedings by exclusion rules. These exclusion rules could be de-activated if no financial consequences were applied. In any case a monitoring of such cases by standardised reporting in performance management meetings is advisable to

- create/ promote a common understanding of coding behaviour
- identify requirements/ possibilities to adapt the coding rules
- prevent abuse of disputing.

In the light of future requirements deriving from a revision of the European law (ref. Recast of the Railway Package), the inclusion of a "dispute resolution phase" after the validation phase has been analysed (see also 8.1.6).

Since the proposed solution could not fulfil the recast's requirement (it has to be implemented on national level for all delay codes) and its efficiency is doubtful, the EPR advisory group decided not to propose the implementation at this stage. Instead a monitoring as described above was advised.

The proposal is described in Annex 5.2 for a possible later resumption.

6. Calculation Process

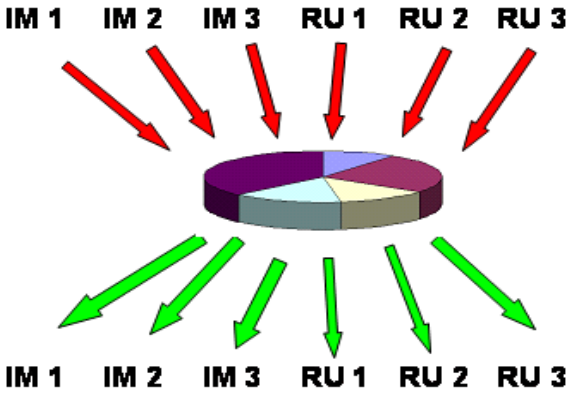
6.1 The EPR model

6.1.1 General principle of the EPR model

The EPR model avoids that the RUs running through several countries are subject to several PR´s calculation rules. The underlying idea of the EPR calculations is to provide a financial incentive for quality improvements and not at all a monetary compensation for the disturbance caused by the delays. As the delay minutes are monitored and the delay reasons codified for each train run, the EPR calculations are also done *per* each train run.

6.1.2 Basis of the EPR model

Parties that have caused delays are assigned "payment minutes" and parties that have suffered from these delays or have recovered delays (=caught up time) are granted "receivable minutes". The payment minutes are paid into a common "money box" according to each company's share of causing of delays to form a fund from which the receivable minutes are distributed according to each company's share of suffering / recovering of delays. The total receivable minutes are equal to the total payment minutes and thus the fund is distributed between the parties after each train run. The EPR payments and receivables are illustrated in this simplified example schema. The number of IMs and RUs is not limited.



Every party pays according to its share of caused delays and is paid according to its share of suffered and recovered delays

Picture 6 – EPR money box

Every delay occurring to a train is always suffered by one or several parties. For example, if a delay takes place at the beginning of the train run, it will be suffered not only by the corresponding IM - and/or RU- counterparty, but by all following actors along the journey (unless the delay is recovered later on). Therefore one delay minute often generates several suffered delay minutes.

The EPR calculation tool calculates a balance for each party on each train run. If the balance is a positive figure, the actor needs to pay *malus* minutes into the money box. In case of a negative figure, the party receives *bonus* minutes from the money box.

6.1.3 General description of the EPR model

This model is able to deal with different situations for actors and train runs such as "classical cooperation" (RU-RU handover points coincide precisely with IM-IM borders), "single RU" (one train operated by one RU on several IMs) trains and "adapted cooperation" situations (several RUs run within a same IM area, even for a short distance).

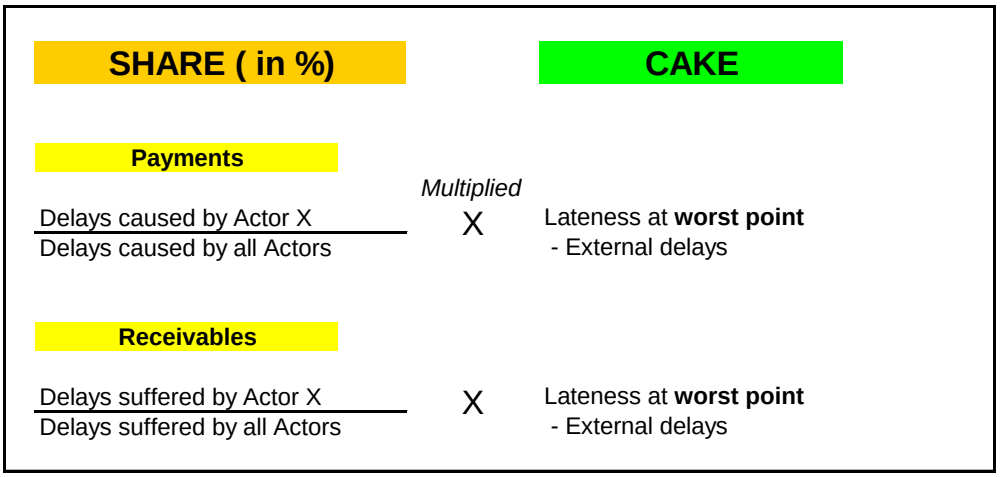
The EPR calculations are based on the requirement that the **financial outcome of each IM should not change according to the RU configuration**, in other words according to whether there is one or several RUs and where the RU-RU handover points are located. To fulfil this prerequisite, the RU handover points have to be modified "artificially" to correspond to the IM-IM borders. In this way the amount of suffered delays from the previous country will not change between different RUs according to the number and location of RU-RU handover points.

In case of several RUs running on one IM area, they are considered as one RU.

The same mathematical formula deals with the different situations in the same way (see Annex 6.1). The calculation is performed at section level (IM responsibility). In order to treat all these situations uniformly, several RUs running on one IM section are considered as one unique RU. An additional mechanism (called "direct payment" between RUs) in the formula shares the receivables and payments between these RUs according to the travel time. All the other calculations are called "indirect payments" (see Annex 6.1.4).

6.1.4 Basic mathematical formula

The following table explains the basic formula used in the EPR model.



Picture 7 – EPR "share and cake"

The calculation tool is based on this formula and calculates balances for each party.
The detailed mathematical formula dealing with all kinds of RU configurations is explained in Annex 6.1.4 and described with examples in Annex 6.1.5.

6.1.5 Allocation of caused, suffered and recovered delay minutes

In the UIC Leaflet 450-2, delays are described as primary, secondary, or external delays.

The primary responsibility is easily identified for the delay codes attributed to IMs (1x, 2X, 3x, 4x) or RUs (5x, 6x, 7x).

Secondary delay cannot be allocated to a source immediately. However, the amount of secondary delays being large - in comparison to the total amount of delays - it has been considered justified to integrate them in the calculations. The treatment of secondary delays was inspired by the "care-taker" principle, according to which the party responsible for a delay is not identified with the company that has caused the original disruption (so-called "wrong-doer") but with the company that has the possibility to restrict its consequences, (the so-called "care-taker").

The long-term goal is to link all delays to the original cause and thus to the original responsible parties (see also 4.5.2).

Undocumented delays, i.e. delay code missing, are allocated to the corresponding IM, even if it may not have caused the delay, as the IMs are responsible for filling in the delay codes.

Mainly due to national coding thresholds, some delays are not coded, which leads to undocumented delay minutes, unless they are recovered in the segment.

External delays are caused by a third party, by force majeure or by exceptional weather conditions. For this reason there are no *malus* payments into the money box. Therefore, the sum of external delays (codes 8x) and dangerous incidents (code 90) has to be subtracted from the "worst point". As a consequence, if external delays are the only delays that occur during the train run, there are no *bonus* receivables from the money box as there were no *malus* payments into the money box.

Finally, **recovered** time also contributes to the calculation of the delays suffered by each party:

- If delay minutes are recovered on line, the benefit of *bonus* minutes is shared between the corresponding IM and RU. This provides an incentive for both to recover and encourages good cooperation between the IM-RU partners.
- If delay minutes are recovered at EPR stations (i.e. defined as EPR points), the benefit of the *bonus* minutes goes entirely to the corresponding RU.
- At stations which happen to be also RU-RU handover point, the benefit of recovered time is granted entirely to the departing RU (this benefit is balanced in two-directional traffic).
- The recovered time at stations which are not EPR points, is handled in the same way as recovered time on line, because the recovered time in that station is not registered as attached to a particular point.

The calculation tool does not receive any information about undocumented minutes and recovered time. Within a segment, both are calculated by the IT tool. The difference between lateness at two consecutive EPR points represents the additional delay in a segment if it is higher than 0. The difference between this additional delay and documented caused delays represents the undocumented or recovered minutes:

- If the difference is above zero, the result corresponds to undocumented delays.
- If the difference is below zero, the result corresponds to recovered time.

The following table shows how caused, suffered and recovered delays are allocated between IMs and RUs, as described in the above paragraphs.

	Caused delays (payments)	Suffered delays (receivables)
IM	IM delay codes (1x, 2x, 3x) Undocumented minutes Delays occurred in other networks due to this IM (4x) Secondary delays (91, 92)	RU delay codes (5x, 6x) Delay at handover point Delays caused in other networks (4x, 7x) Secondary delays (93, 94) External causes (8x, 90) 50% of recovered time in line
RU	RU delay codes (5x, 6x) Delays occurred in other networks due to this RU (7x) Secondary delays (93, 94)	IM delay codes (1x, 2x, 3x) Delays caused in other networks (4x, 7x) Secondary delays (91, 92) Undocumented minutes External causes (8x, 90) Delay at handover point 50% of recovered time in line 100% recovered time in station

Table 3 – illustration of suffered and caused delays by partner

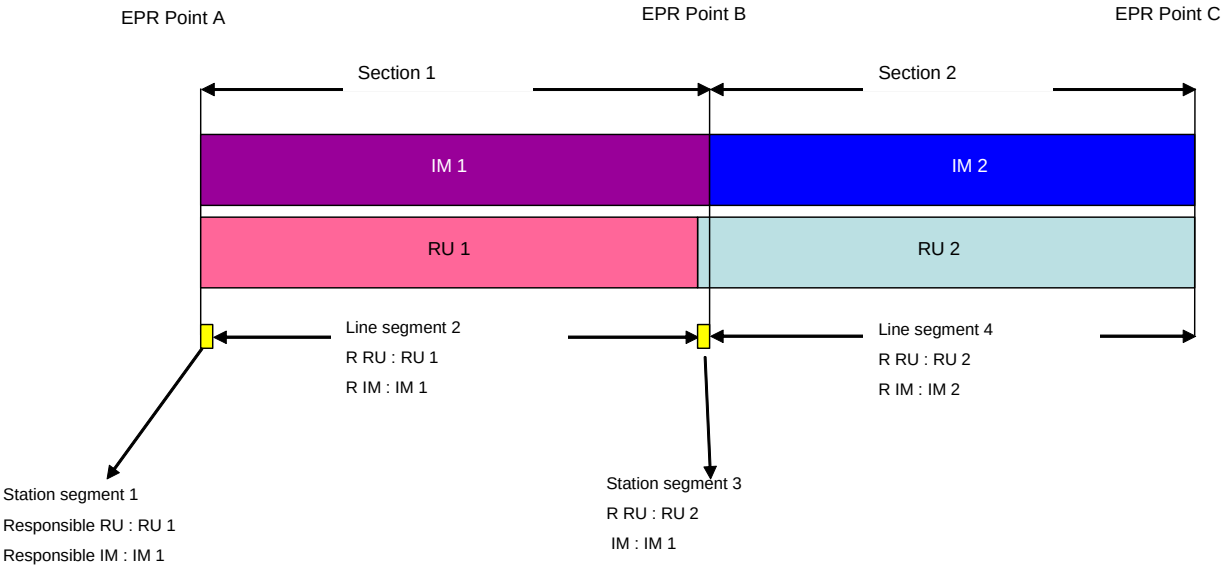
6.1.5.1 Calculation tool

The EPR calculation tool uses the following three items:

- Data sent by IMs to TIS:
  - Train run: CTT, running advice
  - Minutes of delay attributed to responsible party
  - Codification of the delay according to UIC Leaflet 450-2
  - Highest lateness at one of the EPR points (“worst point”)
- Data calculated by the tool itself:
  - Travel time based on CTT (time during which one RU is operating a train on one IM’s area)
  - Cake (lateness at worst point – external delays)
  - Undocumented minutes and recovered time

- Responsibility of each party based on sections (IM responsibility) and segments (RU responsibility within one section)

- Mathematical formula for payments and receivables (see 6.1.4 and Annex 6.1 for detailed formula): each party is assigned payment minutes according to its share of all caused delays and each party is paid receivable minutes according to its share of all suffered (including also recovered) delays.



Picture 8 – segment and sections general rules

6.1.5.3

6.1.5.4 Examples

The Annex 6.1.5 shows the same train run for three RU configurations (cooperation, single RU and adapted cooperation situation).

6.1.6 Financial Considerations

The result of the EPR calculation (Balance, see annex 6.1) is only a calculation unit. Before financial consequences are applied it has to be multiplied by the monetary value that is given to one calculation unit.

6.1.6.1 Monetary Value

The EPR should not be a “liability system” (i.e.: a system which compensates the whole damage corresponding to delays) but a “warning system” based on conventional penalties. Therefore it is likely that the price per calculation unit will be limited to a value comparable to those of already existing national performance regimes. A possible value range could be between € 0.1 and € 5.00 per calculation unit.

The results of the pilot application are not sufficient to suggest a value per calculation unit immediately. Since no financial application is intended in the short term anyway the experience and results of a non-financial application should be used to decide on that value once the introduction of payments is intended.

6.1.6.2 Ceilings and thresholds

In order to avoid disproportional penalties due to exceptional events and to remain a warning system of recurrent quality failures, the setting of "upper limits"- ceilings have been envisaged for EPR. These ceiling(s) can be defined for individual train runs and / or for the total amount of penalties to be paid by an actor within a chosen period (e.g. year).

The EPR calculation tool does not apply such ceilings; so in case of a financial application of the EPR the tool needs to be adapted or the ceilings need to be applied on the calculation results before calculating the financial results.

It is recommended to set thresholds as the minimum number of minutes of delay to consider a train as unpunctual for quality improvement actions and/or to trigger the payments of financial penalties. These thresholds should be applied at the worst point (according to the calculation rules recommended in this document – see 6.1.5and Annex 6) and can be differentiated according to the type of traffic.

6.1.6.3 Calibration of financial payment

Calculation of payments translates the actual level of performance into the *bonus* / *malus* payments within a given period of time. The idea of calibration is to consider also positive/ negative developments, even if absolute targets were not reached/ just reached. Calibration would allow an actor with poor performance, but generating relevant improvements, to obtain a certain levelling of his penalty payments. In the same way, an actor that has a relatively good performance (or has a structural advantage) and who stagnates with quality improvements will see his *bonus* payments being moderated.

The idea of calibration is to factor into the EPR calculation an additional reward for improvements to strengthen EPR as an incentive scheme for quality improvements.

The calibration of payments needs a representative sample of qualitative results - therefore the following procedure is proposed:

- carry out the EPR without financial consequences for some time,
- analyse the results by corridors/ traffic routes
- set fair targets (benchmark) for each partner or each type of partner (IM and RU)
- if financial consequences should be applied: develop rules and functional requirements.

6.2 Evaluation of the EPR Model

The agreement of the actual EPR model was the outcome of combining different requirements (in terms of incentives for quality improvements and fair treatment of actors in different situations) that countries and companies considered necessary for an international performance regime. The EPR calculation model that was developed and subsequently agreed upon is a balanced compromise between these different approaches.

The calculation model had to be tested during the EPR Pilot Application to see if the expected requirements / objectives have been fulfilled.

Based on the data provided by the EPR calculation tool for the 4th quarter of 2011 and the 1st quarter of 2012 an expert team of the Commercial Working Group (CWG) has prepared an evaluation plan and delivered a preliminary opinion to the entire CWG.

The different EPR-partners' observations – either given in writing or personally in the evaluation meeting were deeply analysed and taken into due consideration in the final version of document. This evaluation document has been approved by the EPR Advisory Group on 10 October, 2012.

In short the evaluation result was that a majority voted for keeping the model as it was originally defined – at least if it is used within a performance management scheme without financial flows.

The following table gives an overview in regard of the single components which were analysed:

	CWG ADVICE	Comments
PRIMARY DELAYS	Keep it as it is (unanimously)	For every reasonable calculation model the primary delays will be the basis. There is no discussion about the responsibility for this kind of delays.
SECONDARY DELAYS	Keep it as it is Relevant majority All-3	It is important that the secondary delays will be in the future in the model with the same treatment as primary delays to prevent benefits of different coding behaviour between IMs. Indeed, at the moment, there is no possibility to trace back delays to the primary cause.
EXTERNAL DELAYS	55% keep it as it is 45% only monitoring	They'll be monitored to see if they are increasing and then be reconsidered (assessment of external coding behaviour)
RECOVERED TIME (IN/OUT)	Keep it as it is (unanimously) See notes on the right side	The entire CWG agreed that as the Worst Point (WP) for the cake is chosen, the Recovered Time must be in. This element is linked to the "cake" choice
RECOVERED TIME (share)	Keep it as it is (no clear advice, it's a very-very small amount) see notes on the right side	The share has to be reconsidered in the next phases (to be assessed after increasing the density of EPR points)
CAKE (worst point)	Keep it as it is Relevant majority All-3 (in favour of the Final Destination - FD)	As long-term solution, the entire CWG (unanimously) agreed on the Average Delays at EPR points option.
UNDOCUMENTED DELAYS.	Keep it as it is Almost unanimously All-1	

Table 4 – overview of the recommendations on single EPR components

The details of the evaluation can be found in Annex 6.2.

There the facts & figures, and the specific pros & cons considered for each EPR Reference Model component, are listed along with reasons why a part of the EPR partners did not agree with the majority positions.

7. Billing and invoicing

The EPR model includes the possibility of introducing financial incentives to stimulate good behaviour. The basic financial conditions shall be written down in a contract between all involved parties. The financial process starts at the end of the validation phase, when the calculated EPR results are displayed in the EPR calculation tool.

After the EPR calculation is performed one single entity (EPR Billing and Invoicing Office – EPR BI-Office for short) shall manage all the relevant legal and administrative tasks such as: informing the involved parties, producing and sending out financial statements or bills, organising and controlling the bank transactions and dealing with disputes.

- Billing and invoicing is done by "EPR-BI".
- EPR-BI informs the involved parties on a monthly basis, produces and sends out bills and credit notes, controls the bank transactions and decides on disputes. This procedure and its transparency – from the actual train run to delivery of invoices or credit notes – should minimise or even eradicate disputed debts.
- The forced recovery mechanisms which are available are generally used to collect payment for proven and recoverable debts. Due to the followings reasons it is not recommended to follow a normal procedure if invoices are not paid:
    - The value of the recoverable amount is unlikely to warrant the cost of legal proceedings, which in most cases will be conducted in another country.
    - It is unclear who the plaintiff will be - the EPR-BI or all other participants?
    - It would be difficult to reach an agreement on applicable law and jurisdiction.
    - Obtaining a decision against the debtor for recovery of a debt does not suffice: the decision must then be enforced, which raises many practical difficulties

CONCLUSION: The traditional juridical route for invoicing is by far the least effective.

Other means available to force payment in an international context are:

- **Down payment**
  Participants could be asked to pay a fixed amount from the outset, as a joining fee, which would cover the cost of the first invoices sent out by the EPR-BI. This deposit would be renewed at regular intervals, in a way which was linked to the participants' pace of performance.
- **Mandate to recover funds**
  The EPR-BI could also confer mandates onto participants to collect unpaid *malus* amounts on its behalf, from subsequent train runs
- **Compensation**
  This is the simplest and most obvious system, which is maybe not likely to give the EPR members a 100% guarantee against bad or insolvable debtors, but would reduce the risk.

Since no application of the EPR with financial consequences is expected for the near future no specific company to carry out the task of EPR-BI office has been chosen yet. The task could be organised by RNE upon request, if and when users announce that they intend to introduce the EPR with application of financial incentives.

The EPR Legal Working Group (LWG) advises the option "compensation" which should be carried out by the Brussels Clearing Centre (BCC) in Brussels.

BCC is a clearing house for debts and credence's of its members, associates or affiliates, belonging to the rail community. The advantages are that transactions via the BCC are simplified by cutting the number of two-way flows of funds; there is a reduction in administration costs and bank charges; the BCC Members share the risk of default of one of its Members; payment times are reduced; in the event of late payment, the BCC calculates and automatically incorporates the amount of late payment interest charges; foreign exchange risk are hedged and foreign currency supply costs eliminated through payment and receipt of balances in Euro.

8. Legal issues

The EPR LWG has investigated legal issues with reference to the implementation of EPR as well as to its compliance with European and national law.

The following legal documents were considered:

- EU Directive 2001/14
- EU Regulation 913/2010 (Freight Regulation)
- EU Directive 2012/34 published on 14 December 2012 , ("Recast" of the Railway Packages) – the EPR LWG could only study the Directive when it was in draft version
- National laws on network access and other issues.

The following management summaries present the results of the investigation on the relevant issues.

As far as the topic "dispute resolution" is concerned (**8.1.6**), to gain deeper insight in the analysis, the complete version of the paper delivered by the LWG can be found in Annex **8** to this Handbook.

8.1 Influence of the Freight Corridors Regulation 913/2010 and the "Recast" on EPR

The Recast imposes standardised basic principles for the various domestic performance schemes. By defining them by law, the margin of manoeuvre for existing domestic systems has become very small if they do not match the provisions stated in Annex VI (e.g. the delay codes), which shall apply throughout the network (Article 35 Paragraph 2). Moreover the Commission has been empowered to adopt delegated acts for the basic principles of the performance scheme.

Both the Freight Corridor Regulation and the Recast do not generally hinder the co-existence of different performance schemes, but on the one hand define the basic principles by law and on the other hand oblige Member States to ensure the cooperation of the Infrastructure Managers to enable performance schemes to be efficiently applied for international traffic. While it is not very clear what traffic is within the scope of the coordination required by the Freight Corridor Regulation, the Recast clearly extends the obligation to ensure compatibility between performance schemes outside the freight corridors to all "traffic crossing more than one network of the rail system within the Union".

With regard to the EPR the conclusion is that the legal framework does not impose the EPR as such. Nevertheless it seems that it would be advantageous for all concerned parties if EPR could be offered as a mature performance scheme model for the Corridors at the time of their start in November 2013.

There are several points that remain to be solved for it turns out that the Recast´s relevant clauses have remained unchanged even after the EPR Project Management had communicated its concerns via the lobbying organizations CER and EIM:

8.1.1 Co-existence of different performance schemes

If EPR is not applied to all trains but only to some trains running on a corridor, the relationship with possible domestic performance schemes will then have to be clarified. As to the impact on the EPR Handbook, the Handbook will have to indicate to corridor managers that they have to clarify which trains are subject to the EPR performance scheme.

Project statement: The definition of trains which are subject to the EPR is done by including them in the EPR train list. So the described requirement can be considered as fulfilled.

8.1.2 Requirements for payments in EPR

The EPR LWG recommends solving the contradictory provisions in the Recast[6] on the question whether payments are mandatory or not for performance schemes as follows: payments are not mandatory, but if a performance scheme contains payments, the requirements of the annex IV are mandatory; the thresholds for payments have to be agreed between the Infrastructure Manager and the Applicants.

8.1.3 Communication on timetables

The basic principles in the Recast impose the obligation on the IM to communicate the timetable - on the basis of which delays will be calculated - to the RUs at least five days before the train run (Point 2 (b) of Annex IV).

[6] Article 35: "[…] penalties and bonuses MAY be included in the performance scheme" and point 2 of Article 2(a) in Annex IV: "the infrastructure manager SHALL agree with applicants […] value of delays, in particular […] thresholds for payments due under the performance scheme, both to individual train rums and to all train runs of a railway undertaking […]"

It does happen, that train paths are ordered and allocated at shorter notice than 5 days. The consequences in such cases are not clear:

- A first interpretation could be that allocating paths less than 5 days before train run is not possible. This seems counterproductive in the light of intending to increase rail freight traffic.
- A second interpretation could be that such paths are not subject to a performance regime. This interpretation contradicts the intention of performance regimes because it would be possible to "evade" the performance regime by ordering at short notice.
- A third interpretation could be that the legislator wants to prevent abuse of the system that can be produced by constantly adapting timetables to the effective operational situation in order to prevent penalties.

As the EPR allows for communication to take place later than five days before the train run, Regulatory Bodies may find space for criticism here (which, however, would be little customer-friendly).

Project statement: The delivery of timetables will be implemented at national level. Considering the difficulties that the different timetabling methods already cause now, it will be very important to harmonise the implementation plan of this requirement in advance.

8.1.4 External delays/secondary delays

The basic principles in the Recast impose the attribution of delays "wherever possible, [...] to a single organisation, considering both the responsibility for causing the disruption and the ability to re-establish normal traffic conditions (Point 2 (d) of Annex VI). On the other hand Point 2 c (9) seems to establish a "wrong-doer" and a "care-taker" principle, meaning that any secondary delays should always be attributable to either one or the other party. However the heading of Point 9 in Point 2 c (9) seems to exclude that secondary delays are attributed at all. Thus there is a contradiction in the wording, which may cause legal criticism by interested parties who do not support the introduction of the EPR. Nevertheless the stipulation does not forbid a performance regime such as EPR for it is also unclear as far as the non- attribution of secondary delays is concerned.

Project statement: The attribution of secondary delays seems in line with the 2nd issue to consider (ability to re-establish normal traffic conditions...). External delays are not attributed to any organisation in the calculation procedure, but that is why they are called "external". The currently proposed EPR model goes as far as it is possible with the existing international agreements. A further change would require a complete revision of the UIC leaflet 450-2 and the corresponding message definitions (UIC Leaflet 407) followed by system adaptations at the national and international levels. Even finding an agreement on how to attribute the responsibility for external delays to a single company will not be easy, so resolving this situation can only be considered as a long-term task.

8.1.5 Calculation of payment (see also above, Point III, 1)

The basic principles in the Recast impose on the EPR to take into account the average delay of train services with similar punctuality requirements (Annex IV Point 6 (e)). This provision may be an obstacle to the implementation of EPR not yet solved.

Project statement: The possibility to define different thresholds to make a train relevant for EPR calculations is a – very basic – step in this direction. Since only passenger and freight traffic can be distinguished in the current system set-up, a system change might be advisable here, but only after gathering additional experience.

8.1.6 Investigation of the Legal Requirements of a Dispute Resolution System

The general objective of the dispute resolution system proposed is to avoid wherever, possible having to resolve EPR-related disputes before courts, tribunals or national Regulatory Bodies:

- First step: conciliation procedure between the parties involved under the supervision of a neutral third party
- Second step: dispute to be resolved before a competent Regulatory Body, court or tribunal
- Parties invited to agree on competent jurisdiction, applicable law and binding effect of decision issued by Dispute Resolution System beforehand (recommendation: territorial jurisdiction – either place of performance or domicile of defendant – determines applicable law)

8.1.6.1 Small-Scale Conflicts

Disputes related to (suspended) delay codes and other small-scale disputes reaching a certain threshold of delay minutes.

To be resolved during the validation procedure – rapid solution required.

8.1.6.2 Large-Scale Conflicts

Disputes related to questions of principle or structural issues, recurrent small-scale problem.

- To be resolved outside the validation procedure, the outcome of decision taken is not to be reintroduced into the EPR database, but applied for future cases.
- Concerns all EPR partners, of general interest.

8.1.6.3 Conciliation Body

- Composition – should be composed of representatives of the parties, picked from a "pool of experts" (small-scale conflicts) and perhaps additional representatives from groups of interests for large-scale conflicts.
- Decision-making powers – the objective is to create a consensus among the parties to solve large-scale conflicts; strong decision-making power for small-scale conflicts.

- Appeal against Decision – possible, if there is no appeal within "x" days, dispute is resolved, if there is an appeal within "x" days, the conflict will have to be resolved by a competent Regulatory Body or court/tribunal.
- Time Limit of 10 working days – only applicable to resolution of coding problems (small scale conflicts) with longer term for more complex issues (large scale conflicts)

Project statement: In the EPR procedure described in this Handbook a dispute resolution procedure is not included. Since most delay codes are validated at national level a dispute resolution scheme needs to be implemented nationally. It will be more practicable and efficient to deal with a dispute resolution procedure for international coding again once these national procedures are in place.

8.2 Specific legal questions on several issues

8.2.1 Storage of EPR Data

It was asked how long EPR data has to be stored.

A distinction has to be made between the need to access data if the EPR is applied without financial features (non-financial application) and the need to access data if payments are made under the EPR system (financial application):

- **Non-financial application of EPR (without payments to be made)**

It can be expected that those RUs that have a legal need to see delay data in order to judge the assess of possible claims by their customers (in connection with delays)are concerned by this issue.

From the legal point of view the situation here is as follows:

As to the CIM (International Rules for Freight) and CIV (International Rules for Passenger Services) which are applicable to international traffic, this can only happen one year after the delay incident. Thus there should be no need to store the data longer than 13 months (as they are stored now).

- **As to financial implications directly resulting from EPR**, it has to be differentiated again:

The EPR BI as such is not obliged to store the data for it is neither debtor nor creditor.

The IMs and RUs applying EPR are obliged according to their respective national law to store the data for up to ten years (e. g. Germany). This time limit starts after the end of validation or a possible dispute resolution. Thus the future users of EPR will need to store the data.

There are two possibilities from the LWG´s point of view to handle this:

- If this is technically possible the users of EPR e. g. could get copies and store the data on their own. It is not clear whether this is technically possible or commercially desirable.
- RNE offers the service to store the data on behalf of the implementing IMs and RUs. This could be dealt with in a contract, maybe in the future uniform contract.

As regards the content of the storage:

It only involves the calculation results, for they constitute the basis for billing and invoicing.

- There may be **national requirements** regarding the time at which the data has to be processed. These will also have to be dealt with in a contract.

8.2.2 Relationship between national PR and EPR

It had to be clarified whether it was legally possible to apply a network-wide national PR(performance regime) and - in addition - an EPR. This is possible if the basic principles are the same. Nevertheless this model does not seem to be very appropriate for customers.

Furthermore it was asked whether it was possible to apply the EPR only to some (specified by agreement) international trains. This is actually possible unless national law excludes this.

8.2.3 Requirements for an introduction of the EPR(contracts, network statement)

The EPR can be introduced by concluding a uniform contract (see 2.1 on legal pre-requisites).

8.2.4 Introduction of the EPR for passenger traffic

This refers to the idea of introducing an EPR for passenger traffic either on a bilateral or multilateral basis. The contract mentioned in 8.2.39 could be concluded for this purpose as well.

9. Conclusion and recommendation

Within the framework of the project the EPR tools and procedures were developed and implemented during the Pilot Application.

In general they both worked and were ready to be applied, while issues outside the EPR scope but influencing its working, remain to be dealt with in the future, in particular:

- Alignment of coding behaviour (especially usage of secondary delays)
- Alignment of rules for timetable modifications

The EPR could be used as a self-standing system to measure performance in train traffic and penalise poor performance / reward good performance – but added value is achieved by considering it as part of a quality improvement process.

The quality of data and common procedures are not yet sufficient to allow a financial application of the EPR. The number of excluded trains proves that a relevant number of train runs would not be considered in such a scheme, even though punctuality problems also exist with these trains.

Even without any financial consequences, the preparatory steps of the EPR process provide:

- **Improved data quality** – the exclusion of incorrect/incomplete train run information will avoid drawing the wrong conclusions
- **Reliability of delay code information** – especially for delays in border areas a rise in reliability can be expected by introducing an international validation procedure.
- **Measuring of effects of delays** – for the first time the calculation of suffered delays provides a method to measure the effects a delay has on other parties involved in the train run. This can prove very useful when priorities for improvement actions are discussed on international corridors.

Therefore, the project team recommends that the data collection (including data quality checks), validation of delay causes and reporting (i.e. 3.1of the EPR process) should be integrated into the existing quality improvement processes. This could be done on the RFCs, but also on bilateral or multilateral routes of major interest for the companies involved.

Such practical use will create/ increase the awareness of the consequences of delays and non- harmonised procedures on partner companies and customers. It will lead to

improvement actions by IMs and RUs even without the application of financial consequences.

At a later stage – after more experience has been gained from the practical application – the introduction of financial consequences can be reconsidered.

In parallel to the EPR's development, procedures for quality improvement were worked out within the framework of the RNE Corridors: i.e. Train Performance Management (TPM) tasks (which will be probably passed to the RFCs in the future).

In order to put in place what was proposed above (application of Steps 1-3) it is proposed to merge the EPR with TPM (**Train Performance Management**) in the way described below.

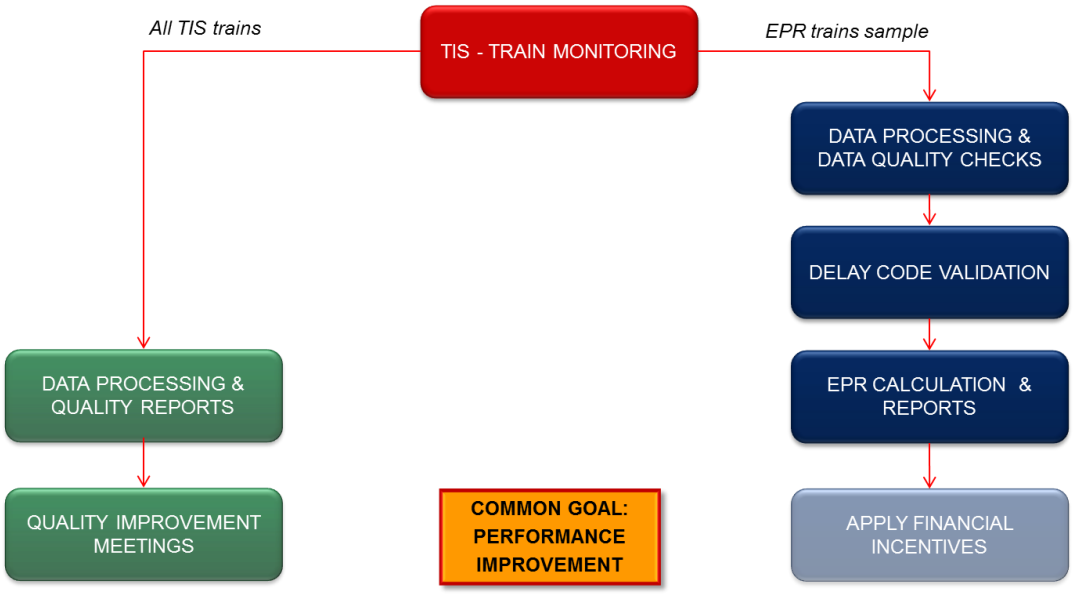
9.1 Relationship between EPR and TPM

During the development and testing phase of the EPR tools the number of considered trains was restricted to a small sample of EPR trains.

Data quality checks and delay code validation were done only for these trains.

In parallel performance management reports were developed on some of the RNE corridors as basis for quality improvement meetings on corridor level (TPM), without systematic data quality checks and validation of delay codes.

The **current situation** is described in this picture:



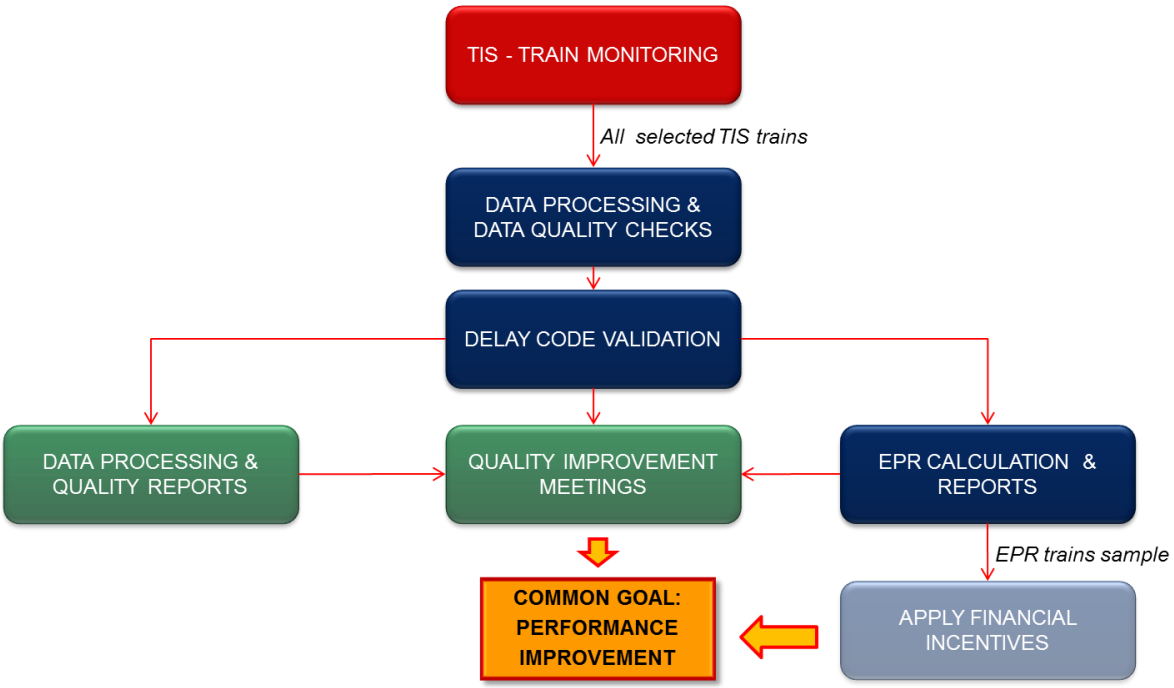
Picture 9 – EPR – TPM relationship as today

To reach the effects described above most efficiently, the procedures of EPR and RNE performance management should be integrated:

- Extend data quality checks and delay code validation to more/ all TIS trains

- Produce EPR calculation reports and quality reports from the same train sample
- Add data quality analyses to identify not-fitting national procedures
- Arrange improvement actions in quality improvement meetings.

The following picture shows the "**future scenario**" if such an approach is followed:



Picture 10 - EPR – TPM relationship in future scenario

9.2 Approval of the Handbook

The EPR Handbook is going to be sent out to all project participants for approval. Comments will be collected in a separate folder in Project Place (see 10. Referenced Documents).

10. Referenced Documents

Documents referenced throughout the Handbook are listed below.

Document title	Relevance for EPR (if necessary)
UIC leaflet 450-2	Defines the basic principles for coding of delays on which the EPR is built.
02 - EPR Validation tool - User guide	
03 -EPR Calculation tool - User guide	
04 - List of EPR contact partners	list of active EPR representatives
05 - Template for contact partners for future application	
06 - Check List for company participation of EPR	
07and 08 -Contract specimen	with or without financial application
09 -Hand-over points (HOP) file – last version available	Definition of segments and responsibilities for the actually chosen EPR points
10- Commercial results final report	
11 - Pilot Application final report	
12-Comments to the EPR Handbook	Provided by EPR participants during the approval phase (February 2013)

Annexes

1. Detailed information relating to Section 1 - Introduction

Short history of the project

The UIC European Performance Regime (EPR) project has its origins in the EU directive 2001/14, Article 11 which stipulates that a Performance Regime should be implemented throughout the network within each Member State. Whereas the EU directive applies to the traffic within a network, the UIC considered it opportune to develop a performance regime for international trains across networks so that the international trains would not be subject to several national PRs.

The EPR was initiated with the objective to design a PR that would be applied to international traffic, but may also be applied to national traffic, if so desired by a specific network. Subsequently the system features and attributes were defined:

- the EPR should focus on the delay minutes of international train runs along corridors monitored by the RNE IT-tool "Train Information System (TIS)"
- the EPR system should be fair, transparent and without any excessive administrative burden
- EPR is intended to be an incentive scheme to induce quality improvements and not a compensation system for damages caused by delays.

Between the years 2004-2008, four different proposals for the EPR *bonus*/*malus* calculations were presented and analysed, finally leading to the adoption of the so-called Reference Model in December 2008 by the UIC Regional Assembly for Europe.

The proposed calculation models were tested and the technical requirements for EPR implementation defined during two series of test-runs that were carried out jointly by the UIC and RNE: in 2007, 3 tests monitoring 1.587 freight trains and 1.185 passenger trains were carried out. In 2008, a second set of 7 tests including 974 freight trains and 820 passenger trains was conducted to consolidate the previous test results.

In 2008 a Memorandum of Understanding on the EPR development was signed by many UIC Members. The conceptual design of EPR was considered accomplished enough to start the preparations for implementation and consequently the EPR project became, at the beginning of 2009, a joint UIC / RNE project. In March 2009 UIC called for companies along the TIS corridors to volunteer to start the preparations for the EPR Pilot Application. The following companies volunteered to be part of the EPR Early Implementers Group and agreed to start the Pilot Application in May 2010:

- Austria : ÖBB + RCA
- Belgium : Infrabel
- France : RFF + SNCF

- Germany: DB Netz + DB Schenker
- Italy : RFI + Trenitalia
- Netherlands : Prorail, KeyRail
- Switzerland : SBB + BLS
- Luxembourg: CFL (from 2011)

The EPR Implementation Handbook (2009) represented the unique reference to be tested during the Pilot Application. The EPR project team (including Early Implementers and other UIC Members) worked within EPR working groups to define the commercial, operational, legal/contractual and IT components. These components have been worked out in close collaboration with RNE who is in charge of the concrete deployment of the EPR scheme. Considering the complexity of the to-be-taken decisions and choices and of the railway system itself, a practicable compromise was reached to create the European Performance Regime model and tools.

The IT tools required for the EPR process were developed by the supplier of the TIS-system, Steria. The delivery of the tools started in April 2011 with the EPR validation tool and was completed in July 2012 with the final version of the calculation tool. The implementation proved challenging: several special situations that only came to light in practice had to be taken care of in order to attribute the responsibilities for delays/ segments for calculations correctly.

The EPR components were tested during the Pilot Application. An evaluation of their practicability was done by the competent working groups.

2. Detailed information relating to Section 2 – Prerequisites

No additional information

3. Detailed information relating to Section 3 – General description of the EPR process

3.1 Reporting (see also 3.1.3 in Handbook)

As with any other quality-related activity, in the EPR the reporting phase is fundamental to ensure a correct interpretation of the outcomes of the application of the system.

Due to the complexity of the EPR system, different areas can be the object of reporting:

- Data quality
- Performance (for example: punctuality, share of delay causes and so on)
- Financial outcomes

The contents and structure of the reporting are different in the project phase and in the industrial application phase.

During the latter, the applicant bodies will have to decide on their own reporting process and documents` contents and structures. They will also have to coordinate the activities strictly connected with EPR (financial calculation) with the wider tasks regarding Train Performance Management.

In the project phase more attention has been dedicated to the analysis of data quality (with the aim of reaching and keeping the requested benchmarking levels), rather than to performance and financial results.

3.2 Reporting on operational aspects

The data quality analysis was carried out by the Operations Working Group (OWG), who created templates for reporting and used them on a regular basis. This reporting was made possible through the use of a reporting IT tool made available by RNE (Oracle Discoverer). The mentioned templates are described below: they are just an example of the possible reporting structure and content and a proposal by the EPR project team as well, but of course the future users of the EPR can choose their own, according to their specific needs.

The OWG has carried out two different levels of data quality analysis:

- High Level Reports (HL Report), with the aim of informing management (especially the EPR Advisory Group) about the ongoing activities and results
- Detailed report, providing an in-depth analysis of the reasons for bad data quality and deciding on the appropriate corrective actions.

Only the first type of report is illustrated here.

The basis of the data quality analysis is the comparison with the given level of minimum data quality decided at the beginning of the Pilot Application by the EPR Commercial WG:

- 80% of the not-cancelled trains[7] – both passenger and freight – are included
- 60% of the not-cancelled trains, both passenger and freight, are included on a Relation Group basis.

Also in consideration of the above-mentioned data quality targets, the content of the HL report is as follows:

- General part:
    - Data quality percentage (trains included/not included) *per* type of traffic
    - Data quality trend (6 months) *per* type of traffic and relation group
    - Share of undocumented minutes (total sample)
    - Share of undocumented minutes *per* IM
    - Number of undocumented minutes *per* IM and segment
    - Outcomes of the validation procedure for international delay codes, i.e. share of (in total and *per* partner):
        - Accepted delays
        - Disputed delays (not agreed)
        - Disputed delays (agreed)
        - Closed delays
        - Untreated delays
- Relation Groups part: data quality percentage (trains included/not included) *per* relation/direction

3.3 Reporting on commercial aspects

All the key figures produced by the calculation tool are also available through the reporting tool (see Section 10 "**EPR Calculation tool – User guide**" for more details)

Please note that the originally planned thresholds for the worst point to trigger EPR calculations (5´ for passenger, 30´ for freight trains) have not been implemented in the calculation tool in order to enhance the flexibility of the tool. Calculations are carried out for all train runs.

If thresholds should be applied, they will have to be implemented in the report definition on the reporting platform.

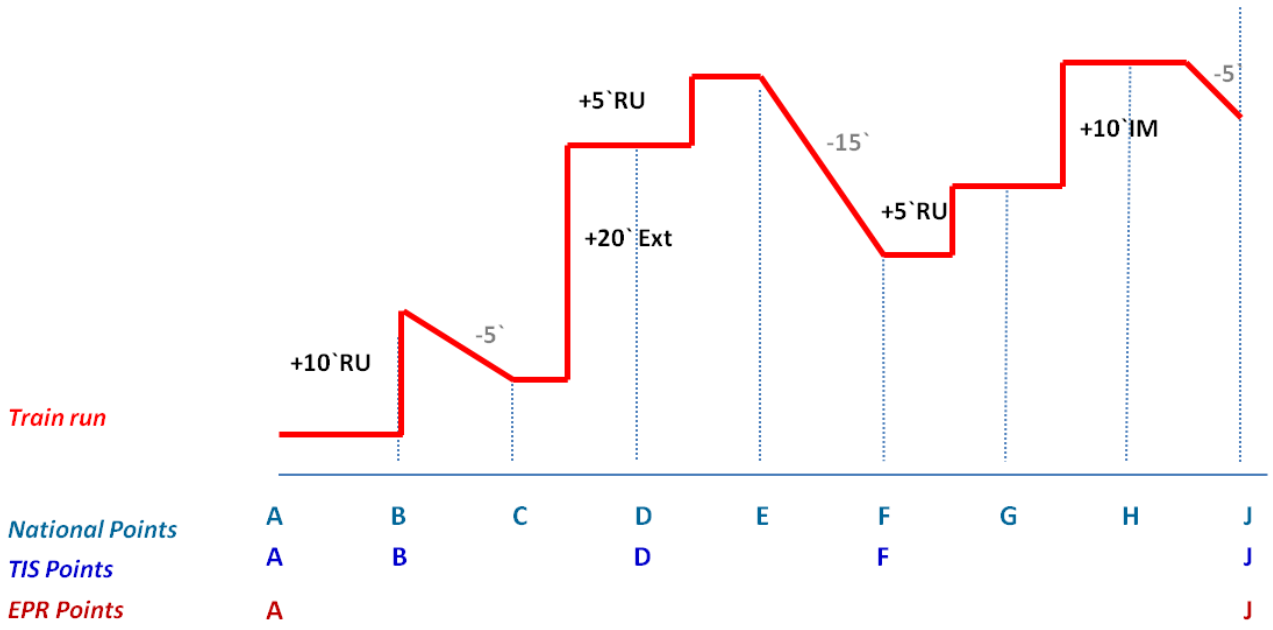
For actual results please refer to **"Pilot Application Final report" – see Section** 10**.**

[7] If a train is cancelled, it is not included in the validation phase. However, a cancellation is an operational/business problem, not a data quality problem

4. Detailed information relating to Section 4 – Train monitoring

4.1 EPR Points explanation

The following explanation describes, as far as national points and TIS points are concerned, the existing situation. Consider the following situation:



Picture 11

National Level: The national system registers the lateness and calculates the delays; the operators assign the delay codes to each deviation/delay8. The final result to be sent to TIS is described in the following table:

Points →	A	B	C	D	E	F	G	H	I
LATENESS (min)	0	10	5	25	30	15	20	30	25
DELAY (min)	0	10	0	20	5	0	5	10	0
CODE	none	10' to RU	none	20' to ext	5' to RU	none	5' to RU	10' to IM	none

Table 5

TIS Level: The national system sends the above information to TIS. TIS does not "know" points C, E, G and H therefore it attributes the information sent for each of these points to

8 Additional details regarding the different procedures followed by the national systems can be found in the OWG's questionnaire

the following "known" point (C · D, E · F and G and H · I), with the results shown in the following table:

Points →	A	B	C	D	E	F	G	H	I
LATENESS (min)	0	10	–	25	–	15	–	–	25
DELAY (min)	0	10	–	20	–	5	–	–	15
CODE	none	10' to RU	–	20' to ext	–	5' to RU	–	–	10' to IM + 5' to RU

Table 6

EPR Level: Now TIS contains all the available information in the national systems, therefore, even if only two points were chosen as EPR points, TIS would provide the following information:

Points →	A	B	C	D	E	F	G	I	H
LATENESS (min)	0	–	–	–	–	–	–	–	25
DELAY (min)	0	–	–	–	–	–	–	–	50
CODE	none	–	–	–	–	–	–	–	10' to IM + 20' to RU + 20' to ext

Table 7

Conclusions

The above explanation shows that as far as the information contained in the national systems is concerned, their completeness does not depend on the number of EPR points, because regardless of the number of points, all data sent by the national systems are stored in TIS and available for EPR purposes.

The choice of the EPR points depends on the commercial importance given to certain points (ex. stations or terminals) where it is important to measure the punctuality of the trains.

In addition, while choosing the EPR points it has to be taken into account that information such as recovered time and undocumented delays is produced by the EPR calculation tool (and not sent by the national systems) on the basis of the lateness registered at the EPR points, therefore undocumented delays that happen and are completely recovered between two EPR points are not calculated. Normally, this happens in the case of small delays (1-2 minutes). Therefore, it is advisable to choose more than one EPR point per section, their number varying according to the length of the sections itself (longer sections=more EPR points).

4.2 Master station concept (see also 4.3.3 of the Handbook)

A Master Station is a TIS point with an underlying sub-network of stations (sub-stations) at which the Infrastructure Manager (IM) is providing information to TIS. As soon as the sub-network has been defined and the points have been linked to the Master Station, the previous TIS points are no longer regarded as TIS points, because all information is now assigned to the Master Station.

This concept is used to put together timetables and train run information in situations where the information is not sent according to defined rules requiring that for every timetable (point) a corresponding running advice (point info) should be sent.

The information sent to the Master Station's **sub-stations** is handled by the application with the following objective: to provide at least one final, complete information set for the Master Station based on information coming from the sub-stations.

Example of Master Station configuration: GENT ZEEHAVEN

	Timetable	Running Advice Departure	Running Advice Arrival
Master Station			
GENT ZEEHAVEN	X	X	X
Sub-Stations			
GENT-NORD	X		
SIFFERDOK-RO		X	
GENT-RODENHUIZE			X

Table 8

4.3 Shortcomings and solutions in data collection

4.3.1 National procedures influencing data quality

This section describes the shortcomings that have been detected due to different timetabling and operational procedures and the solutions that are applied in TIS/ EPR.

4.3.1.1 Use of different train numbers

In TIS the messages 2090 sent by all involved IMs are linked together at the defined handover points. A precondition to allow TIS to do so is that the timetables are sent with the same train number. Since IMs in some cases change the train number on their domestic networks for operational reasons TIS provides for two types of train numbers:

- Train reference number: the originally planned, internationally-agreed train number. It must be kept through the whole train run. IMs that change the train number on their network should still send the original reference train number.
- Train service number: number used on the network of an IM for operational reasons.

With the exception of RFI this concept is not yet used widely by the IMs because it means updating their domestic systems.

A short-term solution for cases where the train number always switches between the same numbers, which are exclusively used for that train run (e.g. mandatory use of odd/even numbers for certain lines), has been implemented. In a table in the TIS system several train numbers can be defined which should be linked to one specific train reference number. If timetables arrive containing one of the defined numbers, the reference number data field is filled with the specified reference number.

This solution only works if the used train numbers are known in advance and are exclusively used for one specific international train run.

In the more frequent cases, i.e.*ad hoc* renumbering, the timetables will not be linked correctly. The train runs will appear as incomplete and be excluded by the exclusion rule "Train run not complete".

A long-term solution may be provided with the implementation of the "Train/ Transport-ID"[9]. In any case the reference train number concept only works if the timetable linked to the reference number is not changed unilaterally. In cases where number and/or timetable are changed without adapting them for the rest of the journey, gaps appear at the handover points between IMs.

4.3.1.2 Use of different timetables

The "normal" case, where a different timetable is agreed and re-planned by all partners for the whole journey, leads to sending new, consistent timetables, to TIS and will not

[9] See http://www.rne.eu/train-transport-id.html

constitute any problems. This section deals with changes to the timetable which are not agreed and affect the whole journey of the train, but only for part of it (returning to the original timetable afterwards).

From a structural point of view 3 situations can be distinguished:

- **different timetable – same train number**

This situation can arise – depending on national rules – during planning (maintenance works) as well as during operations (rerouting in case of service disruptions).

Possible consequences: since TIS considers during the linking of timetables not only the reference train number but also a timeframe for the difference between timetable times at handover points (defined as a parameter) it may happen that the timetables are not recognised as belonging together and are not linked – at least parts of the train run are not stored in TIS and therefore cannot be considered in the EPR.

If the difference is within the timeframe the timetables are linked but gaps appear at the handover points:

- If the re-planned arrival time is earlier than the original one additional spare time pops up – it influences the recovered time, but has no negative effect.
- If the re-planned time is later than the original one, but before the departure time a lack of coded delay causes (undocumented minutes) appears that cannot be detected in the domestic systems. Depending on the border area situation it may concern the IM who re-planned the timetable or the following one.
- If the planned arrival time is later than the planned departure time the train run will be excluded with the exclusion rule "CTT at border".

Treatment in the EPR tool:

Cases 1 and 2 do not lead to exclusion and are considered in the EPR. So they provide an advantage for the departing RU (1) anda disadvantage for one of the IMs (2). Case 3 leads to exclusion.

The long-term goal should be to harmonize the timetabling procedure for international train runs so that it is not allowed to change an international timetable unilaterally.

- **Different timetable – different train number – same load**

Cancellation due to delays or service interruptions and running on a later path; consequence of load shifting for the original load (*ad hoc* traffic).

These cases occur mostly according to a national rule, have a practical background (GSM-R rules, restricted capacity) and are linked to a heavy delay of the original train.

Treatment in the EPR tool:

Such trains are excluded – either with exclusion rule "Cancelled" – if a message 2003 is received – or "Missing running advice" – if the train number is not used on the remaining part of the line, but not cancelled either.

If the remaining part of the line and the train number are used for a different train: see a)

- **No timetable for parts of the train run**

Rerouting without calculating a path for the rerouting section.

This happens more often than originally expected, especially within larger networks with several alternative routes.

Treatment in the EPR tool:

For missing parts of the path, a function that deduces the necessary information has been implemented in the TIS system. But if data for EPR points is missing no calculations are possible and the train runs have to be excluded from the EPR calculations.

4.3.1.3 Change of load (load shifting)

Due to a heavy lateness of the original train run and the availability of a different load of the same RU, from an intermediate point on, the train continues with a completely different set of freight and wagons. In TIS the train run seems inconsistent because the actual arrival time at the intermediate point is later than the actual departure time. The train runs are excluded under the exclusion rule "Running inconsistent".

In case of long stopping times it may happen that some cases of load shifting are not detected by the exclusion rules because one train arrives before the other has departed. In that case an unusually high recovered time pops up at the point where the load changes.

4.3.1.4 Problems caused by wrong delivery of timestamps for Delta-T values

In some cases the delivery of timestamps is based on (within national systems) calculated values. If the calculations at the beginning and at the end of a segment lead to a departure time, that is earlier than the arrival time, train runs will be excluded. The EPR tool considers this as a failure in the domestic system.

4.3.1.5 Provision of code 2003 when a train is partly cancelled

Due to operational rules within the IMs areas or to technical feature in TIS or in domestic systems, not all cancellation cases can be correctly sent by the IM or processed by TIS.

4.3.1.6 Wrong actual time and status in delay code message

The IM's have to deliver the same actual time for delays as for the points of occurrence of these delays. If this is not the case, the delay might be attributed to the wrong segment and thus the wrong company will be held responsible.

An actual time for a delay earlier than the departure at origin time or later than the final destination time may lead to unjustified recovery time.

4.4 Overview of applied measuring methods

4.4.1 Rounding of lateness

The rounding methods applied by the Early Implementers are as follows:

- Method 1: One minute delivered equals a range from 30'' to 1' 29'' (rounding)
- Method 2: One minute delivered equals a range from 1'00'' to 1' 59'' (cutting of seconds)

Method 1 is applied in Austria, Germany, Italy and Switzerland, method 2 in Luxemburg, Belgium, France and the Netherlands.

Conclusion: Method 2 provides a 30'' bonus when delays at the EPR points are measured. The maximum difference is 30 seconds for each EPR point and is not considered relevant. It is left to the IM which rule to apply.

4.4.2 Measuring of delays

The two methods used by IMs to measure delays are:

- Method 1: The delta-t values between exactly 2 national points are compared. If the result exceeds a certain threshold – described further down – a delay message is created for putting in a delay code. If a single delay does not exceed the threshold delay minutes several times the threshold can remain undocumented during a train run.
- Method 2: The delta-t values are compared during the whole run of the train. Also here – if the result exceeds a certain threshold – described further down – a delay message is created for putting in a delay code. Only delay minutes equal to the threshold can remain undocumented.

4.4.3 Rounding of delays

The rules applied by the Early Implementers are as follows:

- Method 1: One minute delivered equals a range from 30'' to 1' 29'' (rounding)
- Method 2: One minute delivered equals a range from 1'00'' to 1' 59'' (cutting of seconds)

4.4.4 Thresholds for delays

A variety of different thresholds is used. It is important to consider the thresholds in combination with the method for measuring delays. The following table illustrates the different methods and thresholds used by the participants of the pilot application.

IM	Measuring method	Threshold		Rounding X =? (Range of sec.)
		Passenger	Freight	
Austria	1	≥45''	≥59''	X-1' 30'' – X' 29''
Belgium	1	≥120''	≥120''	X' 00'' – X' 59''
France	2	≥5'	≥5'	X' 00'' – X' 59''
Germany	1	≥90''	≥90''	X-1', 30'' – X', 29''
Italy	1	≥1'	≥1'	X-1' 31'' – X' 30''
Netherlands	1	≥3'	≥3'	X', 00'' – X', 59''
Switzerland	1	≥3'	≥3'	X-1' 30'' – X' 29''
Luxemburg	1	≥1'	≥1'	Manual input

Table 9 Comparison of applied methods for delays

4.4.5 Conclusion: Relevance for EPR

Depending on how high the chosen threshold is, with Method 1 some delays will not be detected and therefore not coded. The higher the threshold the more minutes will be missing. This leads to less recovered time between 2 EPR points or – if the additional delay between 2 EPR points is higher than the sum of coded delays – to undocumented minutes, which are attributed to the IM.

IMs applying Method 2 may only lose the set threshold once.

As regards the rounding rules users of Method 2 deliver slightly fewer delay minutes than the others. The consequences may be less recovered time and slightly more undocumented minutes.

4.5 Coding of delays

4.5.1 Usage of delay codes according to UIC Leaflet 450.2

All IMs send the delay codes according to UIC Leaflet 450.2, mainly using a translation table. Problems still exist: translation problems or completeness problems (not all codes provided for in the UIC Leaflet are used).

4.5.2 Special aspects at border/handover points

If an IM codes "take over delays" at borders (delays of incoming trains) such information must not be sent to the TIS system, because it was already coded before. Otherwise it would be counted twice in the EPR calculations.

The international codes (40, 41, 70, 71, 84) are provided for cases where a delay occurs in one area of responsibility but was caused by an event occurring in a different area (e.g. stop order due to signal breakdown in the area of the next IM (40), missing or wrong train documents at handover (71) or line closure due to a landslide in the area of the next IM (84).

Note also the attribution rules described above!

If a border station is operated by the IM handing over the train ("old IM") a delay caused by the arriving RU should be coded with a national RU code (5x, 6x, 93-94) and a delay caused by the departing RU with 70.

If a border station is operated by the IM taking over the train ("new IM") a delay caused by the arriving RU should be coded with 71 and a delay caused by the departing RU with a national RU code (5x, 6x, 93-94).

If these rules are not kept, the delays will be assigned to the wrong company.

Information:

Because for calculation purposes the RU-responsibility for a station segment is always attributed to the departing RU, a comparison is made between the company responsible for the delay and the one responsible for the segment. If they are the same the delay is added to the caused delays of the segment-RU and subtracted from the delays caused by the next RU.

5. Detailed information relating to Section 5 – Validation process

5.1 Overview on national validation periods

Country	Duration of national validation
Austria	3 working days
Belgium	3 working days(at least until 21-2012) Probable change from 12-2012: until the end of the following month
France	10 days – EPR validation tool is used for all delays (except for complex cases which can be treated several months later, especially cases which need investigation)
Germany	7 working days
Italy	8 days (except complex-disputed cases, especially if involving the national Agency for railway safety)
Netherlands	Official: within 28 days. For EPR trains : 10 days
Switzerland	Until the 15th day of the following month (i.e up to 46 days)
Luxemburg	5 working days after attribution by allocation body

Table 10

5.2 Proposal for dispute resolution

The proposal described in this section was developed by the Operation working group of the EPR but it was not advised to implement it (see 5.3.3).

If a delay has no clear and accepted cause one of the following situations can occur:

- The delay is coded with 95 (further investigation needed): this case cannot be the subject of an international dispute resolution because it has to be clarified by national validation or dispute resolution procedures
- The delay code is marked as “closed” when partners come to the conclusion that no agreement can be found. Not all of these cases can be analysed in detail, but they can serve as input for general discussions about harmonisation of coding, e.g. path losses due to late arrival at the border (takeover delays from previous IM)
- The delay code is disputed by one partner but no agreement is found in due time. In these cases the delay code is marked as “disputed-not agreed” at the end of validation

In the latter cases, i.e. when EPR partners cannot agree on a code, it could be worthwhile to try and resolve the dispute before the validation expires. If an agreement is found during this additional process, these cases are automatically considered in the calculation.

The most accepted approach for building a team to carry out the dispute resolution is that operational experts with special knowledge about coding matters are involved. In order to ensure the neutrality of the judgement, the persons dealing with a specific case shall not come from the IMs/RUs involved in the concerned train run(s). The IMs and RUs participating in the EPR should officially commit themselves to accept and put into practice the decision taken by these operational experts.

The group formed by such operational experts shall carry out periodical discussions about general questions connected with interpreting the coding. The group will check if the process of validation works in general and, in particular, if all partners check the disputed cases attributed to them in order to restrict the number of cases submitted to dispute resolution.

Dispute resolution could be organised by the performance coordinator and carried out by the 2nd level coding experts (CDV).

An alternative to the approach proposed above is to entrust the dispute resolution process to a neutral body.

Advantages:

- Neutral persons do not have a preconceived opinion (but may still be somewhat influenced by the national way to treat things)

Disadvantages:

- Neutral persons do not know the special circumstances, local conditions, processes and the involved parties, so they need certain additional information – the dispute log is not enough
- If a company leaves a lot of cases with status "D" open (not doing the validation regularly) this should not increase the workload of others.
- It is difficult to identify an appropriate neutral body having both the know-how and the authority to take decisions and make them operational. In addition, the use of such a neutral body for dispute resolutions would imply further administrative and financial burdens

6. Detailed information relating to Section 6 – Calculation process

6.1 Detailed explanation of the mathematical formula in the EPR model

6.1.1 Preamble

As described in Section 6.1 the EPR calculations are based on the requirement that the financial outcome for each IM should not change according to the RU configuration. The aim of this model is to calculate a balance for each actor on each train run. This balance is the difference between the delays caused by one actor (i.e.: caused delay) and the delays suffered or recovered by this same actor. If the balance is a positive figure, the actor needs to pay *malus* minutes and if the balance is a negative figure, the actor receives *bonus* minutes.

The following paragraphs will explain the EPR model for different RU configurations, which have been named "classical cooperation –", "single RU –" and "adapted cooperation" situation The underlying EPR rules and principles remain unchanged and only minor adaptations are needed to fit the EPR calculations to each situation.

The mathematical formula is based on two mechanisms: the indirect payment between all parties, the direct payment between RUs in case of several RUs falling under the responsibility of the same IM.

6.1.2 Different RU situations

The classical cooperation situation refers to circumstances where the RU-RU handover points coincide with the IM-IM borders. The following picture illustrates this situation.

Picture 12

The *single RU situation* refers to circumstances where a single RU is running in several IM areas / countries. The following picture illustrates this situation.

Picture 13

The *adapted cooperation situation* refers to circumstances where several RUs run within the same IM area / country and thus where the RU-RU handover points do not coincide with the IM-IM borders. The following picture illustrates this situation.

Picture 14

6.1.3 Basic formula for calculation

The basis for calculations (see 6.1.4) and the calculation principle (see 6.1.1) have already been described in the main body of the Handbook. Here the mathematical formula for the calculations is explained.

The formula takes into account the following principles:

- Calculation is made for each train run
- All delays are taken into account for the train run
- Primary and secondary delays are attributed to RU and IM
- Recovered time between stations is shared between RU and IM (50%/50%)
- Recovered time at stations is attributed entirely to the RU
- Recovered time at EPR points is attributed to the departing RU, in case of RU-RU hand-over.
- Undocumented minutes are attributed to IM
- External delays are suffered minutes
- Balance is expressed in minutes:
  - A positive figure stands for a *malus* payment
  - A negative value stands for a *bonus* receivable
- For each train run, the sum of *bonus* and *malus* balances is zero.

The formula is expressed as follows:

$$\text{Balance}_i = A * \frac{D_i^{caused}}{\sum_{i=1}^{2n} D_i^{caused}} - A * \frac{D_i^{suffered} + \frac{REC_i}{2} + \alpha * RECS_i}{\sum_{i=1}^{2n} (D_i^{suffered} + \frac{REC_i}{2} + \alpha * RECS_i)}$$

Calculation 1

Explanation of formula elements:

Balance_i = « *bonus* » or « *malus* » for i^{th} actor upon 2n (nIMs +nRUs) for one train run

$_i$ = represents the i^{th} actor upon 2n (nIMs +nRUs)

A = lateness at worst point – external delays

D_i^{caused} = delay caused by i^{th} actor upon 2n (nIMs +nRUs)

$D_i^{suffered}$ = delay suffered by i^{th} actor upon 2n (nIMs +nRUs)

REC_i = recoveries between stations (attributed 50% to IM and 50% to RU)

$RECS_i$ = recoveries at stations (attributed at 100% to RU)

α = 0 for IM

α = 1 for RU

This basic formula allows calculating the balance for a party, expressed in calculation units. This is the "indirect payment" between all parties.

The same mathematical formula deals with the different situations (open access, single RU and adapted cooperation) in the same way. The calculation is performed at section level (IM responsibility). In order to treat all RU situations uniformly, several RUs running on one IM section are considered as a single RU. An additional mechanism (called "direct payment" between RUs) in the formula shares the receivables and payments between these RUs according to the travel time.

6.1.4 "Direct payment" between RUs

The EPR calculations are based on the requirement that the financial outcome for each IM should not change according to the RU configuration, in other words according to whether there is one or several RUs and where the RU-RU handover points are located. To fulfil this prerequisite, the RU handover points have to be modified "artificially" to correspond to the IM-IM borders. In this way the amount of suffered delays in the previous country will not change between different RUs according to the number and location of RU-RU handover points.

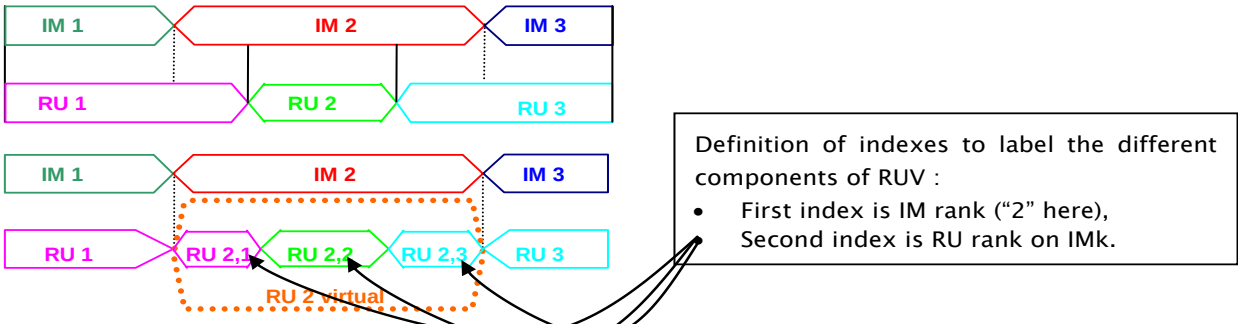
There are 3 reasons for this:

- The delay incurred in the previous country at the IMs' border is allocated entirely to the first RU running on one IM's area even if the following RU also suffers from this delay. Consequently the first RU has to pay part of the suffered minutes to the following RU(s) within the same IM area.
- Furthermore, this "initial" delay at IM-IM border may increase (due to additional delays) or decrease (thanks to recovered time) during the train run and consequently the amount of delay suffered by the following RU at the RU-RU handover point may change.
- Finally the delays occurring in the same IM area are not suffered anymore by one RU, but by several RUs which increases the amount of suffered minutes. This growth of suffered minutes needs to be "downgraded" so that the total of suffered delays remains the same in order to guarantee the same financial outcome to the IMs.

To make these adjustments between the RUs, the first RU has to transfer part of its suffered minutes to the next RU which has to transfer a part of its suffered minutes to the following RU etc., within the same IM area. However, this transfer between two RUs is needed only if there is a delay at their common RU-RU handover point, inside of the IM area.

6.1.4.1 Virtual RU principle (RUV)

For the adapted cooperation situation, an artificial RU, called virtual RU, is built under the IM's responsibility. The different RUs inside the virtual RU are considered « cooperative ». The virtual RU is labelled RUV in the rest of the text.



Picture 15

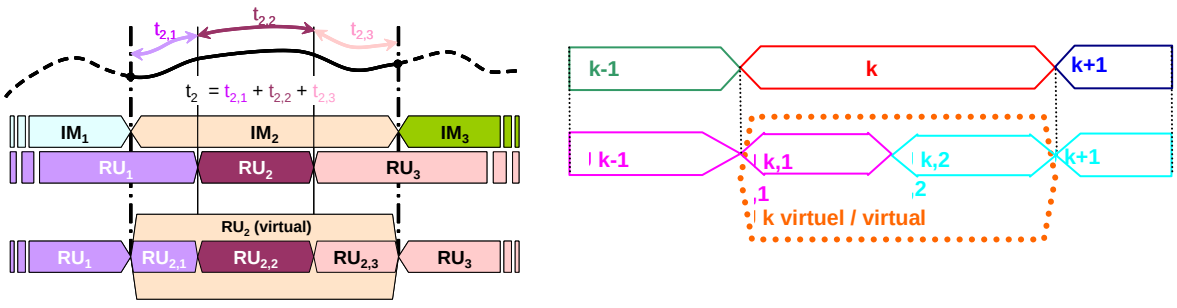
The calculation basis for RUs inside RUV is the basic formula. But the calculation is adjusted to take into account the different partners of the virtual RU and their contribution to the train run. This ensures a fair treatment of the members of RUV.

6.1.4.2 Split between RUs of RUV – travelling time

The travelling time is used to split the payments and receivables between RUs inside the virtual RU.

The travelling time is calculated on the basis of the planned times in the CTT.

The following picture shows the travelling time used inside the virtual RU.



Picture 16

Note: $B = \sum_{i=1}^{2n} (D_i^{suffered} + \frac{REC_i}{2} + \alpha * RECS_i)$

6.1.4.3 Mathematical Formulation (example with two "real" RUs inside the "virtual RU")

« indirect payment » / « paiement indirect »

« direct payment » / « paiement direct » between members of RUV

$$\text{Balance of } RU_{k,1} = \frac{A}{\sum_{i=1}^{2n} D_i^{Caused}} D_{k,1}^{Caused} - \frac{A}{B} \times \left\{ \left[D_{k,1}^{Suffered}\right]_{\substack{at\ entrance \\ on\ IM_k}} + \left[D_{k,1}^{Suffered}\right]_{\substack{after\ entrance\ on\ IM_k \\ because\ of\ IM_k \\ and\ external\ delays}} + \frac{REC_{k,1}}{2} + RECS_{k,1} \right\} + \frac{A}{B}\left(1 - \frac{t_{k,1}}{t_{k,1}+t_{k,2}}\right)\left[\left[D_{k,1}^{Suffered}\right]_{\substack{at\ entrance \\ on\ IM_k}} + \left[D_{k,1}^{Suffered}\right]_{\substack{after\ entrance\ on\ IM_k \\ because\ of\ IM_k \\ and\ external\ delays}} + \left[D_{k,1}^{Caused}\right]_{\substack{because \\ of\ RU_{k,1}}} - REC_{k,1} - RECS_{k,1}\right]$$

Malus paid by RU k,1 indirectly to other parties	Bonus received by RU k,1 from other parties	Bonus received by RU k,1 from other parties	Bonus received by RU k,1 from other parties	Travelling time of the second RU inside the virtual RU	Malus paid by RU k,1 directly to RU k,2	Malus paid by RU k,1 directly to RU k,2	Malus paid by RU k,1 directly to RU k,2
Contribution of RUk,1 in the total delay of the train.	Delay suffered by RU k,1 created by previous actors.	Delay suffered by RU k,1 created on IMk	Time recovered by RU k,1		RU k,2 receives from RU k,1 a part of the suffered delay at entrance on IMk. This part paid from RUk,1 to RUk,2 is proportional to **the travelling time of each RUk,j** (theoretical time when RUk,j operate the train).	RU k,2 receives from RU k,1 a part of the suffered time of RUk,1 on IMk. This part from RU k,1 to RU k,2 is linked to **the travelling time when RUk,2 operates the train** (tk,2)	RU k,2 receives a part of the delay caused by RU k,1. - This delay is lowered by time recovered (REC et RECS) by RU k,1. Thus RU k,1 doesn't lose a part of its own bonus. - This given part from RU k,1 to RU k,2 is proportional to **the travelling time when Ruk,2 (tk,2) operates the train** and also linked to the remaining actors. These actors receive money from RUk,1 through their indirect part of their balance. In order to receive from RU k,1 the same part as the others parties (to be fair to RUk,2 as it doesn't receive from RUk,1 through its indirect part of its balance), this member has to be divided by A/B like others suffered delays.
RU k,1 pays to the others parties but indirectly for delays caused by itself. RU k,2 is not among these parties as it is part of RUV.	RU k,1 receives all the money for the delay of the train at entrance on IMk (indirect payment from the others actors). It forwards a part of it to the others members of RUV in some case (see below).	RU k,1 receives all the money of these delays as suffered. It forwards a part of it to the others members of RUV.					

In the formula, each member :

- preceded by « + » : it's a « payment » (delay created by actor),
- preceded by « - » : it's a « receivable » (delay suffered or recovered by actor)

6.1.4.4 How the formula is working in case of two RUs inside the virtual RU

Calculation 3

$$\text{Balance of RU}_{k,1} = \frac{A}{\sum_{i=1}^{2n} D_i^{\text{Caused}}} D_{k,1}^{\text{Caused}} - \frac{A}{B} \times \left\{ \left[D_{k,1}^{\text{Suffered}} \right]_{\substack{\text{at entrance} \\ \text{on IM}_k}} + \left[D_{k,1}^{\text{Suffered}} \right]_{\substack{\text{after entrance} \\ \text{on IM}_k \\ \text{because of IM}_k \\ \text{and external delays}}} + \frac{\text{REC}_{k,1}}{2} + \text{RECS}_{k,1} \right\} + \frac{A}{B} \left(1 - \frac{t_{k,1}}{t_{k,1} + t_{k,2}} \right) \left[\left[D_{k,1}^{\text{Suffered}} \right]_{\substack{\text{at entrance} \\ \text{on IM}_k}} + \left[D_{k,1}^{\text{Suffered}} \right]_{\substack{\text{after entrance} \\ \text{on IM}_k \\ \text{because of IM}_k \\ \text{and external delays}}} + \left[D_{k,1}^{\text{Caused}} \right]_{\substack{\text{because} \\ \text{of RU}_{k,1}}} - \text{REC}_{k,1} - \text{RECS}_{k,1} \right]$$

Basic formula for cooperation train « indirect payment » to the system

Exchange of money between RU members of virtual RU « indirect payment »

Calculation 4

$$\text{Balance of RU}_{k,2} = \frac{A}{\sum_{i=1}^{2n} D_i^{\text{Caused}}} D_{k,2}^{\text{Caused}} - \frac{A}{B} \times \left\{ \left[D_{k,2}^{\text{Suffered}} \right]_{\substack{\text{after entrance} \\ \text{on } IM_k \\ \text{because of } IM_k \\ \text{and external delays}}} + \frac{REC_{k,2}}{2} + RECS_{k,2} \right\}$$

-

opposite result of the yellow part for RU k,1

The yellow part of the formula is a direct payment from RUk,1 to RUk,2. It depends on the quality of production by each RUv partner. This part is created under the condition below ($\Omega_{k,1}$). Otherwise, the yellow part is not calculated.

In order to be fair to the other party, the sum of the direct exchange between RUk,1 and RUk,2 equals zero.

Calculation 5

$$\Omega_{k,1} = \left[D_{k,1}^{\text{Suffered}}\right]_{\substack{\text{at entrance}\\ \text{on } IM_k}} + \left[D_{k,1}^{\text{Suffered}}\right]_{\substack{\text{after entrance}\\ \text{on } IM_k\\ \text{becabecause of } IM_k\\ \text{and external delays}}} + \left[D_{k,1}^{\text{Caused}}\right]_{\substack{\text{because}\\ \text{of } RU_{k,1}}} - REC_{k,1} - RECS_{k,1}$$

If $\Omega_{k,1} \leq 0$ then the yellow part of the formula called $\Delta_{k,1}$ =0

$\text{if } \Omega_{k,1} > 0, \text{then } \Delta_{k,1} \neq 0$ If the yellow part of the formula is negative, it is as if RUk,2 pays money to RUk,1.

So, this part of the formula must be positive to be taken into account. This is expressed by the mathematical condition $\Omega_{k,1}$.

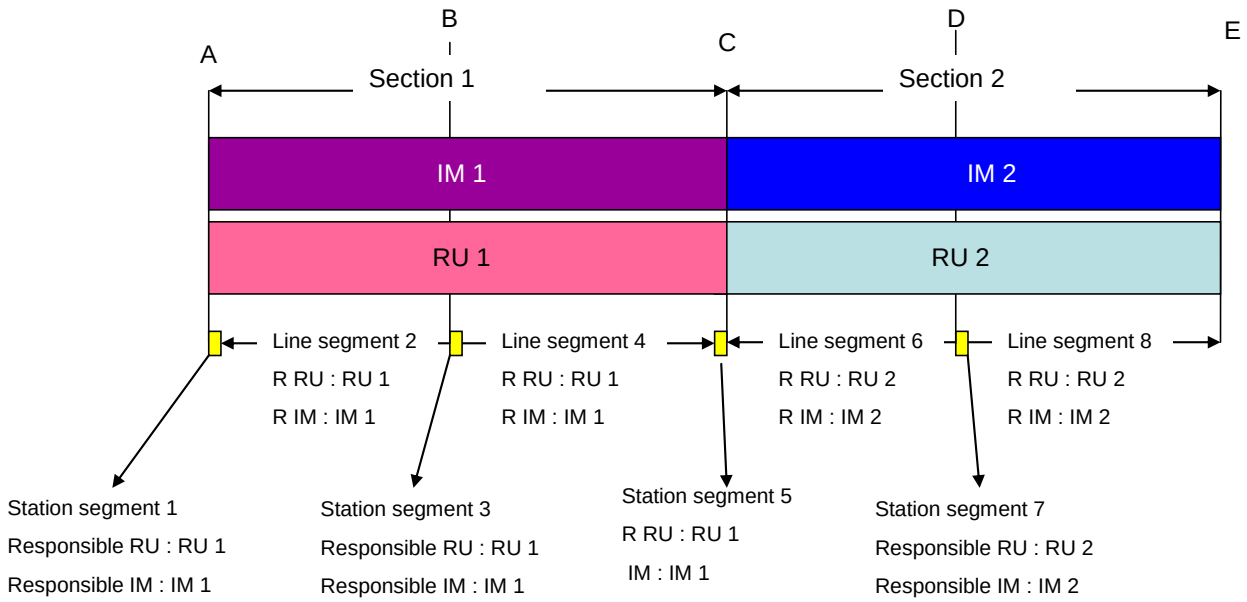
6.1.5 Examples of EPR calculation

The following 3 sub-sections give examples of the 3 different RU configurations used within the EPR model. The same mathematical formula (see Annex 6.1.4 on the formula) deals with the different situations without any changes.

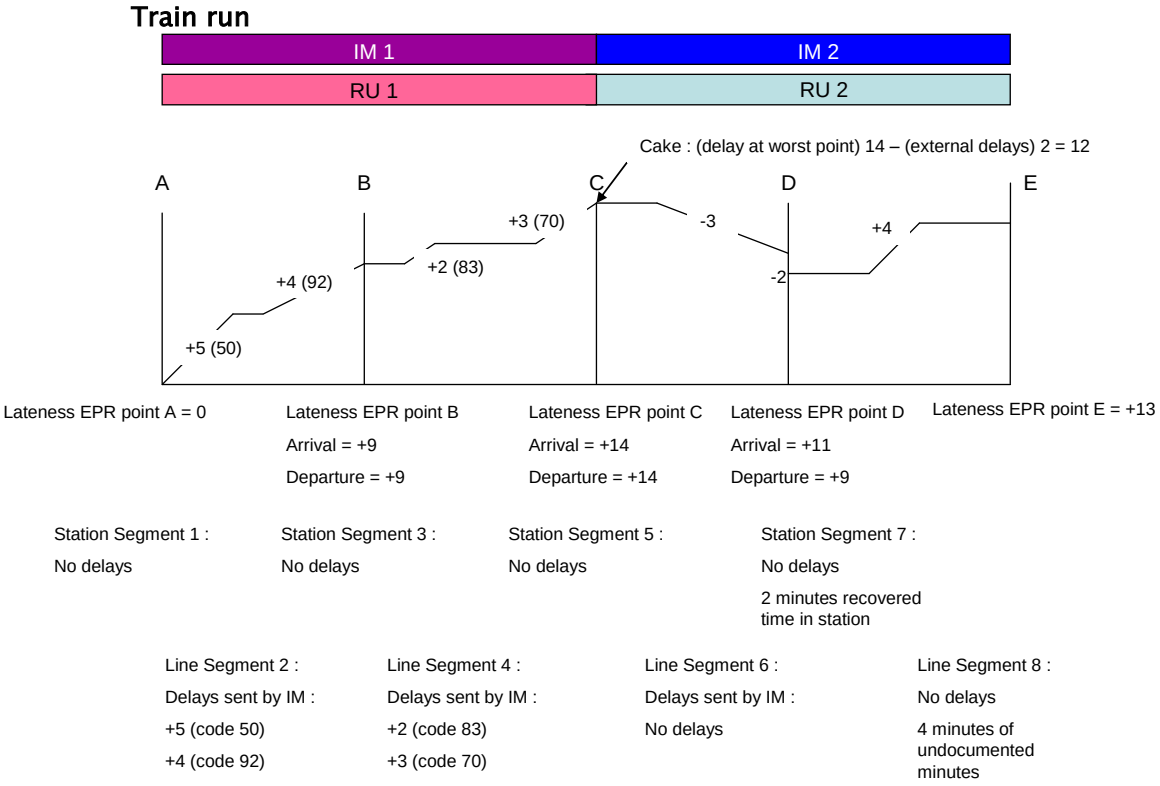
The same train run will be used for the different cases shown below.

6.1.5.1 Example of classical cooperation

The classical cooperation situation refers to circumstances where the RU-RU handover points coincide with the IM-IM borders. The following picture illustrates this situation.



Picture 17



Picture 18

Allocation of caused, suffered and recovered time

	Caused delays (payments)	Suffered delays (receivables)
IM1	• 4 (92)	• 5 (50) • 3 (70) • 2 (83)
IM2	• 4 (undocumented minutes)	• 3/2 (recovered time in line) • 14 (delay at handover point)
RU1	• 5 (50)	• 4 (92) • 2 (83) • 3 (70)
RU2	• 3 (70)	• 4 (undocumented) • 3/2 (recovered time in line) • 2 (recovered time in station) • 14 (delay at handover point)
TOTAL	16	56

Table 11

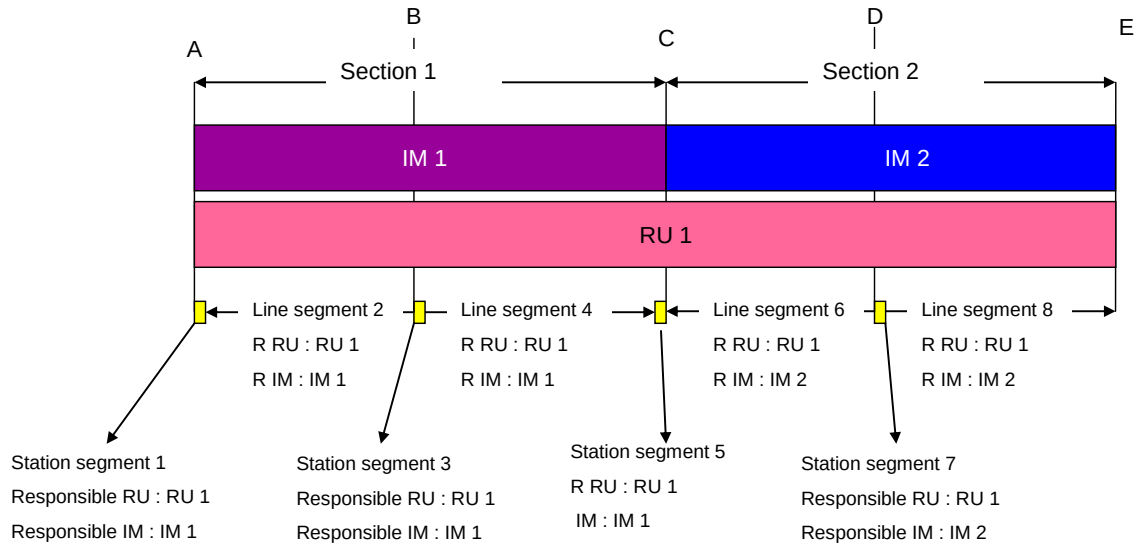
IMs and RUs balances

	Caused delays (payments)	Suffered delays (receivables)	Balance
IM1	$12*\frac{4}{16} = 3$	$12*\frac{(5+3+2)}{56} = 2{,}14$	0,86
IM2	$12*\frac{4}{16} = 3$	$12*\frac{(\frac{3}{2}+14)}{56} = 3{,}32$	-0,32
RU1	$12*\frac{5}{16} = 3{,}75$	$12*\frac{(4+2+3)}{56} = 1{,}93$	1,82
RU2	$12*\frac{3}{16} = 2{,}25$	$12*\frac{(4+\frac{3}{2}+2+14)}{56} = 4{,}61$	-2,36
TOTAL			0

Table 12

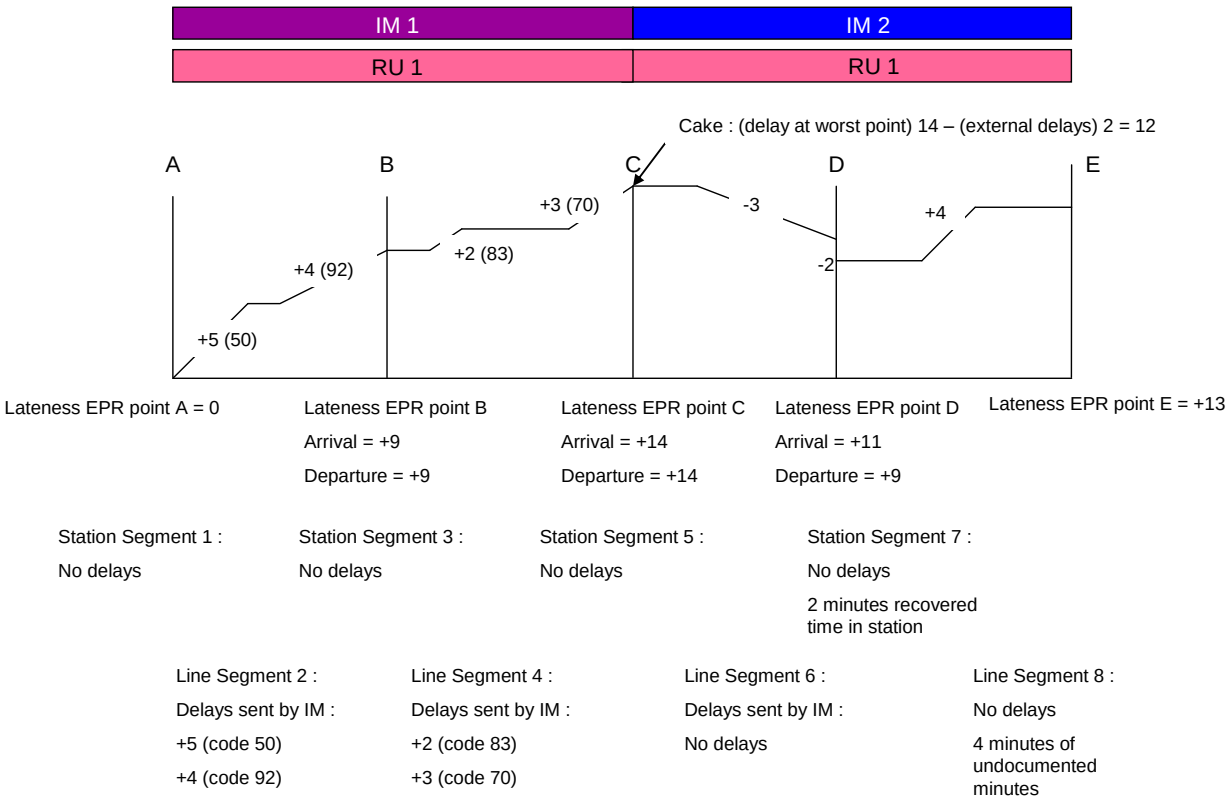
6.1.5.2 Example of single RU situation

Single RU situation refers to circumstances where a single RU is running in several IM areas / countries.



Picture 19

Train run



Picture 20

6.1.5.3 Allocation of caused, suffered and recovered time

The allocation of caused, suffered and recovered delays is done in the same way as in the classical cooperation situation. The single RU receives caused and suffered minutes as if it was the national RU in each country. The net result of the unique RU is the aggregated result of its balances in all countries (yellow cells below). By doing this, the EPR calculations need to accept the fact that in the next IM area a RU will suffer the delays that it has caused itself in the previous IM area (border delay from previous country).

	Caused delays (payments)	Suffered delays (receivables)
IM1	• 4 (92)	• 5 (50) • 3 (70) • 2 (83)
IM2	• 4 (undocumented minutes)	• 3/2 (recovered time in line) • 14 (delay at handover point)
RU1 on IM1	• 5 (50)	• 4 (92) • 2 (83) • 3 (70)
RU1 on IM2	• 3 (70)	• 4 (undocumented) • 3/2 (recovered time in line) • 2 (recovered time in station) • 14 (delay at handover point)
TOTAL	16	56

Table 13

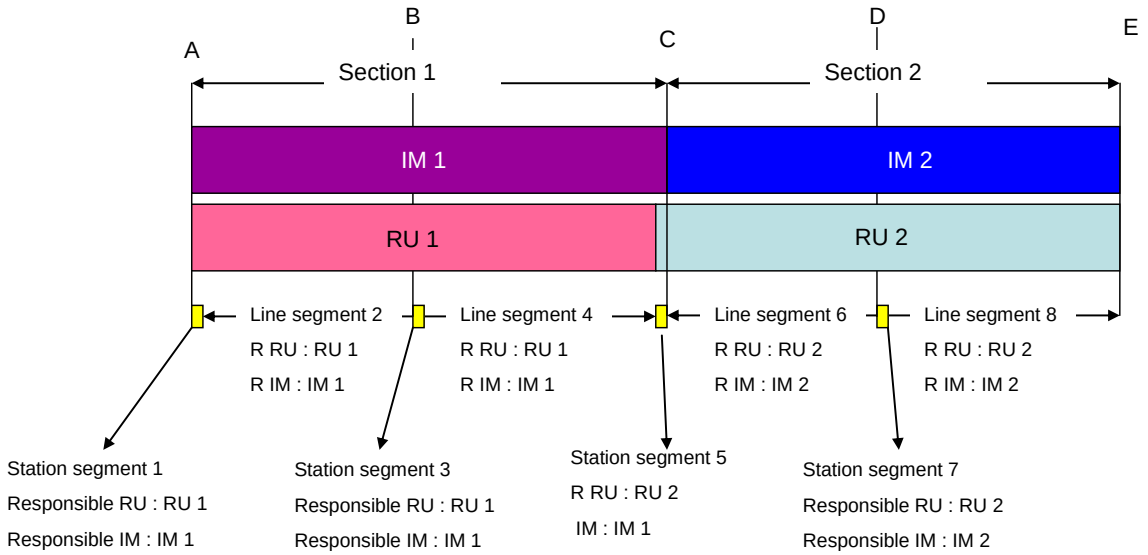
IMs and RU balances

	Caused delays (payments)		Suffered delays (receivables)		Balance	
IM1	$12*\frac{4}{16}$ = 3		$12*\frac{(5+3+2)}{56}$ = 2,14		0,86	
IM2	$12*\frac{4}{16}$ = 3		$12*\frac{(\frac{3}{2}+14)}{56}$ = 3,32		-0,32	
RU1 on IM1	$12*\frac{5}{16}$ = 3,75	= 6	$12*\frac{(4+2+3)}{56}$ = 1,93	= 6,54	1,82	Balance for RU 1 = - 0,54
RU1 on IM2	$12*\frac{3}{16}$ = 2,25		$12*\frac{(4+\frac{3}{2}+2+14)}{56}$ = 4,61		-2,36	
TOTAL					0	

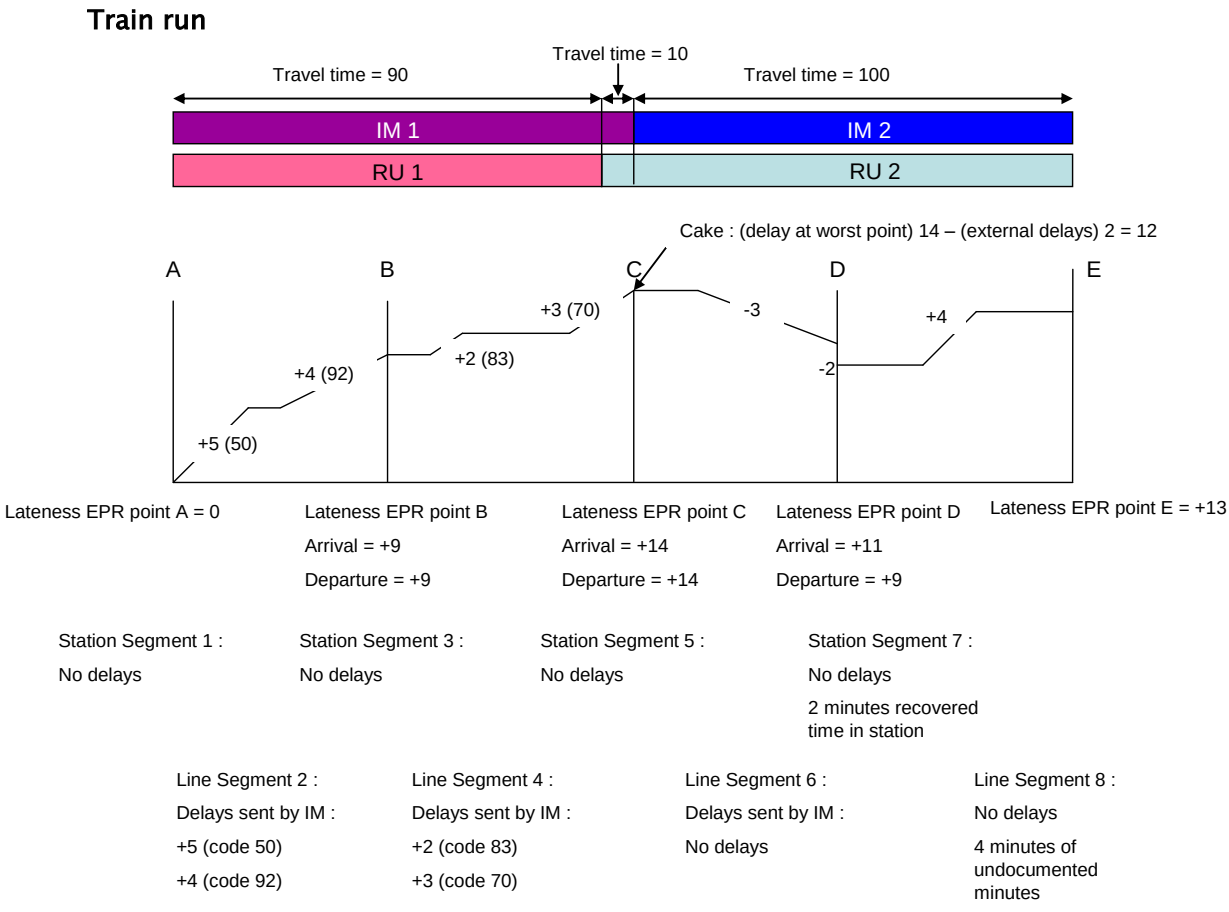
Table 14

6.1.5.4 EPR calculations in a adapted cooperation situation

The adapted cooperation situation refers to circumstances where several RUs run within the same IM area / country and thus where the RU-RU handover points do not coincide with the IM-IM borders.



Picture 21


Train run
Travel time = 10
Travel time = 90
Travel time = 100
IM 1
IM 2
RU 1
RU 2
Cake : (delay at worst point) 14 – (external delays) 2 = 12
A
B
C
D
E
+5 (50)
+4 (92)
+2 (83)
+3 (70)
-3
-2
+4
Lateness EPR point A = 0
Lateness EPR point B
Arrival = +9
Departure = +9
Lateness EPR point C
Arrival = +14
Departure = +14
Lateness EPR point D
Arrival = +11
Departure = +9
Lateness EPR point E = +13
Station Segment 1 :
No delays
Station Segment 3 :
No delays
Station Segment 5 :
No delays
Station Segment 7 :
No delays
2 minutes recovered time in station
Line Segment 2 :
Delays sent by IM :
+5 (code 50)
+4 (code 92)
Line Segment 4 :
Delays sent by IM :
+2 (code 83)
+3 (code 70)
Line Segment 6 :
Delays sent by IM :
No delays
Line Segment 8 :
No delays
4 minutes of undocumented minutes

Picture 22

Allocation of caused, suffered and recovered time

	Caused delays (payments)	Suffered delays (receivables)
IM1	• 4 (92)	• 5 (50) • 3 (70) • 2 (83)
IM2	• 4 (undocumented minutes)	• 3/2 (recovered time in line) • 14 (delay at handover point)
RU1	• 5 (50)	• 4 (92) • 2 (83) • 3 (70)
RU 2 on IM1	• 0	• 0
RU2 on IM2	• 3 (70)	• 4 (undocumented) • 3/2 (recovered time in line) • 2 (recovered time in station) • 14 (delay at handover point)
TOTAL	16	56

Table 15

6.1.5.5 IMs and RU balances

The first part of the calculations is done in the same way as previously (indirect payment between parties). The caused, suffered and recovered delays are normally allocated to the IMs and to the RUs according to their position in the train run.

In the second part of the calculations additional adjustments are done between RUs (direct payment between RUs) within the same IM area, i.e. between RU1 and RU2 on IM1 in our example (blue cells).

$$\text{cake} * \left(\text{Proportion of remaining travelling time}\right) * \left\{ \frac{\left(\text{Delay at handover point between IM}\right) + \left(\text{Delay caused by IM and external delays}\right) + \left(\text{Delay caused by first RU on IM area}\right) - \left(\text{Recovered time}\right)}{\text{Total of suffered delays}} \right\}$$

Calculation 6

In our example, from RU1 to RU2 on IM1

$$12 * \left(\frac{10}{100} \right) * \frac{\left[0 \right] + \left[4+2 \right] + \left[5 \right] - \left[0 \right]}{56}$$

$$= 0.235$$

Calculation 7

	Caused delays **(payments)**	Suffered delays **(receivables)**	**Direct payment** by RU1 to RU2 on IM2		**Balance**
			Payment by RU1	**Receivable paid** to RU2 on IM1 by RU1	
IM1	$12*\frac{4}{16}$ = 3	$12*\frac{(5+3+2)}{56}$ = 2,14			0,86
IM2	$12*\frac{4}{16}$ = 3	$12*\frac{(\frac{3}{2}+14)}{56}$ = 3,32			-0,32
RU1	$12*\frac{5}{16}$ = 3,75	$12*\frac{(4+2+3)}{56}$ = 1,93	$12*\frac{10}{100}*\frac{(4+2+5)}{56}$ = 0,235		3,75 - 1,93 + 0,235 = 2,055
RU2 on IM1	0	0		= - 0,235	
RU2 on IM2	$12*\frac{3}{16}$ = 2,25	$12*\frac{(4+\frac{3}{2}+2+14)}{56}$ = 4,61			2,25 - 4,61 - 0,235 = - 2.595
TOTAL					0

Table 16

6.2 Evaluation of the EPR model

This section describes the model's evaluation in detail, for which a summary can be found in Section 6.2 of the Handbooks' main body.

6.2.1 Evaluation process

An experts group of the Commercial Working Group (CWG) prepared the evaluation and gave a preliminary advice to the CWG. The CWG evaluated the model and reported the results to the project management and the Advisory Group (AG). The AG accepted the evaluation results in the meeting on October 10th, 2012 with the notion that explanations for minority positions have to be included in the detailed description of the evaluation.

6.2.2 Scope of the evaluation

The scope of the evaluation was the commercial and calculation-related part of the EPR.

The elements required for the application of financial consequences, such as thresholds and ceilings, the monetary value of a minute and calibration issues were not treated during the model evaluation.

6.2.3 Preconditions for evaluation

6.2.3.1 Performance of the calculation tool

The calculation tool has no structural bugs anymore, but as a consequence of false data sent by IMs, inconsequent validation (wrong codes not disputed and remaining in the tool) and the impossibility to apply exclusion rules retro-actively not every outcome is fully reliable.

For the overall evaluation this is not a problem, but for deductions about specific topics the impact of this can be bigger.

6.2.4 Representativeness of the pilot data

6.2.4.1 Benchmark target

Quite early in the pilot application data quality targets were defined as a benchmark to decide, whether the available EPR data quality was sufficient for the evaluation:

- 80% of passenger trains included *per* month
- 72% of freight trains included *per* month
- at least 60% trains included *per* month and *per* relation group

The CWG also set a quantity target: 4.000 passenger trains and 3.000 freight trains.

6.2.4.2 Achieved results

Considering the time frame October 2011 – March 2012, the quantitative target results have been reached (12.572 passenger and 7.119 freight trains monitored – meaning an average of around 2500 and 1400 respectively).

For corridor C02 (for freight traffic on Rotterdam – Novara only) and for Corridor C05 (Rotterdam / Antwerp – Luxembourg / Paris – Lyon / Basel all routes and traffics) the quality benchmark targets were not reached. These corridors have been left out of the scope of the evaluation.

The passenger traffic route France – Luxembourg included data from one train pair which ran to Brussels until the change of timetable. These few train runs (120 in total) produced results for Infrabel, which were not representative when compared to the others based on a much bigger train sample. Therefore the Infrabel results were removed from the graphs for passenger traffic.

6.2.4.3 Lessons learned from the corridors that were not considered:

Hypotheses about reasons why the above-mentioned corridors (traffics) did not manage to reach the target:

- Topology of national networks
- Inconsistency between arrival and departure time at EPR points

- Manual input by IM (CFL) partly missing (weekends)
- More handover points due to more networks crossed. At every handover point some trains are lost (they are excluded for not consistent CTT or RA)
- Data problems in several networks
- Frequently, few problems occurring in few points are the cause of the biggest number of exclusions
- Cancellations not correctly registered in national systems.

On short routes we manage to reach the benchmark target of included trains. The sum of excluded trains is bigger if there are more handover points. Moreover if the running distance increases the risk of a delay is also bigger. As a second-order effect of this, load shifting (or running the train on a different path) is also happening more frequently. At least for the pilot traffic Rotterdam-Novara the combination of these effects will make it very difficult to reach the target, also in the future.

Although the problems listed above are serious and will have to be solved by IMs with the support of RNE, they are not blocking points for the evaluation. For topics where their impact is bigger a remark was made in the relevant section of the evaluation. The impact can be different for different corridors.

The Advisory Group has decided that although the overall benchmark target for included trains has not been reached, the sample of trains will be considered on corridors where the target has been reached.

The following table gives an overview of the routes, for which data was considered for the model evaluation.

PASSENGER	FREIGHT
I-CH via Domodossola	RNE-C2 - Rotterdam - Novara
I-CH via Chiasso	RNE-C2 - ROLA
F-CH via St. Louis	RNE-C4 - Brenner (I-A-D)
F-D via Strasbourg	RNE-C4 - Brenner (I-A)
F-D via Stiring-Wendel	RNE-C5 - BE-LUX
RNE-C5 PASSENGER	RNE-C5 - LUX-F
F-LUX (TER via Rodange)	RNE-C5 - BE-NL
LUX-F (TER via Zoufftgen)	RNE-C8 - Modane
F-LUX (Voyages)	A-D-A via Rosenheim
CH-F via La Plaine	
Considered for Evaluation	Not considered for evaluation

Table 17

6.2.5 Evaluation - Actual elements of the EPR Reference Model

Elements of the EPR model which were subject to the evaluation:

- Primary delays
- Secondary delays
- External delays
- Undocumented delays and recovered time
- Cake
- Cross-border delays (codes 40, 41, 70,71 and 84).

Unless indicated otherwise all the facts and figures concern data collected in the period from October 1st 2011 until March 31st 2012.

6.2.5.1 Structure of evaluation description

- Description (topic of evaluation)
- Facts & figures (charts for passenger and freight traffic)
  Since the length of the train runs and also the number of trains is very different a method to make the figures comparable was needed. In the absence of information about train kilometres the "next best" solution – running hours – was chosen.
- Pros & Cons (arguments considered during the evaluation)
  - Under "Pros" reasons are listed that support the way that issue is implemented in the model, i.e. reasons to keep that part as it is and not to make (big) changes.
  - Under "Cons" the reasons why we should think about changing or skipping that issue in the model are listed.
  - Not only the number of pros and cons is important, but also their weight matters.
- Advice (opinion given by the expert group and the CWG)
  For the evaluation in the CWG, statements given personally in the meeting were considered as well as those given in writing before the meeting, because not all CWG representatives could participate in the evaluation meeting.
- Result
- Minority opinions

6.2.5.2 General overview

The following table gives an overview, of whether and how the components of the EPR model provide an incentive.

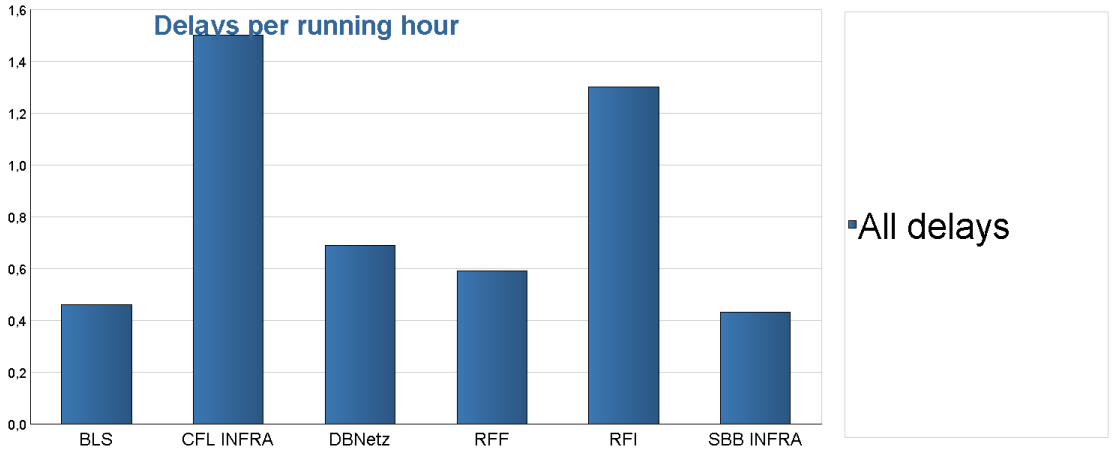
EPR Model	Incentives in the model	
Malus "Payments"	Primary causes	By minimizing primary delays partners get a financial benefit (incentive).
	Secondary causes	IMs and RUs are care-taker for minimising a part of secondary delays. The result is a financial benefit (incentive).
	Undocumented delays	IMs have a financial benefit (incentive) for minimising undocumented delays. Later the responsible partner has a benefit for minimising the corresponding primary or secondary delays.
Bonus "Receivables"	Suffered direct causes (and undocumented)	Only sharing the money No direct incentive or influence
	Suffered secondary causes	Only sharing the money No direct incentive or influence
	Suffered external delays	Only sharing the money (no direct incentive or influence). Even a negative incentive, because RU and IM have a benefit (even if a primary cause is the real reason).
	Handed-over delays (in previous network(s) at borders and handover points	Needed by the EPR mechanism, no contribution to quality improvement, only sharing the money No direct incentive or influence
	Bonus for recovered time	There is an incentive for recovering existing delays.

Table 18

6.2.5.3 Overview of all delays

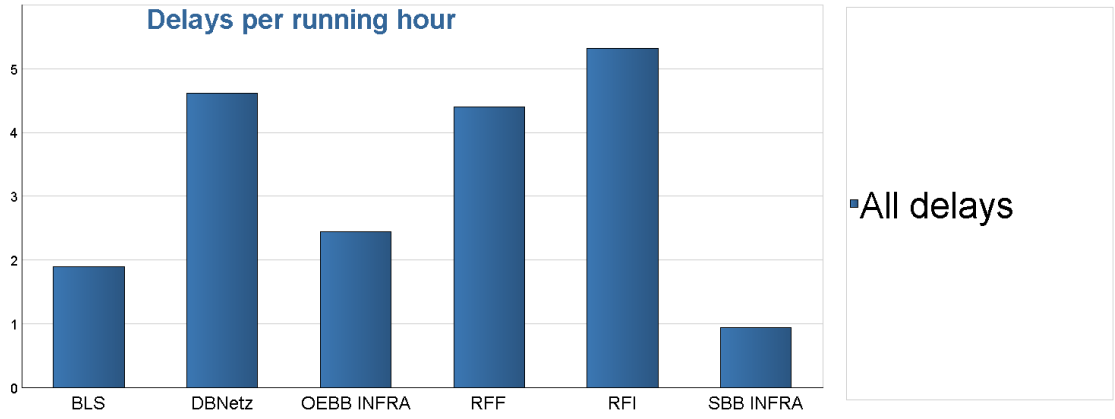
- Description: all delays except delays caused by other networks (codes 40, 41, 70, 71) and except external delays on other networks are considered here.
- The graphs show the IM where the delays occurred and give no indication about the responsibility for the delay.

Passenger trains



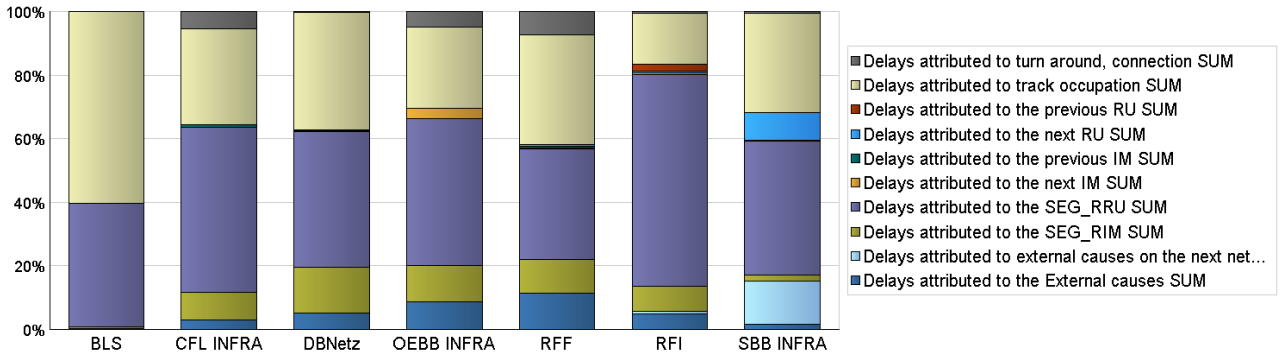
Graph 1

Freight trains



Graph 2

Both types of traffic, all coded delays



Graph 3

This graph shows all delays occurring on the network of an IM and indicates the distribution of delay code types for every IM. Please note that it does not indicate the amount of delays, but only their distribution.

Observations/ remarks:

The small percentage of IM causes for the Swiss IMs (BLS and SBB Infra) is very unlikely. The small percentage at BLS is partly due to the problem that on the Brig – Domo line several IMs are involved (RFI, BLS, SBB) and there are difficulties to assign delays correctly. Solutions are under investigation. The very high percentage of secondary delays on BLS is due to long single line stretches where secondary delays appear as soon as incoming trains arrive late – these delays can hardly be influenced by BLS (IM).

The big percentage of external delays on the next network is also rather high on the SBB network and is linked to coding cases in Chiasso.

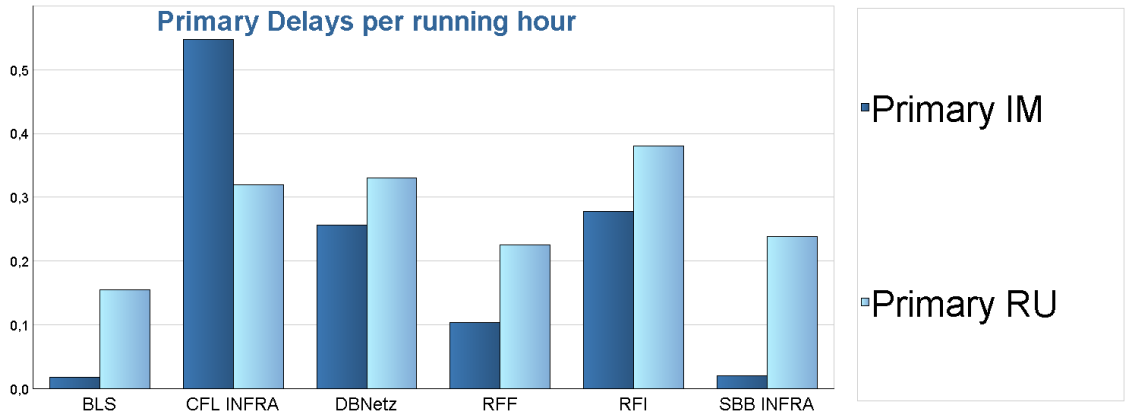
6.2.5.4 Primary delays

Description

Codes 1x, 2x, 3x, 4x (attributed to IMs) and 5x, 6x, 7x) (attributed to RUs)

Facts and Figures

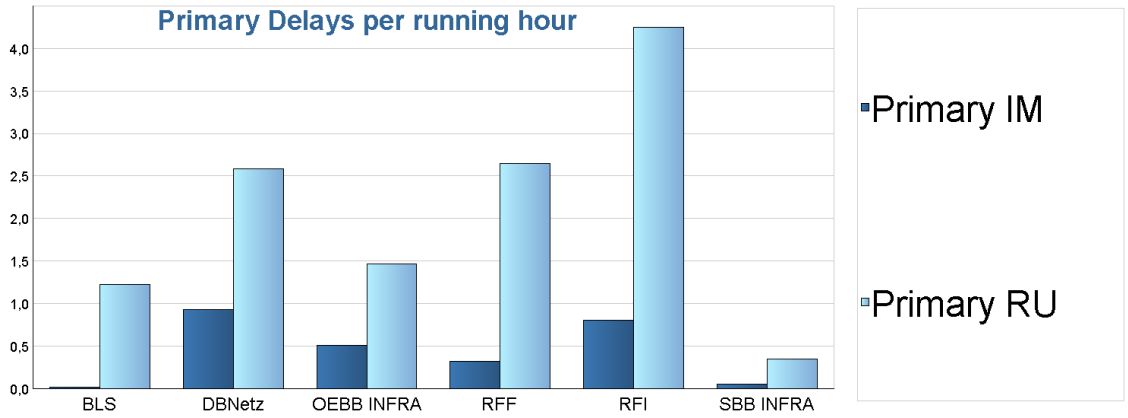
Passenger trains



Graph 4

It is differentiated by IM, but as regards passenger trains the primary delays caused by IM and RUs are of a similar amount.

Freight trains



Graph 5

As regards freight trains RUs cause a lot more primary delays. Of course this has an influence on the final balance.

Pros and Cons

For every reasonable calculation model the primary delays will be the basis. There is no discussion possible about the responsibility for this kind of delays.

Advice

Keep primary delays unchanged in the EPR model.

Status of this advice:

Preliminary advice of Experts	Unanimously
Advice of CWG	Unanimously

Conclusion

The treatment of primary delays remains unchanged in the EPR model.

6.2.5.5 Secondary delays

Description

Codes 91, 92 (track occupation), 93 (connections) and 94 (turn around)

Relation with primary delays

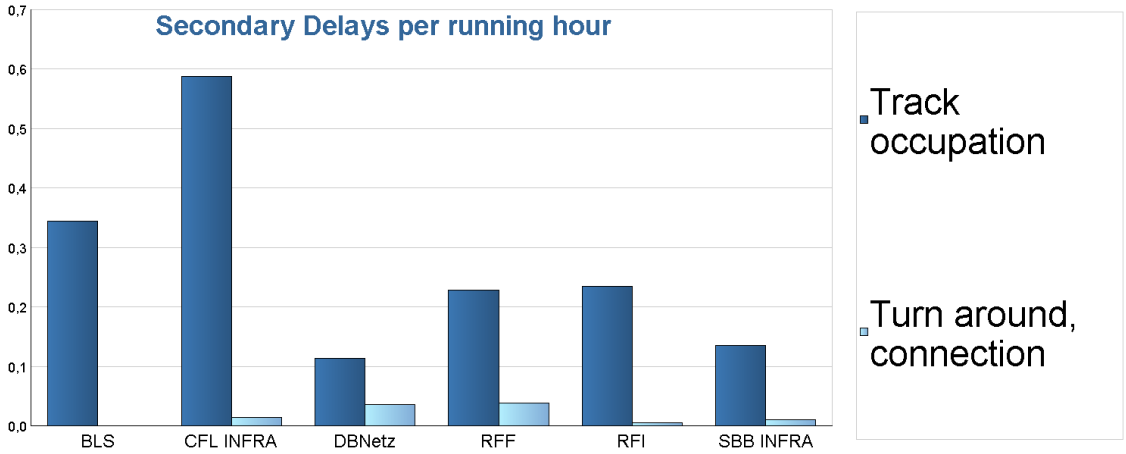
As described above, due to the different coding behaviour of different IMs the demarcation between primary and secondary delays is not clear cut under all circumstances. This is an aspect that had to be taken into consideration for the evaluation of the secondary delays. For any change in the calculation of secondary delays the impact of the coding behaviour has to be checked in order to evaluate its influence.

It is very likely that primary causes are coded as secondary delays by some IMs. There is a difference between IMs as regards coding of the delay cause of following trains (primary or secondary delays) after a train has been delayed by defective track.

Secondary delays cannot always be charged to the real source of the delay as this is often not part of EPR: e.g. national RU outside EPR causes delays to EPR trains.

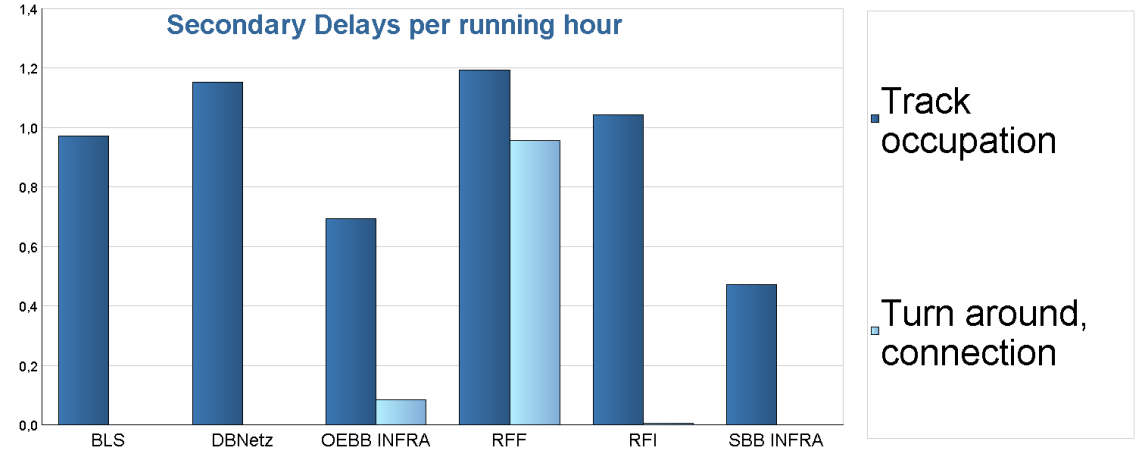
Facts and Figures of the pilot

Passenger trains



Graph 6

Freight trains



Graph 7

Under most conditions the secondary delays are very small (<1 minute per hour). As regards passenger trains this is approximately the same amount as primary delays. As regards freight trains secondary delays are far less numerous than primary delays.

It is not necessary to have worry too much about the influence of this kind of delays-that are not easy to minimise in the model- their influence is not so great.

Pros and Cons

Pros	Cons
There is an incentive for companies to minimise the amount of secondary delays caused (useful inputs for future timetable, rolling stock, staff, daily business) Primary causes might be coded as secondary delays by some IMs. In the model secondary delays should have the same treatment as primary delays, to prevent the benefits of these different coding behaviours. Chance: to ensure better quality in train performance it should be a goal to get as much information as possible about delay reasons to take measures (more management attention) Chance: not all RUs which can cause secondary delays on EPR trains are part of EPR. Still the IM (who is responsible for the track occupation) is in the best position to incentivise (or at the end	It is difficult to minimise the amount of secondary delays (sometimes attribution does not reflect "responsibility"). The implicit assumption that the care-taker principle should give a 50-50 result between IMs and RUs is not correct.

to collect the money of) "the other RU" (via the national PR). Chance: there is a possibility for IMs to change the system to trace back the delays to primary	

Table 19

Another possibility would be tracing back secondary delays, but for the near future it is neither supported by the UIC 2005 message nor by international and domestic systems.

IMs have no specific information enabling them to identify a secondary delay cause on the RU side (93 and 94 codes). Lacking this information, most of the time, the IM will apply a primary delay code. A proper coding of secondary delay causes can be done only if the exact information is provided. For the outcomes of the current calculation this has no influence as long as primary and secondary delays are calculated in the same way if the company responsible for the delay is known.

It is important for secondary delays to remain in the model with the same treatment as primary delays to prevent the benefits of different coding behaviour between IMs.

Advice

Keep secondary delays unchanged in the EPR model.

Status of this advice:

Preliminary advice of Experts	Unanimously
Advice of CWG	Relevant majority (All – 3)

Conclusion

The treatment of secondary delays remains unchanged in the EPR model.

Arguments of minority positions

- Secondary delays need to be standardised with a link to the primary cause. If not, the same primary cause can have different secondary causes due to coding behaviour.
- The use of the care-taker principle is a wrong incentive for increasing quality. It reduces capacities on track. For example, a primary delay caused by a RU produces a track occupation. A general charge in context of secondary delay minutes produces a preventive time buffer and other undesirable effects in the system.
- Because of the existence of different coding behaviours at the moment, it might be adequate to keep secondary delays in the EPR system. For a fair way to treat secondary delays in the future, systems should be able to trace back delay minutes to the original source.

- With long single-track stretches, the BLS network depends on punctual trains as small delays may cause large amounts of secondary delays which cannot be influenced by BLS. The share of secondary delays (not really caused by BLS) is up to 66% of all caused delays on the BLS network and thus the care-taker principle is no longer fair.

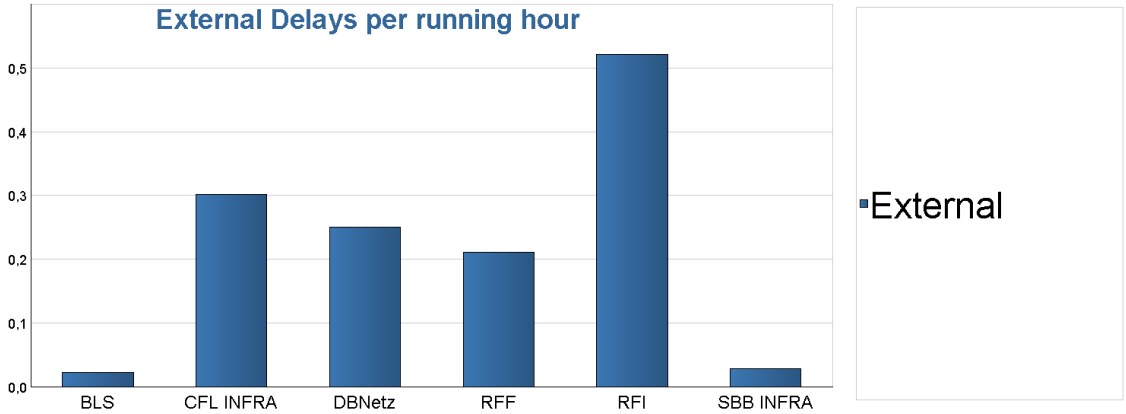
6.2.5.6 External delays

Description

Codes 8x, 90

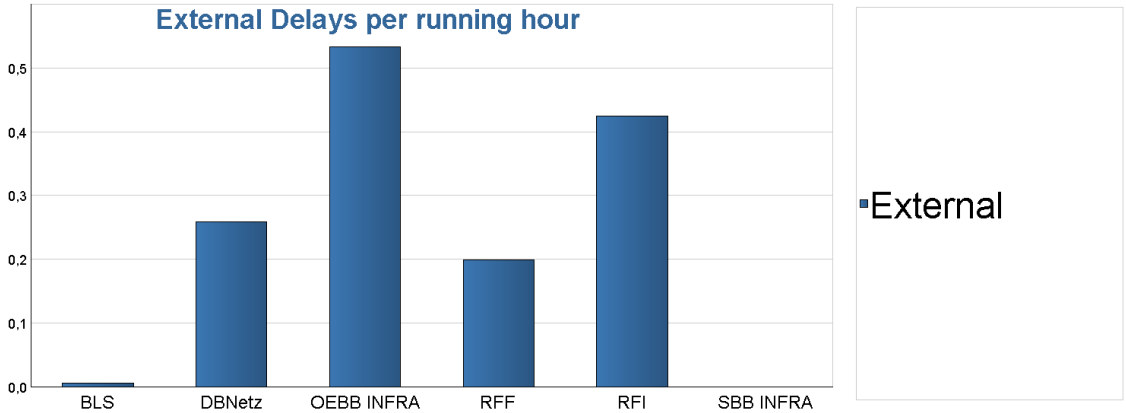
Facts and Figures of the pilot

Passenger trains



Graph 8

Freight trains



Graph 9

The amount of external delays concerning both passenger trains and freight trains is far less than the amount of primary and secondary delays. Of course this is an average.

Pros and Cons

Pros	Cons
All causes are taken into account for the calculation It promotes a deeper analysis of different coding behaviours It promotes international harmonisation of the definition and use of external causes	There is only an indirect incentive to make all possible efforts to minimise external delays. Some of them are unavoidable but not all of them (e.g.: possible actions to reduce the influence of weather conditions). Most of these delays are validated in the national systems. The only company (RU) that can check has no benefit to change a situation if the coding behaviour codes more delays to external (instead of primary) as is strictly necessary. The demarcation between external delays and other kinds of delays is not clear cut under all circumstances: for a switch that is out of order when it snows in winter, both code 24 ("Track") and code 83 ("Effects of weather and natural causes") can be a correct code.

Table 20

There are 3 possibilities to treat external delays:

- If external delays are suffered and subtracted to find the cake (see 6.2.5.6 for a definition of the "cake"): incentive is available for all parties to control the amount of external delays
- If external delays are not suffered but subtracted to find the cake: the negative incentive remains by reducing the cake
- If external delays are not suffered and not subtracted to find the cake: huge bills due to the weight of the delays caused getting higher and the minutes of delay not attributed.

It is important to monitor external delays in order to minimise the impact of coding behaviour.

Advice

Keep external delays unchanged in the EPR model, but monitor them and reconsider if in the future the amount of external delays increases.

Status of this advice:

Preliminary advice by Experts	Relevant majority (>60%)
Advice by CWG	Majority (>50%)

Arguments of minority positions

The rest of the CWG is in favour of only monitoring the external delays, but most can accept the majority decision if the amount of external delays is checked and if the situation is reconsidered, should the amount of external delays increase abnormally

- The definition of "external delays" is insufficient in the present form of the EPR. It is possible that the coding of delay minutes is not correct for the same situation in different times or regions. In the interest of a harmonised and consistent treatment of our customers, it is absolutely necessary for delays to be precisely defined.

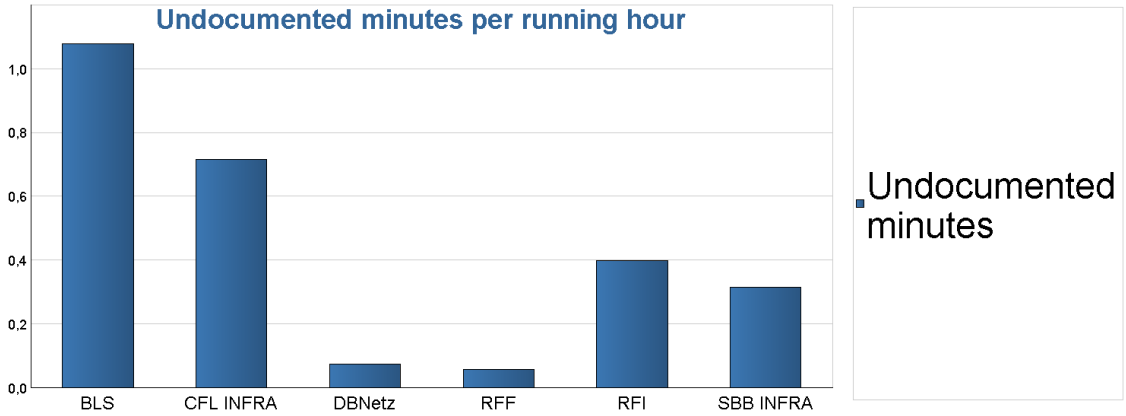
6.2.5.7 Undocumented delays and recovered time

Description

Undocumented minutes and recovered time are figures calculated within the EPR calculation procedures per train run and segment (see 6.1.5)

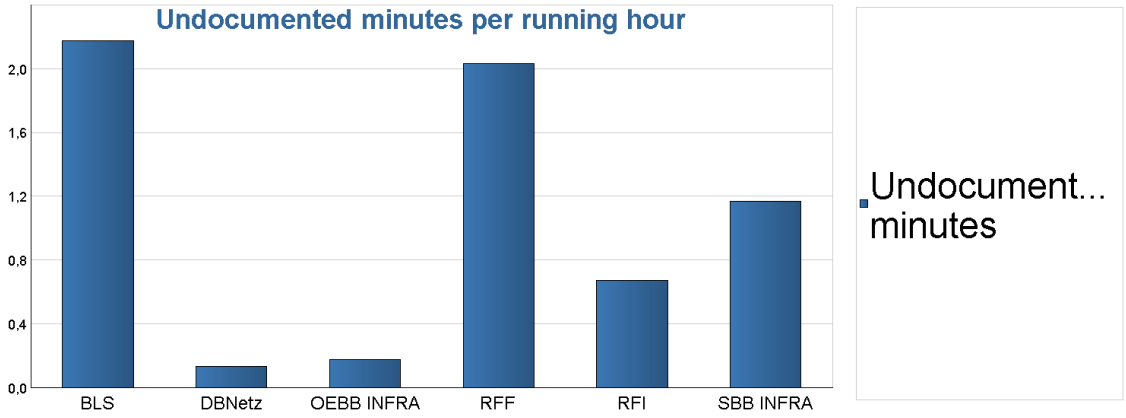
Facts and Figures of pilot regarding undocumented delays

Passenger trains



Graph 10

Freight trains



Graph 11

Pros and Cons of undocumented delays

Pros	Cons	Remarks
Incentive for the IM to codify all delays. Incentive for IM to have a low threshold for coding Long-term chance: if the density of EPR points increases, the data quality at EPR point will also increase.	Short-term risk: different density of EPR points influences outcomes of the undocumented minutes calculation Risk: between EPR points undocumented delays will be compensated at first by recovered time	Application of the 450-2 leaflet for coding is mandatory or attribution of the undocumented delays has to be adapted (threshold?) Undocumented delays and recovered time are automatically calculated by the tool by subtraction (see 4.5.1) Rules and thresholds for coding are different in every country and lead to different weight of undocumented minutes

Table 21

Relation with number of EPR points

The number of EPR points is more important when calculating the amount of undocumented delays and recovered minutes than for other parts of the model. Between EPR points, at first the recovered time will compensate for undocumented delays. Only the surplus of undocumented delays or of recovered time will be calculated in the model. If there are fewer EPR points there is more possibility for undocumented delays and recovered time to cancel each other out.

In order to record most of the recovered time and undocumented delays, every network point should be an EPR point in the future. For the moment, data quality is not good enough (this would lead to many additional excluded trains) to allow a high density of EPR points.

Advice regarding undocumented delays

Keep undocumented delays unchanged in the EPR model.

Status of this advice:

Preliminary advice by Experts	Unanimously
Advice by CWG	Almost unanimously (all – 1)

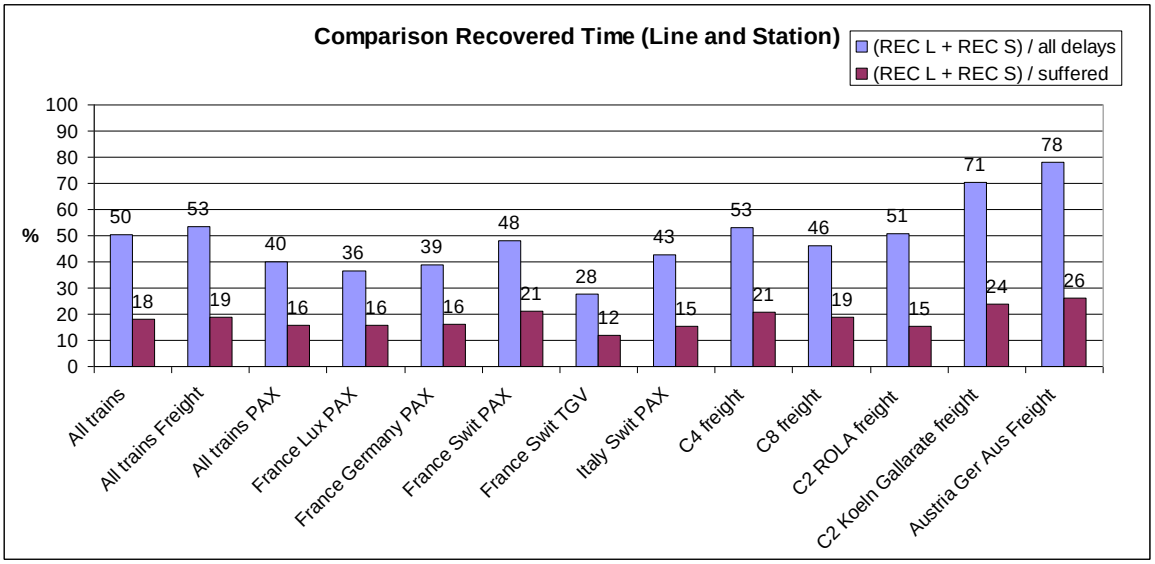
Arguments of minority positions

- If the undocumented delays are charged to the IMs, an unwanted change of coding behaviour will be generated. This will lead to endless discussions with the RUs.

Facts and Figures of pilot regarding recovered time

Graph of comparison between:

- Recovered time in line and station and caused delays
- Recovered time in line and station and suffered delays



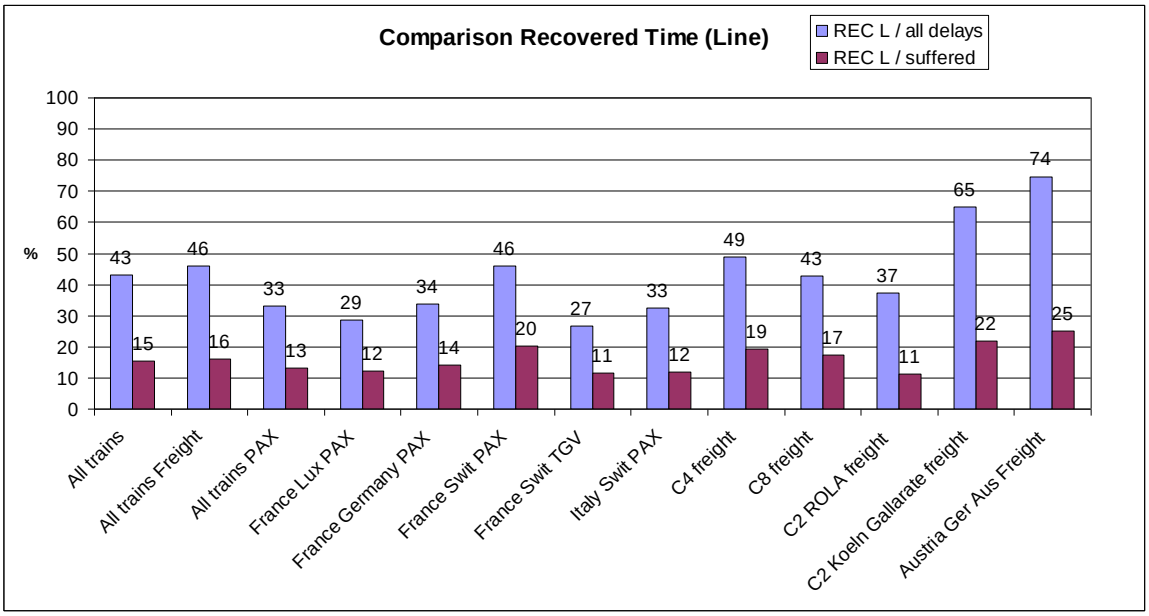
Graph 12

Recovered minutes represent more than 50% of all delays or in other words: more than 50% of delays are recovered during the train run.

Recovered minutes represent 20% of the suffered delay.

Graph of comparison between:

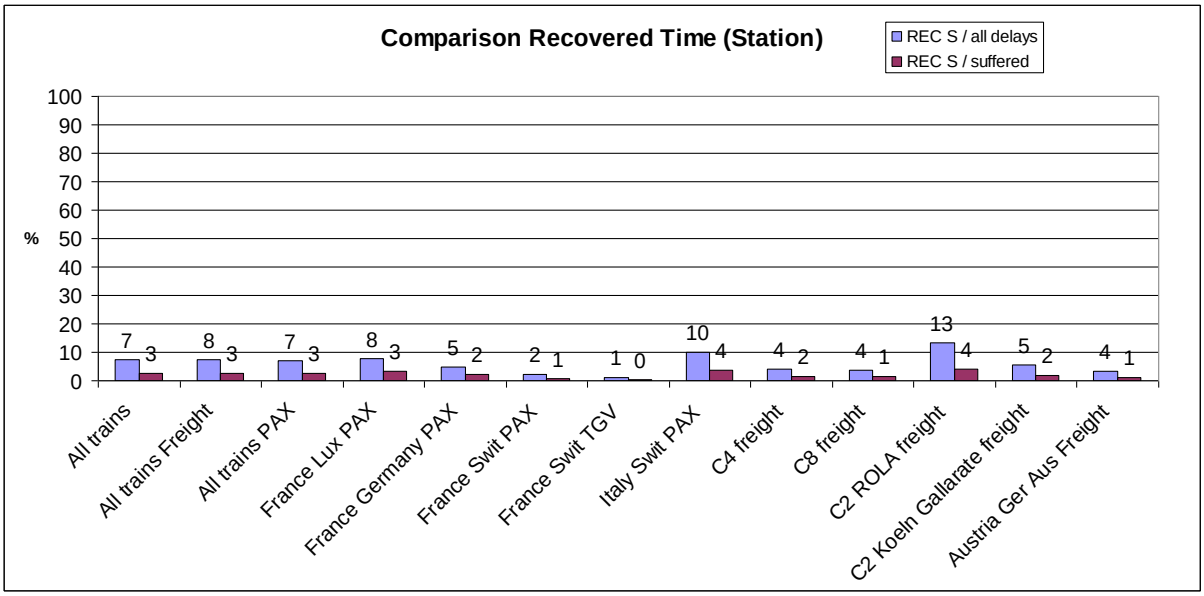
- Recovered time in line and caused delay
- Recovered time in line and suffered delay



Graph 13

Graph of comparison between:

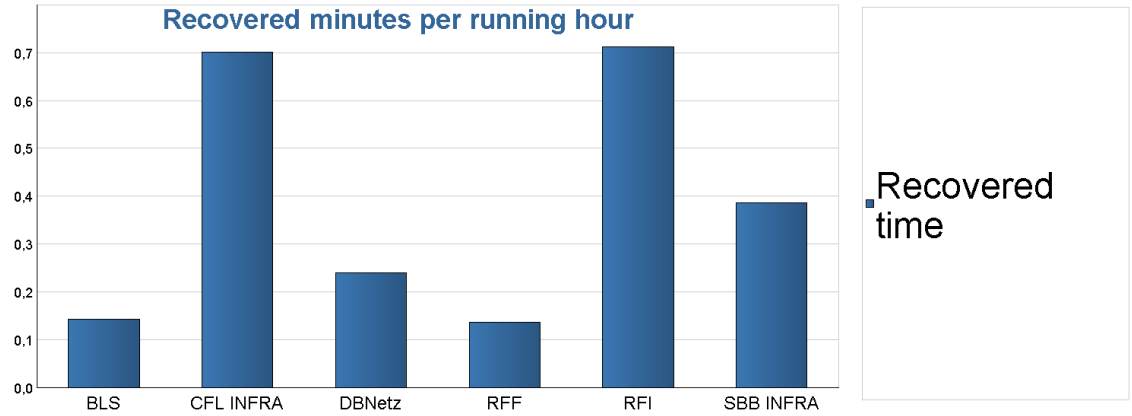
- Recovered time in station and caused delay
- Recovered time in station and suffered delay



Graph 14

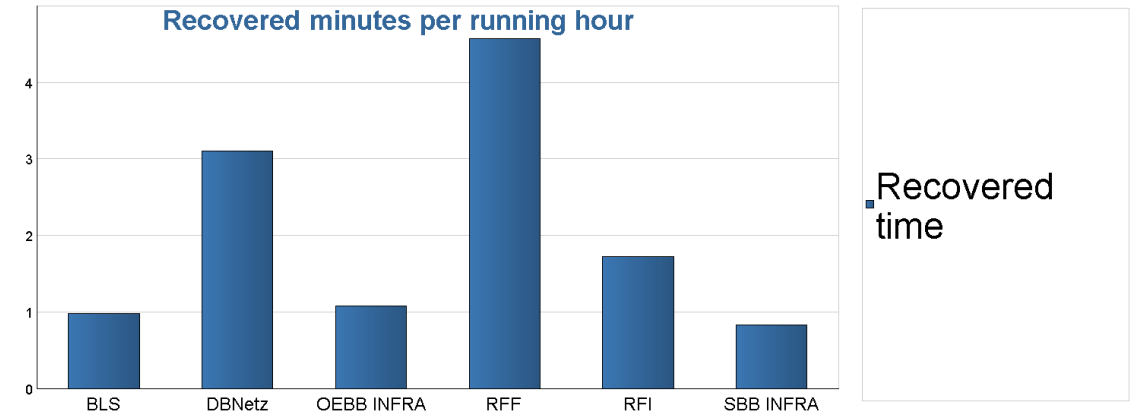
The recovered time in line represents almost all the recovered time. As many stations or stops are not considered as EPR points, most of the recovered time in station is treated as recovered time in line.

Passenger trains



Graph 15

Freight trains



Graph 16

It seems that there is a correlation between track occupation and recovered time.

IMs that have a disadvantage regarding track occupation organise their business in such a way that they are able to recover the time lost. Keeping both elements in gives an opportunity to repair quality in the IM's own area, with also a (more or less neutral) result in EPR.

Pros and Cons of recovered time

Pros	Cons	Remarks
Inside the suffered time, recovered minutes are the only item that can be influenced in a positive way by an actor. Margins create robustness for the stability of the network	Risk: different density of EPR points. To facilitate more points we need a good data quality on every EPR point Rules to take into account possibility to recover time in path building are not applied in a harmonised way. Counterproductive to shorter travelling times (in planning) bringing a disadvantage for IMs / RUs that use short and competitive travelling times Between EPR points recovered times are compensated at first by the undocumented delays	Undocumented delays and recovered time are automatically calculated by the tool by subtraction (see 4.5.1) This risk is unlikely because if one actor uses more than a reasonable slack time, fewer paths will be sold and there will be additional costs for the use of staff resources

Table 22

Advice regarding recovered time

- Keep the recovered time in
- Keep current share of 50%/50% between IM and RU in line segments
- Keep current share of 100% for RU in station segments.

Status of this advice:

Preliminary advice by Experts	Relevant majority (>60%) for keeping recovered time in. The others wanted to remove it from the calculation. If recovered time is agreed by all for the advice regarding line segments and agreed by 50% for the advice regarding station segment, the

	others wanted to treat station segment in the same way as line segments
Advice by CWG	Unanimously in favour, because the CWG advises to keep as cake the worst point. Then keeping the recovered time in is the only reasonable possibility). If "final destination" were chosen instead of worst point some members would have preferred skipping recovered time.

Arguments of minority positions

- Why is there a difference between recovery on line and recovery in stations? This will influence the timetable demands/planning and decrease the commercial speed.
- The included time recoveries are not requested by the Recast legislation and have negative effects on the railway system as a whole. The wrong incentive to recover time damages the time schedule in relation to the capacities of the system. The aim of the EPR should be to attain maximum quality with a maximum capacity in an economic manner.
- Recovery time is no argument to improve quality (main reason for EPR) – it shows only the capacity of timetables or infrastructure to regain time in case of delays. The possibility to recover time depends on the infrastructure / timetable situation at the time of running but does not depend on special efforts by RUs/IMs.

6.2.5.8 Definition of the cake

(See also 6.1.2)

Cake

The cake is the total amount of minutes shared for a late train; the Parties who have caused the delay pay a share of the cake, while the Parties who have suffered the delay receive a share of the cake; the cake is equal to the lateness at the worst point.

Cake sizing

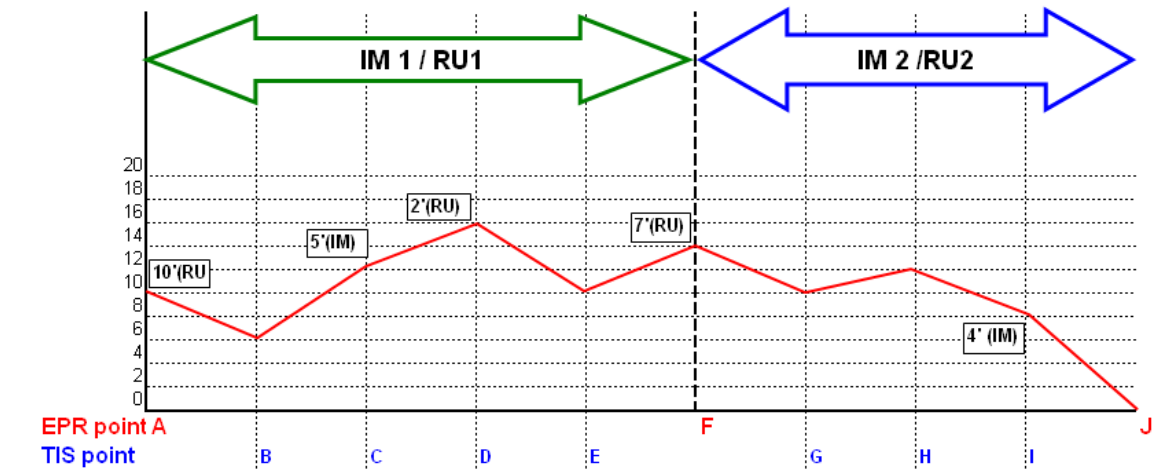
In the original version of the UIC model (before 2009), the size of the cake was the quantity of minutes of lateness at destination. This proposal did not fit either the nature of the traffic (international) or passenger traffic. In fact, a heavily-delayed train, causing disturbances in one or more networks (and one or more important passenger stations) which recovered all its lateness before arriving at destination in the last network would not produce any penalty, thus putting the previous networks' parties at disadvantage.

One additional proposal was to consider all deviations along the journey, but this was discarded after discussion in the CWG group (2009).

In the EPR pilot application, the cake is equal to the lateness at the worst point (EPR point along a train run where lateness is highest). External delays are subtracted from the worst delay at an EPR point, thus reducing the cake. This subtraction is applied to all options.

Description

4 options were investigated for the sizing of the cake. They are illustrated in the example below:



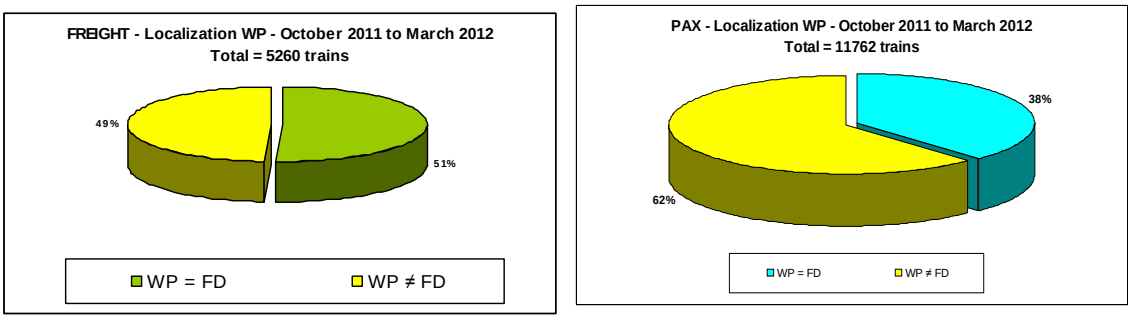
Picture 23

- **Final destination** (Point J) : cake = 0'
- **Worst EPR point** (Point F) : cake = 14'
- **All delays** (coded + undocumented) along the train run: cake = 10'(RU + 5'(IM) + 1'(undocumented) + 2'(RU) + 7'(RU) + 4'(IM) = 29'
- **Average of lateness at all EPR points** : cake = (A + F + J) / 3 = (10 + 14 + 0) / 3 = 8

Facts and Figures of pilot

Localisation of the worst point

From October 2011 to March 2012, 17022 EPR trains were available for calculation: 5260 Freight and 11762 Passenger.



Graph 17

In **Freight traffic**, 51% of the trains have their highest delay at final destination. Among them 12% are running on time (no delay on the whole train run). There is a warning for less than 39% of the EPR trains if external delays are subtracted from the cake. The opportunity to minimise disruption and improve the performance of the networks is lost for 49% of the trains (88% of delayed trains minus 39% of delayed trains at final destination).

In **Passenger traffic**, 38% of the trains have their highest delay at final destination and among them 16,5% are running on time. There is a warning for less than 21,5% of the trains.

These graphs show that in **most cases the delays occur during the train run.**

In each option the size of the cake is defined by the amount of minutes and the price of the minute.

If « All delays » is chosen the size of the cake is double.

In the WP (worst point) and FD (final destination) options the cake is not very different.

The difference between models is in the same range for Freight and Passenger.

The cake is calculated train by train. For one single train the cake can be similar in all 3 options if the value of the minute is adjusted.

The option chosen for the cake is not important for the cake sizing (number of minutes x value of the minute).

The expert group considers that choosing "all delays" for the cake is not relevant because during its run a train can be delayed several times and then recover these delays several times. This option would lead to a huge amount of minutes in the cake without taking the real impact of recovered time into account.

The financial impact of each option depends on the number of trains for which the cake is different from 0.

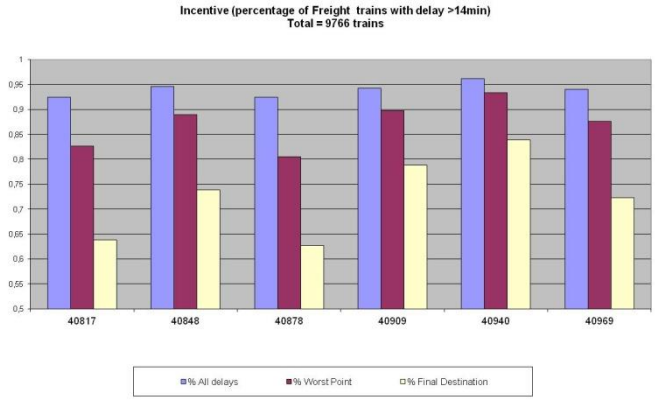
If a train causes disruption at one point in a network and recovers its delay at the worst point there is no incentive for this train because there is no cake to share.

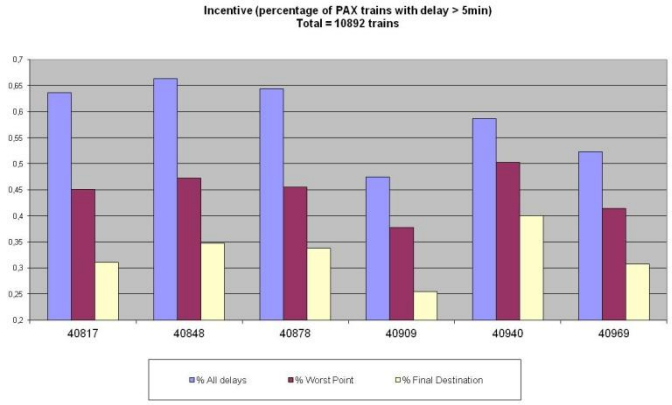
Total amount of minutes shared in the cake from September 2011 to March 2012

	Freight	Passengers
Worst point	335.065min (34,3 min/train))	105.466min (9,7 min/train)
Final destination	244.604min (25 min/train)	798.18min (7,3 min/train)

Number of trains for which EPR calculation gives a warning (without application of threshold)

	Freight	Passengers
Number of trains having at least 1min delay at final destination	8.715	1.9130
Final destination	38,5%	39,6%





Graph 18

If a train runs on time (no delay coded and no undocumented delay calculated), or if the cake (WP, FD, sum of delays or average of delays at EPR points) is equal to 0, then this train is not considered in EPR and thus there is no incentive for it.

In the picture above, a threshold is set to 5´ for Passenger and 14min for Freight trains. The picture shows the number of trains in each option for which a *bonus/malus* is applied. There will be no incentive for the trains that recover part of their delay before the measuring point for the cake because there is no calculation result in EPR for these trains.

Pros and Cons

Case 1: Cake = All delays (caused + undocumented) – external delays

Pros	Cons	Remarks
The greatest incentive: not only one point is considered for the cake but all delays. (it takes into account the greatest amount of trains possible)	Needs to take recovered time and undocumented minutes into account Unfair treatment of partners due to the difference of density of EPR points (as high as possible) Unfair treatment of partners due to different national coding rules and thresholds. It could happen that train runs which never cross the punctuality threshold are heavily penalised. As the length of the train run is not considered in the system there will be no comparability and fairness between long and short train runs	High financial flow (depending on the price of minutes and on thresholds)

Table 23

Case 2: Cake = Lateness at final destination – external delays

Pros	Cons	Remarks
No influence of coding behaviour (except for external delays) No need for equal density of EPR points	Potential incentive not to recover time (to have a bigger money flow), RU and IM on the last network are not encouraged to make	- FD reduces the number of trains for which EPR produces financial consequences (lower contribution to quality improvement)

FD reduces the volume of financial flow (lower bureaucratic arrangements needed) No need to take recovered time into account	improvements. Recovered time can hide real problems along the train run.	- There is a link between the lateness at final destination and the recovered time: part of it is related to the slack time included in the CTT.

Table 24

Case 3: Cake = Lateness at worst EPR point – external delays

Pros	Cons	Remarks
Incentive for all partners (the WP is not always in the same network) Gives an overview of all networks No influence of coding behaviour (except for external delays)	Incentive to decrease density of EPR points Missing EPR points can hide real worst point and a lack of improvement for hidden problems Needs the same coding behaviour as for external delays	

Table 25

Case 4: Cake = Average of lateness at EPR points – external delays

Pros	Cons	Remarks
Incentive for all partners (the WP is not always in the same network). Gives an overview of all networks No influence of coding behaviour (except for external delays)	Needs the same coding behaviour for external delays	Incentive for all partners (overview of all networks) to improve quality and reduce money flow

Table 26

Advice

In the short term, the advice is to keep the Worst Point.

As long-term solution, Case 4 (average lateness at EPR points) is favoured. But only with equal and high density of EPR points (the advice is to study this option in depth, because the results are not in the tool yet).

Status of this advice:

Preliminary advice by Experts	Long-term solution: unanimously Short-term solution: relevant Majority (> 60%)
Advice by CWG	Long-term solution: unanimously Short-term solution: relevant majority (all – 3)

6.2.5.9 Cross-border delays

Description

- Delays caused by next IM (40)
- Delays caused by previous IM (41)
- Delays caused by next RU (70)
- Delays caused by previous RU (71)
- Delays caused by external reasons on the next network (84)

Border stations constitute a weak link in international railway transport.

In fact, traditionally all partners have concentrated their efforts on implementing traffic operational agreements, taking care to play their respective roles in the best possible way.

IMs and RUs are organised in a different way depending on contracts (cooperation between RUs, subcontracting between RUS, cooperation between RUs and geographical organisation of IMs).

In short, the EPR raised the problem, even better gave the "opportunity", to take care of overall international transport quality and created awareness.

Starting from the absolute need to make the situation at border stations clearer, to properly feed the national/international systems with correct data and to come to an appropriate allocation of responsibilities for the recorded delays, a territorial approach has been adopted.

There is only one responsible IM for every border station, that is the territorially responsible IM (i.e. the IM on whose network the border station is located) that is in charge of the planning of timetables and operations in that specific installation. That IM must be consequently responsible for feeding the national/international information systems, both as regards the contracted timetables and the running advices.

The territorial approach has clarified the limits of the IMs' responsibility but the competence (responsibility) on the RUs' side still had to be elucidated. Consequently, difficulties have been registered in using the RUs' international codes: 70 and 71.

A common agreement within the pilot participants was reached:

The “previous RU” responsibility ends at the arrival at the border station

The “next RU” is then responsible for all operations done inside the border station (traction change, shunting, tail signals change, technical visit, etc …) until the train departure and afterwards.

These RUs’ responsibility limits were agreed on to solve technical problems and are not the real limits defined by contract between these RUs.

As specific operational situations are noticed at some border points, a ”responsibility matrix”(valid only within the frame of EPR) has been built for every EPR traffic route. Matrixes have been checked and approved by the EPR OWG members, as far as the validation is concerned, and by the CWG Experts as far as the calculation is concerned. Any change to the matrixes must be re-evaluated, checked and re-approved by the corridor coordinators.

Pros and Cons

Pros	Cons
Information is now exchanged between partners	

Table 27

Advice

Concrete and relevant results have been achieved. Validation and calculation functions can properly work so that the common advice is to keep the applied concept unchanged.

Status of this advice:

Preliminary advice by Experts	Unanimously (for the treatment of cross border delays -see for code external on the next network also the advice about external delays)
Advice by CWG	Unanimously (for the treatment of cross border delays - see for code external on the next network also the advice about external delays)

7. Detailed information relating to Section 7 – Billing/ Invoicing

No detailed information

8. Detailed information relating to Section 8 – INVESTIGATION OF THE LEGAL REQUIREMENTS OF A DISPUTE RESOLUTION SYSTEM

8.1 Legal context and required task:

As a reminder, the implementation of a system to improve performance is required by Article 35 of the **EU Directive 2012/34 published on 14 December 2012 , ("Recast" of the Railway Packages)** :

Infrastructure charging schemes shall encourage railway undertakings and the infrastructure manager to minimise disruption and improve the performance of the railway network through a performance scheme. This may include penalties for actions which disrupt the operation of the network, compensation for undertakings which suffer from disruption and bonuses that reward better-than-planned performance.

The basic principles of the performance scheme as listed in Annex VIII, point 4 shall apply throughout the network.

Annex VIII, point 4 may be amended in the light of experience in accordance with the procedure referred to in Article 60.

The Recast introduces the enforcement of basic principles, which are listed in Annex VIII, point 4. One of these principles, point 4(g) stipulates that:

Without prejudice to the existing appeal procedures and to the provisions of Article 50, in case of disputes relating to the performance scheme, a ***dispute resolution system*** *shall be made available in order to settle such matters promptly. If this system is applied, a decision shall be reached within a time limit of 10 working days.*

The EPR Legal Working Group (LWG) has therefore been requested to outline a dispute resolution system. What is required is not a "turnkey solution" but an analysis of the different possibilities available to the IMs and RUs in order to resolve their EPR-related disputes.

8.2 Summary of the proposition and feedback by the Project Management and OWG on the paper

8.2.1 Summary

The general objective of the dispute resolution system proposed is to avoid, as much as possible, to have to resolve EPR-related conflicts before the courts and tribunals and/or the national regulatory bodies. The LWG has consequently developed an escalation-based dispute resolution system. The dispute resolution system can be broken down in several steps.

The first step consists of a **conciliation** process between the involved parties- IM or RU – under the supervision of a neutral third party. The recourse to a third neutral party is necessary to bring the parties together. The exact role of the third party (arbitrator, facilitator, negotiator) is discussed later on.

In the event of failure to reach an agreement, a second step is triggered: the dispute has to be resolved before a **competent regulatory body** or **court** or **tribunal**.

In any case, in order to avoid future procedural discussions, the parties are invited to agree, on a contractual basis and beforehand, upon several criteria defining the **competent jurisdiction**, the **applicable law** and the **binding power** of the decision issued from the dispute resolution system.

As the objective is to explore potential solutions, the LWG´s proposal should not be unconditionally accepted or rejected, but rather discussed and perhaps improved.

The LWG would finally like to point out that in its expert document it refers to "IM / corridor management" to highlight the fact that EPR is to be used both by IMs (for passenger or freight traffic) and corridor management (for freight corridors only).

8.2.2 Feedbacks from the Operational Working Group and Project Manager

The LWG received fruitful feedback from two sources (the OWG and the project manager) which were very useful to grasp new issues which were not taken into account in the first draft and to help the group to propose a solution to them.

The LWG would like to clarify the differentiation between the dispute resolution process and the validation procedure. In its point of view the dispute resolution procedure **is not part** of the validation procedure but a separate further step (see also 8.3.1: Validation process).

This can already be concluded from the formulation in Annex VIII 4 g that refers in a general way to the performance scheme and not only to the validation procedure. While the LWG feels that in practice most disputes will probably be resolved within a short period of time by the parties (RU and IM / corridor management), there should be a neutral body to which disputes may be referred to if they cannot be resolved at the IM / corridor management level (i.e. by the parties themselves). This is probably the situation that the authors of the draft Recast had in mind.
Furthermore, the validation process does not offer the opportunity to call for a neutral third party. In the LWG`s point of view, this neutral body could turn out to be very useful in order to settle a dispute.

The EPR Project Manager also underlined the necessity to harmonize the period for validating delay (up to ~40 days). The LWG agrees that the validation process should be shortened in order to have a balance between the validation period and the dispute resolution process (limited to a 10-days period).

8.3 Two types of disputes: small-scale and large-scale conflicts

The LWG has identified two different kinds of disputes to be settled within the dispute resolution system: **small-scale** and **large-scale** disputes. It should be taken into account that a dispute could occur between an infrastructure manager and a railway undertaking, but also between two infrastructure managers or two railway undertakings, not to say several IMs and RUs. As underlined *supra*, the LWG definitely thinks that the dispute resolution system proposed **should** take place **after** the attribution of the delay code and the validation process.

8.3.1 Validation process

According to the EPR Handbook, a delay code is attributed to a delay by the IM and subsequently notice is given to the parties to whom the code is attributed. A national or international delay code validation follows, during which the code and the linked minutes are accepted or negotiated between the IM and the party made responsible for the code. If the EPR partners cannot agree on a code the data set is marked for dispute resolution (see Section 5)

The EPR Handbook also adds that "*if no common decision is reached the case can be marked as closed. Disputed and closed delay code cases will be excluded from the EPR at the end of the validation phase*."

Should a dispute resolution procedure be applied after the validation process to cases that now are marked as closed, the cases that are settled through this dispute resolution system **could not be reintroduced** into the EPR system. This solution would make the dispute resolution system **useless**: the "winning party" would not benefit from its *bonus* minutes and the "losing party" would not be "sentenced" to the conventional penalty.

Furthermore nothing would prevent a party from hindering the correct functioning of the EPR **by disputing every delay code**, the final objective being to get its train excluded from the EPR database.

Having regard to these elements, the LWG strongly suggests that a train to which a disputed delay code is attributed, should not merely be excluded from the EPR system but **suspended during the resolution of the conflict**.

In case it is not possible to suspend a a disputed delay code for technical (or any other) reasons, a differentiation should be drawn between the small-scale and large-scale conflicts (see: *following points*). While a small-scale dispute would be resolved **during the validation procedure**, a large-scale conflict would be resolved **outside of the validation procedure** and the outcome of the decision taken thereafter should not be reintroduced into the EPR database.

8.3.2 Small-scale disputes

Small-scale disputes include disputes related to (suspended) delay codes. Yet, every small-scale dispute should not give rise to a dispute resolution procedure. A threshold should be established to ensure that only conflicts with a certain amount of disputed delay minutes are brought before the body in charge (*e.g.* 20 minutes delay for passenger and 60 minutes for freight). The threshold needs not to be applied if a question of principle or recurrence is involved (see 8.3.2.1 Large-scale disputes).

If it is technically possible, the resolution of this type of conflict should take place **after** the validation process. If it is not, then disputed delay codes should be resolved within the validation process.

The validation process should therefore be revised (see also below 8.4.1.3 Setting up the conciliation body).

8.3.2.1 Large-scale disputes

Large-scale disputes are conflicts related to a question of **principle**/ **structural issue** of the EPR or a **recurrent small-scale conflict**, i.e. the same delay code which is systematically disputed, possibly by the same parties. In any case, large-scale dispute resolution will take place **after** the validation procedure. If the delay code cannot be suspended, the decision resulting from the process shall not be incorporated in the EPR database.

8.3.3 Why a differentiation?

Large-scale and small-scale conflicts, by their very nature, cannot be resolved by the same persons and following the same procedure. Small-scale conflicts have to be solved rapidly and by the parties themselves – possibly with the help of a third neutral party, while large-scale conflicts concern every EPR Partner and need much more time to be solved (see also below 8.4 Which body will be in charge of the dispute resolution process? and 8.4.1.6 The time limit of ten working days).

8.4 Which body will be in charge of the dispute resolution process?

The EPR LWG examined the question of which authority should be empowered with decision-making power and the enforcement of those decisions. The existing authorities (regulatory bodies, courts and tribunals, ICC) do not offer the guarantees of promptness required in the Recast (see below, 8.4.1.6. The time limit of ten working days).

That does not mean that they are excluded from the entire procedure, but they should remain at the last level of the dispute resolution system.

Therefore, we would rather lean towards the creation of a specific body (*ad hoc* body): the **Conciliation Body**. This body should be empowered a single task: resolving EPR disputes, both small and large scale.

The recourse to competent national regulatory bodies (hereinafter "RB") or courts and tribunals (hereinafter "C&T") is not put aside. As already pointed out, if they were to be involved, they should remain at the last level of the dispute resolution.

8.4.1 The Conciliation Body

8.4.1.1 Composition of the Conciliation Body

The Conciliation Body could be composed of representatives of the parties, taken from a "pool of experts". The exact composition of the body would depend on the type of issue at stake.

Representatives from a pool of experts

The conciliation body could be an **expert conciliation panel**, under the supervision of a neutral third party, the latter being responsible for organising the conciliation process under the best possible conditions. A UIC member might play the role of neutral third party as UIC has the necessary expertise and is not directly involved in conflicts, but still does know the EPR system. However, it has to be added that the UIC has to decide whether it agrees with this proposal and

check whether it has sufficient financial and human resources at its disposal. Another possibility is to call for the help of the freight corridor managing board.

On this basis, representatives of the parties (RUs, IMs, possibly UIC or MB) shall constitute the conciliation body. Every party should be represented either by one or an equal number of delegates. In order to be able to create this body quickly, a "**pool of experts**" (representatives of IMs and RUs) shall be created and duly registered with the UIC secretary/freight corridor management.

Every party should have the opportunity to **reject the composition** of the panel, on the basis of duly justified reasons. If the panel is not rejected within a three days time limit, the panel will be considered as accepted.

RNE should **not be directly involved** in the dispute resolution body as it is a partial body: if RNE were involved, **CIT** would have to be involved as well. For the time being, however, CIT does not have the resources to become involved.

8.4.1.2 A composition depending on the issue at stake

The composition of the Conciliation Body depends on the **type of issue** at stake.

Small-scale disputes, related to delay codes do not require a large panel. Therefore, only **one** representative of the parties involved and **one** representative of the neutral third party (*e.g.* UIC or a member of the freight corridor managing board) should sit on the panel.

Large-scale disputes are much more complex. Indeed, all EPR Partners will be interested in the outcome of such discussions since the impact of the decisions taken will concern the entire EPR system. Consequently the discussion of EPR principles or tool malfunctioning will certainly require a more complex panel composition and the involvement of a larger number of experts, But the exact number of has not yet been defined. However, the involvement of **all users** of EPR will certainly cause practical problems.

Similarly to the freight corridors' advisory groups, a solution could be to create several **groups of interest**: EPR's project management, RU's, IM's and possibly terminal owners and managers, freight corridor managing board. In this way, each "group of interest" would be required to appoint one or several representatives to the panel. The latter would then defend the entire group's interest.

8.4.1.3 Setting up the conciliation body

Firstly, a strong legal basis must exist beforehand. Every EPR Partner should enter into a **general agreement**, defining the procedure, composition, exact functioning of the conciliation body and nature of the decisions it may take. If this system is applied within a **freight corridor**, the LWG strongly suggests that **every single member** of the corridor should enter into this agreement

As suggested above, recourse to this Conciliation Body should be made **after the validation process**. If this is not possible, small-scale conflicts would be dealt with during the validation process while large-scale conflicts would be resolved after the validation process. The LWG also suggests a **revision of the EPR Handbook** and, possibly, the **validation process**.

The conciliation remains an **opportunity** available to the parties; if they do not want to make use of the it, they remain free to go before their C&T' s or RB' s. However, if they enter into the agreement referred to *supra*, they should be compelled to make use of the dispute resolution system.

8.4.1.4 Nature of the conciliation decision

The objective of the dispute resolution system is to find a **consensus among the parties**. Therefore, this procedure is not, strictly speaking, the same as arbitration. Moreover it appears that arbitration would lead to additional legal problems. For instance, in some countries (*e.g.* Belgium), if the parties opt for arbitration, they are not allowed to go before C&Ts anymore.

However, if dissent between the parties is too great and a consensus cannot be reached, recourse to the Conciliation Body will not help much. The Conciliation Body, and particularly the neutral person, should thus be empowered with a **strong decision-making power**.

There is a **conflict** between the need for a real decision-making body and the legal problem attached to arbitration. For this reason, the LWG has formulated **two different hypotheses**. According to the first hypothesis, the neutral third party does not have any decision-making power. If a consensus is not reached among the parties, then the conflict will have to be brought before national authorities – with the problems attached thereto (see below 8.4.2. Regulatory bodies and 8.4.4. Courts and Tribunals).

According to the second hypothesis, the neutral third party is endowed with decision-making power: if a consensus is not rapidly reached, it can **impose** a decision on both parties. Thus, the third party will play the role of **arbitrator**, with the legal problems attached thereto (see above). Arbitration would **only** be applicable to **small-scale conflicts**, as the resolution of large-scale conflicts requires necessarily a general consensus.

In this way the role of the third party might be **ambivalent** depending on **the dispute at stake**. Within a small-scale dispute procedure, the conflict must be settled quickly and if possible within a time frame of 10 working days (see: below, 8.4.1.6. The time limit of ten working days). The neutral third party should dispose of sizeable powers (to be defined – *e.g.* casting vote) in order to oblige the parties to find a rapid solution.

Its role should not be the same when dealing with a **large-scale dispute**. It would lose his casting vote and should simply represent a "group of interest" – *e.g.* UIC or MB – or be a mere facilitator.

8.4.1.5 Appeal against the decision

When the Conciliation Body gives a "ruling", the parties might have a time limit (*e.g.* 10 days) to **"appeal"** against the decision before their national authorities (RB or C&T). If they fail to so, the decision will be legally binding upon the parties, on a contractual basis.

It should be noted that this legal possibility could **weaken** the dispute resolution system: a party could simply pretend to agree on a consensus, and subsequently appeal against this decision before its national authorities.

8.4.1.6 The time limit of ten working days

The Recast stipulates: "Without prejudice to the existing appeal procedures and to the provisions of Article 50, in case of disputes relating to the performance scheme, a dispute resolution system shall be made available in order to settle such matters **promptly**. If this system is applied, **a decision shall be reached within a time limit of 10 working days**."

This provision in the Recast was a problem for the EPR LWG inasmuch as it was unable to determine to which period this time limit of 10 days corresponds, and exactly when the deadline should start. In any case it is assumed that the time limit **begins** when the entity in charge of the dispute resolution system receives **all the information necessary** to resolve the conflict from the parties involved.

The **duration of the validation process** should also be taken into account; it differs from one Member States to another. In order to prevent legal and operational misalignment, the time limit to validate the delay codes should be fully harmonised, or at least harmonised within each freight corridor.

This ten-day time limit could reasonably be applied to a small-scale conflict resolution procedure, no matter if it takes place before or after the validation process. However, concerning large-scale disputes, having regard to the complexity of the issues at stake, more than ten days will definitively be needed to resolve the conflict. It is therefore assumed that the time limit would only be applicable to small-scale disputes. If such a distinction cannot be made, it will not be possible to respect the ten-days time limit shall not be respected.

In conclusion, CER should propose an amendment:

- a ten-days time limit shall be applicable for coding problems
- a longer time limit will be needed for more complex issues

8.4.2 Regulatory Bodies

National regulatory bodies ("RBs") could also resolve EPR- related disputes. Legally speaking, they could deal with EPR disputes since they are empowered with the general task of deciding on any complaints **related to charges for the use of rail infrastructure** (see 8.4.2.1. Legal basis: article 30 of Directive 2001/14 and article 55 of the Recast).

However, recourse to RBs is not necessarily the best solution, as it presents as many advantages as disadvantages (see 8.4.2.2. Regulatory bodies: advantages and disadvantages).

Finally, a European Regulatory Body yet to be established might be regarded as a possible solution in the future.

8.4.2.1 Legal basis: Article 30 of Directive 2001/14/EC and Article 55 of the Recast

According to Article 30 of Directive 2001/14:

"30.2 An applicant shall have a right to appeal to the regulatory body if it believes that it has been unfairly treated, discriminated against or is in any other way aggrieved, and in particular

against decisions adopted by the infrastructure manager or where appropriate the railway undertaking concerning: (…;) d) the charging scheme; (…)

30.3. The regulatory body shall ensure that charges set by the infrastructure manager comply with chapter II and are non-discriminatory. Negotiation between applicants and an infrastructure manager concerning the level of infrastructure charges shall only be permitted if these are carried out under the supervision of the regulatory body. The regulatory body shall intervene if negotiations are likely to contravene the requirements of this Directive.

(…)

30.5. The regulatory body shall be required to decide on any complaints and take action to remedy the situation within a maximum period of two months from receipt of all information. Notwithstanding paragraph 6, a decision of the regulatory body shall be binding on all parties covered by that decision."

The regulatory body is therefore responsible for **matters related to charges for the use of rail infrastructure**. Based on this article, can it be assumed that the regulatory body is in charge of dispute resolution for EPR-related matters?

There are several elements pleading for this conclusion, mainly based on the terms used in the Directive 2001/14 (Articles 11 and 30(2)) and the key role given to the regulatory bodies in the Recast.

Article 30(2) of Directive 2001/14 lists the powers of the regulatory body. Article 56 of the Recast does the same. These powers should be considered residual rather than attributed powers.

Indeed, the list of powers attributed to regulatory bodies ("RBs") in Article 30(2) of Directive 2001/14 does not appear to be exhaustive. The European legislator envisages that the Regulatory Body is in charge of appeals against decisions adopted by the IM if an applicant believes that it has been unfairly treated, discriminated against or is **in any other way aggrieved**. In this way, the RBs scope of analysis is not limited to preventing discrimination.

Moreover, the RB is explicitly mandated to receive the appeals against decisions related to the **charging system** (Art. 30(2) (d)). The charging system encompasses, i.e., the performance regime. This is confirmed by the specific place occupied by Article 11 of Directive 2001/14 (dealing with the performance regime), which stands namely under Chapter II: infrastructure charges. Consequently, given that the performance regime falls within the scope of the charging system, the Directive considers that **RBs** might play the role of **"arbitrator"** in the dispute resolution system.

Yet, it can be argued that the European legislator has not attributed this competence **explicitly** to the RB. If the European legislator had intended to attribute the resolution of EPR-related disputes to the regulatory body, it seems more than likely that it would have added it to Directive 2001/14, to Annex VIII, Point 4(g) and/or to Article 56 of the Recast. This is not the case. Additions to the Recast (in comparison with Directive 2001/14) involve only the attribution of general powers, such as *monitoring competition* and *preventing discrimination*

between *applicants*[10]. These functions have more to do with monitoring the development of the rail market than with the resolution of EPR-related disputes. Can we conclude from the Directive that rail stakeholders are therefore free to decide which body is competent to arbitrate EPR-related disputes?

The LWG rather considers that RBs are competent to arbitrate EPR-related disputes *in absentia*, meaning it should **not prevent parties from agreeing upon another dispute resolution system**, as proposed hereinbefore (see above 8.4.1.3. Setting up the conciliation body).

It has to be added that any dispute resolution system must, in any case, **respect the European and national legislation in force**. Therefore, if the RB's are chosen to arbitrate a dispute, first it must be checked whether the national regulatory body has validly and legally been empowered with the task of ruling on EPR-related disputes (or equivalent).

For instance, recently the Belgian RB has been legally empowered with the competence to resolve disputes arising from the application of the national performance regime, and particularly attribution of delays[11]. The Belgian national regulatory body could, on this basis, give a ruling on an EPR-related dispute.

8.4.2.2 Regulatory body: advantages and disadvantages

Regulatory bodies present as many advantages as disadvantages. These are exposed hereinafter.

<u>Disadvantages</u>

The main disadvantages are the disparities between regulatory bodies, which may be more or less obvious. It is indeed difficult to enforce the recourse to this institution in all circumstances due to the differences existing among the regulatory bodies: resources, experience, functioning and attributed powers.

Clearly, the resolution of EPR-related disputes would, in all circumstances, represent an additional workload for regulatory bodies. Certain regulatory bodies may not possess the **financial and human resources** needed to organise arbitration proceedings[12], not to mention taking on additional tasks such as the supervision of rail markets and audits required by the Recast. In order to perform appropriate supervision of the rail market, European legislature intends to ensure that regulatory bodies have the "necessary organisational capacity" [13] to carry out their tasks. Yet, there is no guarantee that this will actually be implemented.

Furthermore, regulatory bodies do not all possess the same amount of **experience** in rail matters. For example, in Great Britain and similarly in Germany, a regulatory body was established several years ago[14]. These disparities may be the source of tension or conflict in the

[10] Recast Art. 56(2): "The regulatory body shall also have the power to monitor the competition in the rail services markets and review points (a) to (g) of paragraph 1 on its own initiative and with a view to preventing discrimination between applicants".

[11] Applicable from 2013. Art. 9 § 6 of the Loi du 04.12.2006 relative à l'utilisation de l'infrastructure ferroviaire, telle que modifiée par la loi du 14.04.2011.

[12] In Britain, the regulatory body does not have the resources to organise this type of arbitration within a limited amount of time. The situation appears to be similar in Belgium.

[13] Art. 57(2) *in fine* Recast.

[14] ITS Study, White Rose Research Online, University of Leeds, Sheffield and York, pp. 12-13.

event where the resolution of disputes is attributed to one regulatory body and not to another. For example, as Germany has a well-funded regulatory body with considerable experience in this field, all disputes involving the German rail network will probably be submitted to this body. If this is the case, this may lead to a loss of objectivity in the attribution of powers and the risk of unfair practices to preserve national interests.

There exist substantial differences in the functioning and status of the RB, implying substantial differences regarding the **independence** of these RBs. Hence, the LIB Index has divided European RBs in three categories: special regulatory bodies, regulatory bodies within a railway authority and regulatory bodies within a ministry. The latter is considered as the weakest form of independence, owing to the fact that they do have their own budget[15].

The regulatory bodies do not enjoy the same **powers** either. For instance, Sweden, Germany, United Kingdom, Denmark, the Netherlands and Austria form a leading group : their RBs possess wide-ranging competencies and powers. But they differ from another in relation to their facilities for ordering penalties and fines: Germany can order penalty payments but is not allowed to impose any fines. This power is, however, granted to the Swedish, Dutch and UK RBs[16]. We also refer to the **legal disparities** that could occur between the Member States (see above 8.4.2.1. Legal basis: Article 30 of Directive 2001/14/EC and Article 55 of the Recast).

These differences and weaknesses of the various RBs will probably disappear in the future. But it should be remembered that for the moment, RBs are not in the same playing field and that this situation could lead to frustration or other conflicts.

Advantages

Nevertheless, the use of regulatory bodies does offer some advantages, such as experience with general rail matters, an existing legal framework, and the relatively low cost of their involvement.

Firstly, regulatory bodies have the railway experience required to resolve disputes relating to delays. Regulatory bodies understand (or are supposed to understand) the issues at stake and the applicable principles, whereas non-specialist arbitrators would require explanations on most rail-related principles, thus slowing down arbitration proceedings and decision-making.

Secondly, regulatory bodies have already been set up and are evolving within an established legal framework. As mentioned above, they enjoy specific powers notably in charging schemes17, are required to cooperate for the purpose of coordinating their decision-making principles18, are independent from the parties in conflict19 and have the authority to compel infrastructure managers and RUs to provide all necessary information20. Thus it seems that, attributing the disüute-resplution competence to RBs would reflect the European legislator's mind.

[15] Rail Liberalisation Index 2011, LIB Index, IBM Global Business Services, p 56.
[16] Rail Liberalisation Index 2011, LIB Index, IBM Global Business Services, pp. 48-49.
17 Art. 30 of Directive 2001/14.
18 Art. 31 of Directive 2001/14.
19 Art. 30(1) of Directive 2001/14.
[20] Art. 30(4) of Directive 2001/14. The Recast even provides for the application of "appropriate" sanctions, including fines, in the event of non-compliance with the regulatory body's requests.

Moreover, the cost of arbitration proceedings organised by the regulatory bodies is relatively limited in comparison to the cost of arbitration by the ICC[21]. In theory, they are funded by each Member State, which means no advance payment or pointless expenses (also see below).

Finally, if decision-making powers were attributed to regulatory bodies, their decisions would normally be **binding** on the parties (see Article 30.5 Directive 2001/14 *in fine: a decision of the regulatory body shall be binding on all parties covered by that decision*). Furthermore, the Recast provides for the possibility of applying **appropriate sanctions**, including fines, in order to enforce the regulatory body's decisions[22].

8.4.3 The European Regulatory Body

In an ideal world, a European regulatory body would be set up. Its scope would extend throughout the European Union and it would centralise all EPR-related disputes.

However, this solution does not exist in legislative texts, except in Article 57 of the Recast[23]. Moreover, the **workload** of this regulatory body would be extraordinary, preventing this institution from providing solutions within a 10-day delay.

8.4.4 The Courts and Tribunals

The use of national courts and tribunals should remain possible in order to ensure that decisions can be appealed against. It is preferable to retain this possibility regardless of the final solution adopted.

However, given the slowness of national legal systems, it would be better to use them as a last resort (appeal of the arbitrator's decision) and not at the first level of the dispute resolution process. Moreover, the legal competencies of the national courts and tribunals are to be checked in every Member State.

Next, Article 30(6) of Directive 2001/14 states that "*Member States shall take the measures necessary to ensure that decisions taken by the regulatory body* ***are subject to judicial review***". In the LWG´s opinion, this provision must be applied *mutatis mutandis* to EPR-related decisions, regardless of the authority having made the decision under appeal.

Furthermore, a judicial review of any kind of decision requires that the C&T have the **material jurisdiction** to do so. It is up to every Member State to check whether their C&T possess the necessary material jurisdiction.

Finally, as a reminder, LWG highlights the danger that a systematic recourse to C&T will hinder or even **weaken** the dispute resolution system, as presented above.

8.4.5 4.4. International Chamber of Commerce (ICC)

ICC is the International Chamber of Commerce; its headquarters are set in Paris. It specialises in the arbitration and resolution of commercial disputes.

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[21] A minimum of $3,000 is required to set up the arbitration court in addition to an amount proportionate to the sum at stake.

22 Art. 56(4) in fine Recast.

23 See in this way: Draft Report 2010/0253 (COD) on the proposal of a directive of the European Parliament and the Council establishing a single European railway area (recast), Committee on Transport and Tourism, Rapporteur Debora Serracchiani, pp. 11-12: Recital 21 a new: Based on the experience of the network of regulatory bodies the Commission should come forward with a legislative proposal for the setting-up of a European regulatory body. The current version of the Recast does not provide for a European regulatory body except for the proposal in Art. 57 a (new): It might come with the fourth Railway Package.

An analysis of how the ICC work, the cost of proceedings (a minimum of $3,000) and the time required (up to 13 months) shows that this solution does not correspond to what is expected by rail stakeholders who want faster, more easily applicable and cost-effective decisions.

8.5 Applicable law and territorial jurisdiction

In all circumstances, the applicable law regarding EPR-related disputes must be determined. As such, in case a national court, tribunal or regulatory body is in charge of resolving the conflict, it will be necessary to consider its territorial jurisdiction.

Without prejudice to the free choice left to the parties, the applicable law and the territorial jurisdiction should be determined in advance (i.e. before any conflict). The parties should thus agree on **general criteria**, allowing them to rapidly and objectively decide on which jurisdiction is competent and which law is applicable. Such criteria could be *e.g.* the first delay, the greatest delay or the domicile of the defendant.

Council Regulation No. 44/2001 of 22 December 2000 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters (Brussels I) could usefully analysed[24]. Indeed, this regulation attributes territorial jurisdiction in civil and commercial matters regardless of the nature of this jurisdiction. However, it does not extend to revenue, customs or administrative matters or arbitration. This does not prevent from using the main criteria of the Regulation to draw conclusions for the dispute resolution.

8.5.1 First criteria: the choice of the parties

The parties remain free to decide which law will be applicable and which body will be competent to give a ruling on their dispute. The choice of the parties should definitely remain their first option.

However, at this stage of discussion, it is more than likely that they will not be able to agree upon the applicable law and territorial jurisdiction. Moreover, the body they choose must have the material jurisdiction to deal with this kind of dispute (see above 8.4.4 Courts and Tribunals).

8.5.2 Territorial jurisdiction – Two general principles

Determining the territorial jurisdiction is essential when a conflict has to be brought before national C&T or a national RB. The criteria needed to determine the territorial jurisdiction could be inspired by Regulation 44/2001.

First general principle: The place of performance

According to Article 5.1 of Regulation 44/2001, "a person domiciled in a Member State may, in another Member State, be sued in matters relating to a contract, in the courts for the place of performance of the obligation in question. For the purpose of this provision and unless otherwise agreed, the place of performance of the obligation in question shall be (…) in the

[24] Council Regulation (EC) No 44/2001 of 22 December 2000 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters, Official Journal L 012 , 16/01/2001.

case of the provision of services, the place in a Member State where, under the contract, the services were provided or should have been provided" (art. 5.1 R. 44/2001).

If this was applied to the EPR, it would mean that territorial jurisdiction is determined by the place of performance of the obligation, that is, the **place where the delay related to the dispute occurred**.

If there are **several delays**, the LGW recommends that the parties choose the jurisdiction in relation to the place where the **first disputed delay** occurred or where the **longest disputed delay** occurred.

Example:

If a delay occurs in Member State A while the train is operated by RU Z domiciled in Member State B, then in the event of a dispute, the institutions of Member State A have territorial jurisdiction because the delay that is causingthe dispute occurred in A.

*If delays occur in Member States **A**, C and F while the train is operated by RU Z domiciled in Member State B, then in the event of a dispute in these three countries, the institutions of Member State **A** have territorial jurisdiction because the first delay causing the dispute occurred in A/or because the longest delay occurred in this Member State.*

Second general principle: The domicile of the defendant

Legally speaking, a legal person is domiciled at the place where it has its: (a) statutory seat, or (b) central administration, or (c) principal place of business[25]. The issue is to determine who the "defendant" is and where its domicile is situated. Determining the domicile of a party should not cause any problems, but determining who must be considered as "defendant" is not always crystal clear.

A concrete solution could be the following: a party **objecting** to the attribution of the delay should be considered as the "**claimant**". In this way, the "**defendant**" should be either the party which has **attributed** the delay – in the case of an IM – or **whose "*bonus*" is challenged** – in the case of a RU. The domicile of the latter would determine the territorial jurisdiction. If there are several defendants, the one who has attributed the longest delay or whose "*bonus*" is the longest will be considered as **main defendant** – its domicile will be chosen.

Example:

If delays occur in Member States A, C and F while the train is operated by RU Z domiciled in Member State F, and the delay is attributed by an IM domiciled in C, then in the event of a dispute, the institutions of Member State C have territorial jurisdiction because the IM – the defendant – is domiciled there.

8.5.3 Applicable law: the applicable law follows the jurisdiction

The applicable law is the **law of the country of the jurisdiction**, unless otherwise agreed upon by both parties. This is a logical solution. Each national jurisdiction or body applies its domestic

[25] Art. 60 R. 44/2001 of 22 December 2000.

law in order to avoid more complex legal issues. Consequently, determining the territorial jurisdiction is crucial.

5.4. Enforcement of judgments

"A judgment given in a Member State shall be recognised in the other Member States without any special procedure being required" (Art. 33(1) R. 44/2001).

This general principle is also applicable to the resolution of EPR-related disputes, namely that **no special procedure should be required**. This principle must appear in an agreement, *e.g.* a contract for the use of infrastructure or the general agreement establishing an EPR dispute resolution system.

8.5.4 Conclusion: recommendations for criteria to determine the jurisdiction and applicable law

The EPR LWG recommends that:

- The parties choose the jurisdiction they prefer by means of a legal agreement. The territorial jurisdiction determines the applicable law (see above).
- The parties agree, beforehand in a general agreement, on a general principle: either the place of performance or the domicile of the defendant. In this way, in case of disagreement, this criterion will be used.

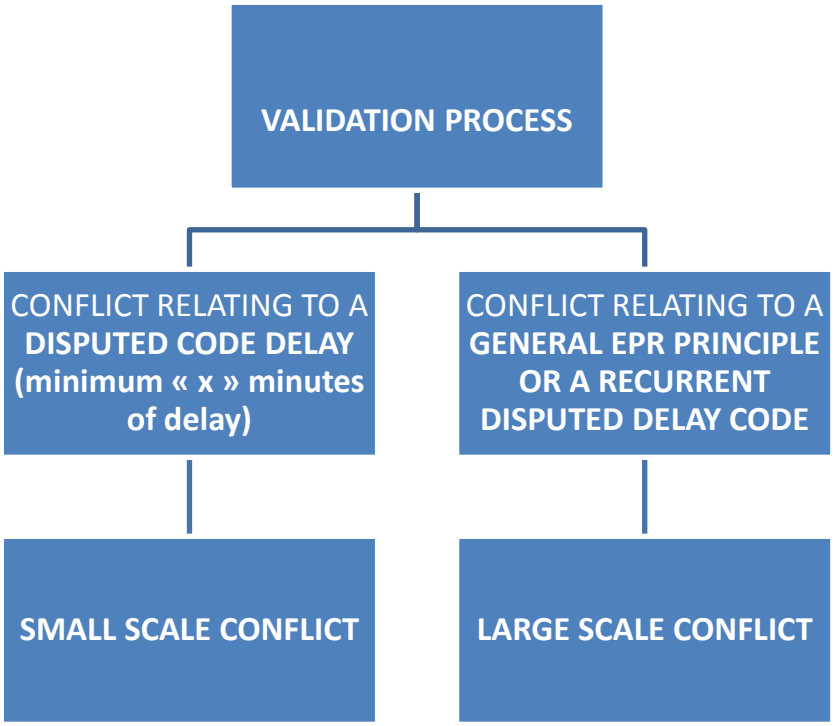
8.6 General conclusion

Administrative and judicial procedures are often complex and lengthy. Moreover, each domestic law provides its own rules regarding the territorial and material jurisdiction. In addition, disputes are often related to a small conflict, not worth a costly procedure.

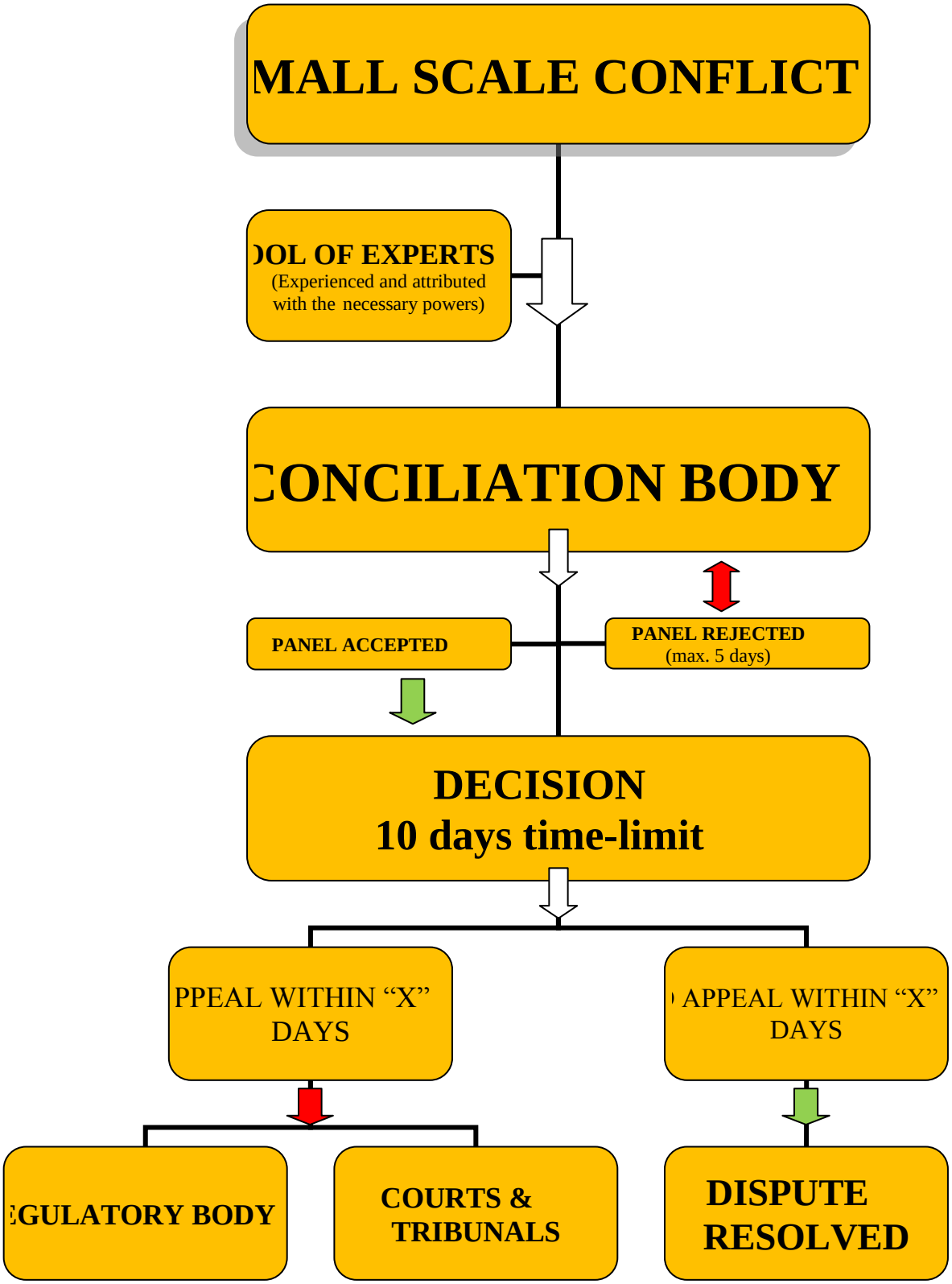
Therefore, the creation of a single international dispute resolution system seems to be the more pragmatic and effective solution: it complies with the delays imposed by the European legislator (the ten-day time frame), allows the parties to settle their disputes in an objective, rapid, pragmatic and cost-effective way and avoids any long-lasting procedure.

This does not constitute a fully comprehensive solution to the problems that could occur during the implementation and application of the EPR system, but from then on there would be a place to discuss these.

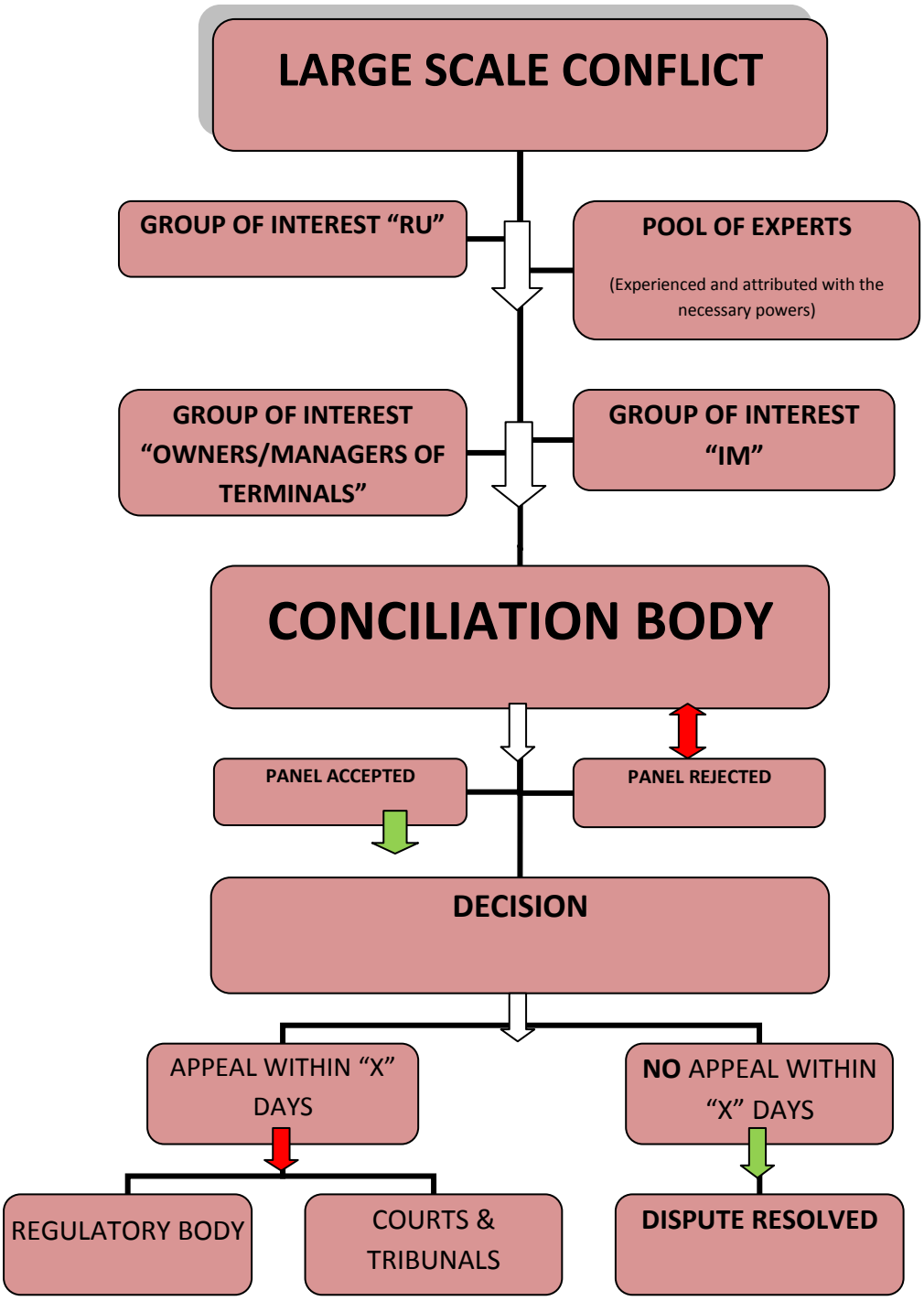
8.7 ANNEXES: SCHEMES OF THE DISPUTE RESOLUTION SYSTEM



Picture 24 – types of conflicts



Picture 25 – small scale conflict process



Picture 26 – large scale conflicts process

9. Glossary

Term	Explanation	Reference
Border point (or station):	Handover point or station coinciding (at least from the operational / administrative point of view) with the geographical border between two countries.	4.2 4.5 Annex 4.5
Cake	Amount of "calculation units" paid in total for a late train; the parties who have caused the delays pay a share of the cake, while the parties who have suffered the delays receive a share of the cake; the cake is equal to the lateness at the worst EPR point minus external delays	6.1
Calculation tool	Tool to calculate the EPR results	3.1.3 6.1.6 Annex 6
Caused delay	A delay attributed to one of the partners operating the given train. Additionally undocumented minutes are treated as caused delays. Each caused delay is "suffered" by the other partners; it is the basis to calculate the penalty that each party has to pay.	6.1
CDQ	Contact partner for data quality issues Function on company level, required to investigate and resolve data quality problems	3.2
CDV	Contact partner for delay code validation Function on company level, required to validate delay codes	3.2
Ceiling	Maximum penalty that has to be paid per train run; it is needed to limit the penalties to a warning function. The currently implemented EPR calculations do not consider ceilings.	6.1.6.2
Coding points	All or a sub-set of national points where the delay cause is coded, if it exceeds a specified threshold, which differs from country to country	Annex 4.2
Corridors	General definition: a major railway line along a geographical route. For EPR purposes: sample of train numbers of similar traffic type and area of running. Used to summarize results during the EPR pilot application.	3.2.2
CTT	**C**ontracted **T**ime **T**able Defines the planned route and planned time of a train run. It is delivered by the IMs to the TIS system with message 2090 and merged into an international timetable by the TIS-tool.	4.3.1

Delay	First or subsequent delay above a pre-defined national threshold; it is delivered by the IMs with message 2005 along with a delay cause code according to UIC leaflet 450-2. Delays are important for the attribution of caused and suffered delays.	4.3.5
Delay code	The "explanation" why a delay occurred in form of a code defined in UIC leaflet 450-2. Delay codes are subject to validation.	3.5
Delta-t value	Difference between planned and actual time for a specific point/ status.	4.4
EPR points	Subset of TIS points, used to define the segments for EPR calculations. The lateness at EPR points is an important factor in calculating the "Cake", "Undocumented minutes" and "Recovered time".	4.2 Annex 4.1
EPR SM	EPR System Manager Function on general level, required to keep the EPR tools running and up to date. Integrated into the system administration of TIS and carried out by RNE.	3.2
EPR tools	Tools created within the EPR project to monitor data quality of EPR trains, support the validation of delay codes and carry out the calculations for the EPR model.	2.2.2
EPR train list	List of train numbers which are subject to the EPR procedures	4.1
EPR-BI	EPR Billing & Invoicing Office Describes the function taking care of the administration of payments and receivables.	7
EPR-CC	EPR Corridor Coordinator Function on corridor/ relation level, required to coordinate data collection and data quality for a relation	3.2
Exclusion rules	Exclusion rules are functions of the EPR tool to avoid that train runs with incorrect or insufficient data or not agreed delay codes are considered in the EPR calculations.	4.6
External delays	Delay with a delay code defined as "External cause". Such causes originate from circumstances which cannot be influenced by IMs or RUs. They include delays caused by force majeure, third parties or exceptional weather conditions. UIC leaflet 450-2 summarizes them in column 8x. For EPR purposes also code 90 "dangerous incidents, accidents and hazards" are treated as external.	4.5 6.1

Handover point (or station):	Point or station where the responsibility of the IM and/or (for EPR purposes) RU changes	4.2 4.5 6.1 Annex 4.5 Annex 6.1
International validation	International validation is a procedure to ensure that the delay codes 4x, 7x and 84 are displayed to and accepted by the company made responsible for the delay. International validation is done with the EPR validation tool.	5.3
Lateness	Delta-t value, if >0	4.4
Master station	TIS function used to replace missing CTT or running advice information with information from nearby points. Master and substations have to be defined in the TIS tool.	4.3.3 Annex 4.2
National point	A point along the train path, where the national IT and operational systems measure the lateness (normally automatically); their number and distance differ from country to country	Annex 4.1
National validation	Validation is a procedure to ensure that delay codes are displayed to and accepted by the company made responsible for the delay. National validation includes all codes except 4x, 7x and 84. The EPR validation tool can be used for national validation by decision of the IM.	5.2
Next/ previous IM/RU delays	Delays that occurred in one area of responsibility, but were caused by an incident in another area of responsibility. Necessary to attribute the responsibility for caused delays correctly. The corresponding codes (4x for IM, 7x for RU, 84 for external delays) are often also called “international codes”.	4.5 Annex 4.5
Point status	Describes the status of a train run at a specific point. Relevant stati for EPR calculations are: 1 Arrival at final destination 2 Departure from origin 3 Arrival at an intermediate station 4 Departure from an intermediate station 5 Run-through	4.2 Annex 4.1

Primary delays	A delay which is a direct consequence of an incident (engine breakdown, signal box failure, suicide). In case of "train based" incidents like engine breakdown only the delay of such a train is considered as primary delay. Primary delays can be • Attributed to the IM (1x, 2x, 3x, 4x) • Attributed to the RU (5x, 6x, 7x) • Considered as external delays (8x, 90)	4.5
RA	**R**unning **A**dvice Delivers the actual time at a specific point/ status and the deviation from the planned time at that point. It is sent by the IMs to the TIS system with message 2002.	4.3.2
Recovered time	Recovered time is a calculation function in the EPR calculation tool and calculated on segment level as follows: Lateness $^{Point/status\ 2}$ minus Lateness $^{Point/status\ 1}$ minus Delay ^{Segment}, if <0 The calculation tool shows the absolute value.	6.1
RU configuration	Classical cooperation: Responsibility areas of IMs coincide exactly with those of RUs for the whole train run. Concurrence (or open access): One RU is operating the train throughout the whole train run. Mixed situation: (Some) responsibility areas of IMs do not coincide exactly with those of RUs.	6.1 Annex 6.1
Secondary delays	Delay with a delay code defined as "Secondary cause". Such causes describe an operational consequence of lateness (of the same or another train) instead of the basic cause. Secondary causes are track occupation, turnaround of staff or vehicles and connections.	4.5
Section	A section is the area of a single IM and consists of several segments	3.1.3
Segment	Lowest level for EPR calculations Are defined by EPR-points and can be either station segments (Starting station or between arrival and departure at an EPR-point) or line segments (departure from one EPR-point until arrival at the next)	3.1.3
Suffered delay	Delay that an IM or RU has to deal with because a train is late due to the responsibility of a different party. Additionally the suffered delays include recovered times. It is the basis to calculate the share of the cake a party receives as compensation.	6.1

TIS	Train Information System – a monitoring tool for international trains, operated by RNE. TIS is the data provider system for EPR. The EPR validation and calculation tool are also part of the TIS system family. http://tis.rne.eu/	2.2.1
TIS points	Locations (e.g. stations) defined in the topology of the TIS tool. They are a subset of the points defined in an IMs national timetabling /dispatching tools. With exception of the delay code message 2005 TIS discards all messages related to points not defined as TIS points.	Annex 4.1
TIS Train Information page	Website of the TIS tool which provides real-time information on train runs. The train numbers in the EPR validation and calculation tool are linked to the "train information page".	3.1.3
Travelling time	Time that a RU operates a train run, based on the planned times (CTT). It is required to split the calculation results between several RUs operating a train run in the area of one IM (see also "Virtual RU").	Annex 6.1.4
Undocumented delay	Delay minutes to which no cause has been attributed. It is a calculation function in the EPR calculation tool and calculated on segment level as follows: Lateness $^{\text{EPR Point/status 2}}$ minus Lateness $^{\text{EPR Point/status 1}}$ minus Delay $^{\text{Segment}}$, if >0	6.1
Validation tool	Tool that displays delays to the companies they are attributed to and allows accepting or disputing it. Can be used for validation of all codes, is required for validation of international codes.	3.1.2 5
Virtual RU	Support function used in the calculations for the "mixed situation"; in a first step all RUs running in the area of one IM are considered as one "Virtual RU" and in a second step the result is split between them based on their travelling time.	Annex 6.1.4
Worst Point	EPR point/ status within a train run, where the lateness is highest	6.1 Annex 6.1 Annex 6.2