

# TAP TSI

Telematics Applications for Passenger Services  
Technical Specifications for Interoperability

## **INTERMEDIATE REPORT** **Submitted on 8 December 2011**

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## 1. Executive Summary

This intermediate report provides a **mid-term overview** of where the TAP Phase One project currently stands and where it is heading in terms **of contents**. It is an important milestone that deserves full Steering Committee attention. **Feedback by 6 January 2012** is important in order to allow for a qualified review in the Steering Committee meeting on 10 January, thus making best use of the remaining time until final delivery mid-May.

From the outset of the project the Project Team has spent significant effort on reaching out to as many stakeholders as possible in order to ensure broad acceptance of the Phase One work and deliverables. The **mobilisation** has been **largely successful** and the project has established a network with more than 100 experts from a functionally and geographically **diverse group of railways and ticket vendors** that **participate** in developing and reviewing the Phase One outputs. There have been more than 20 interdisciplinary working meetings so far that helped solidify a constructive working atmosphere.

The project has also helped trigger initiatives by sector and Ticket Vendor organisations as well as by individual actors supporting the realisation of the TAP TSI objectives. The Project Team has established liaison with a significant number of these initiatives and will continue to seek synergies. Yet, a lot needs to be done to keep momentum and to **ensure the trustful working relationship will persist in and beyond Phase One**. The Steering Committee can support the Project Team by keeping TAP TSI on the agenda of their constituencies.

The key findings, initial conclusions and recommendations of the RU/ IM, Retail, Governance and Masterplan Work Streams of the project are as follows:

### **RU/ IM Communication:**

**Key elements** of the joint TAP/TAF communication between railway undertakings and infrastructure managers - architecture and reference files – are considered **suitable for the passenger rail** business. A joint reference file with retail elements such as tariff and reservation codes etc. can help further increase data quality.

Storage of Service Disruption information is not suitable for passenger rights handling. The requirement should be replaced by the storage of train running information.

**Alignment with TAF TSI** is ongoing on all levels of the projects and **progressing very well**.

### **Retail:**

Market requirements and technological advances mean the sector is moving more and more towards an on-line way of selling tickets. Yield and quota management - key sources for value offers to travellers - require frequent, ideally real-time, data exchange between rail operators and retailers. **TAP TSI needs to be flexible** so as not to freeze traditional ways of rail retailing. This is especially important for the exchange of tariff and fares information, where not all TAP Technical Documents are considered appropriate to satisfy this RU and Ticket Vendor business requirement.

As work on dynamic data exchange solutions requires more time than realistically available in Phase One, it is **suggested that the remaining project time** in retail specifications and architecture **focuses on** further assessing **cost-effective File Transfer Protocol based solutions**. Such solutions are believed to help get all railways - including those not yet familiar with the Technical Documents (former UIC leaflets) - on the same level, thus **realising tangible customer benefits whilst preserving the flexibility to move towards more innovative solutions** in a stepwise manner.

Meanwhile, the **Full-Service Model (FSM)** Work Stream will **build on** the initial **requirements for innovative end-to-end solutions** that have been collected so far, **incorporating work on a dynamic data exchange** already underway within the railway community. This work has been recognised as being highly relevant and well aligned to the FSM. In the January meeting of the Steering Committee, the Project Manager will provide more reasoning and an impact assessment.

#### **Governance and masterplanning:**

In its recent meeting the Steering Committee concluded that **governance should be flexible and scalable** to accommodate future needs. Initial project work suggests that TAP TSI governance needs a **permanent statutory body** with a defined range of responsibilities. Which elements require central or distributed oversight still needs to be assessed in conjunction with the Architecture and FSM Work Streams.

It is also necessary to **differentiate** between **governance for Phases Two and Three**, the latter being designed for perpetuity. In principle **agreement by the Steering Committee is needed by the end of February 2012** so that the governance costs can be estimated and the funding bodies can be notified and consulted in spring of 2012.

Work on **masterplanning** is now starting, in close **alignment with TAF TSI** in regards to RU/ IM communication and individual company implementation planning.

RUs and IMs are unable to provide the Phase One Project Team with accurate and detailed material that is commercially important in good time. In consequence, **all estimates of costs and benefits will be made by the Project Team**, based on their own expertise and on publicly available published data. The **Steering Committee is asked to approve** of this approach.

Looking ahead, a **stable organisational framework** for the suggested activities **post** submission of the **Phase One** deliverables as well as for the supervision and support of implementation work is needed. The Project **Team recommends** that the **established Steering Committee stays on** beyond May 2012. Proposals for the staffing and funding of TAP TSI activities will be presented in the Steering Committee meeting in February.

## 2. Introduction

This intermediate report is a key deliverable required from the Phase One project and marks a major milestone of the TAP TSI implementation.

### Background

TAP Phase One constitutes the first phase of implementing the Commission Regulation (EU) No 454/2011<sup>1</sup> on the technical specification for interoperability relating to the subsystem ‘telematics applications for passenger services’ of the trans-European rail system. The Regulation entered into force on 13 May 2011.

Primary goal of TAP TSI is to provide travellers with quality pre- and on-journey information and to facilitate the purchase of rail tickets by improving the data exchange among railway undertakings and between railway undertakings on the one hand and Infrastructure and Station Managers, Ticket Vendors and Public Bodies on the other.

Phase One is managed by a Project Team of railway and Ticket Vendor representatives and supervised by a multi-disciplinary Steering Committee (SteCo), in which a wide range of stakeholder interests are represented.

As per the Regulation, the Project Team shall submit an intermediate report to the Steering Committee no later than five months after the kick-off meeting, which took place on 8 July 2011.

### Purpose of the report

The purpose of the intermediate report is to provide the SteCo with a solid overview of where the project stands and where it is heading in terms of contents<sup>2</sup>. It thus serves as an institutionalised gate check, allowing the SteCo members to re-calibrate project focus and priorities and to provide the Project Team with a stable framework for the remainder of Phase One.

This report is the product of work involving many parties. Working-level participation was and is open to all sector representative bodies and Ticket Vendor associations, all of which had been invited to contribute expertise and input.

### Structure of the report

Chapter 3 of this report summarises the main project findings and achievements to date. It also highlights work in progress and the next steps in terms of content development. It is largely structured in accordance with the logic of the Phase One Work Streams, with an additional section on assistance to Passengers with Reduced Mobility (PRM).

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<sup>1</sup> In the following referred to as “TAP TSI”, “the TAP TSI Regulation” or “the Regulation”

<sup>2</sup> For project management updates see the Project Manager’s monthly progress reports

Work Stream	Chapter in this report	Basic Parameters (BPs) covered
RU/ IM Communication	3.1	4.2.12 <sup>3</sup> , 4.2.13 <sup>4</sup> , 4.2.14, 4.2.15, 4.2.16, 4.2.17 and 4.2.18, 4.2.19, 4.2.20, 4.2.21, 4.2.22 (overarching BPs)
Retail Specifications	3.2.1	4.2.1, 4.2.2, 4.2.3, 4.2.7, 4.2.8, 4.2.9, 4.2.10, 4.2.11 and 4.2.18, 4.2.19, 4.2.20, 4.2.21, 4.2.22 (overarching BPs)
Retail Architecture	3.2.2	4.2.1, 4.2.2, 4.2.3, 4.2.7, 4.2.8, 4.2.9, 4.2.10, 4.2.11 and 4.2.18, 4.2.19, 4.2.20, 4.2.21, 4.2.22 (overarching BPs)
Schedules/ Timetables	3.2.2.4	4.2.1
Tariffs/ Fares	3.2.2.5	4.2.2
Reservation	3.2.2.6	4.2.7, 4.2.8, 4.2.9
Fulfilment	3.2.2.7	4.2.10, 4.2.11
Reference Data	3.2.2.8	4.2.19
Full-Service Model	3.2.3	<i>Addresses areas not covered by the Regulation and adds depth to the initial retail solutions that will ultimately be proposed as Phase One deliverables to meet the TAP TSI obligations in the short run</i>
<i>PRM Assistance</i>	3.2.4	4.2.6
Governance	3.3	Chapter 7 of the Regulation
Masterplan	3.4	Chapter 7 of the Regulation

Note: Basic Parameters that were due to be implemented by RUs by 13 November 2011 are not covered in the Phase One project.

In Chapter 4 conclusions are drawn and recommendations to the Steering Committee made. Both conclusions and recommendations are strictly intermediate and require further assessment by the Project Team, additional input from and consultation with stakeholders as well as SteCo review.

### Steering Committee feedback on the report

The members of the TAP SteCo are invited to ask their stakeholders for views on the report. It was agreed by the SteCo that feedback shall be provided by 6 January 2012 for qualified discussion in the upcoming SteCo meeting on 10 January 2012. In order to make best use of the remaining time for Phase One it is essential that this timing is respected.

The report will also be published on the project website at <http://TAP.TSI.uic.org/>.

The Project Team has also prepared a press release that can be used by the organisations represented in the SteCo to communicate more widely about this milestone through their established communication channels.

<sup>3</sup> As agreed in the SteCo/ Project Team kick-off the Project Team will not elaborate on BPs 4.2.12 as they specify what individual companies have to do internally without requiring interoperable solutions

<sup>4</sup> See remarks on footnote 3



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## 3. Initial Phase One Project Findings

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### 3.1. RU/ IM Communication<sup>5</sup>

**Key information to take away:**

- Key elements of the joint TAP/TAF RU/ IM communication - architecture and reference files - are suitable for the passenger rail business. A joint reference file with retail elements such as tariff and reservation codes etc. can help further increase data quality
- Storage of Service Disruption information is not suitable for passenger rights handling. The requirement should be deleted and replaced by the storage of train running information
- Besides the adaptation of existing TAF messages, new messages such as Change of Track are created in order to fulfil TAP TSI requirements and assist railway companies in providing better customer information

#### 3.1.1 Introduction to RU/ IM

The TAP TSI operational part describes the communication between Railway Undertaking (RU), Station Manager (SM) and Infrastructure Manager (IM). The purpose of these standards is to allow railway companies - in the same way for domestic and interoperable<sup>6</sup> services – to:

- order train paths
- control and manage their train services (and indirectly staff and fleet)
- Improve customer information provided by RUs and SMs<sup>7</sup>

Different requirements in the Passenger Rights Regulation (PRR) and TAP TSI are the basis for these RU/ IM communications. For example Annex II Part II of PRR requires passenger RUs to inform their customers about delays and main connecting services during their train ride. Basic Parameter 4.2.12 of TAP TSI requires SMs to inform passengers about material delays, change of track or platforms, full or partial cancellation of trains and train rerouting. In order to give this information, data exchange between IMs, RUs and SMs is needed, covered by B.30 of TAP TSI. The supporting processes of ordering train paths and informing the IM about the readiness of a train are covered as well, facilitating the interoperable train run for RUs.

#### 3.1.2 General Outline

The TAP Phase One RU/ IM Work Stream covers three Expert Groups (EG) with the main tasks of enhancing the TAF TSI RU/ IM Messages and Implementation Guides with the needs of passenger railways.

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<sup>5</sup> The part of TAP TSI covering the operational communication is generally referred to as “RU/IM Communication”. This includes the communication with the Station Managers

<sup>6</sup> For the work of the RU/IM Work Stream an “interoperable” train service is understood as a train that involves more than one IM and/ or more than one RU

<sup>7</sup> And IMs in case they provide services as a Station Manager or in direct communication to passengers

The three Expert Groups are:

- EG 1 – Planning
- EG 2 – Train Run/ Operations
- EG 3 – IT Architecture

The RU/ IM Work Stream has delivered the legacy survey report<sup>8</sup> and has worked on processes, messages and related data for the communication between RUs and IMs. Work on messages and process is based on available TAF TSI results<sup>9</sup> that have been adapted as appropriate following discussions in the Expert Groups involving RUs and IMs, including TAF TSI representatives.

Work that will be covered in the remaining part of the project will deal with train identification, functional governance, codings, implementation guides and the harmonisation with TAF TSI.

**Initial findings:**

- The processes, how and when to use the messages, are by far not harmonised<sup>10</sup>. As a result TAP will assist in providing standardised IT messages. This will be just one step to interoperability, as railway undertakings will still have to check national rules to know when and how these messages are applied
- Half of the responding companies in the legacy survey currently use the same coding for operational and commercial use. The Phase One Project Team will try to take this into account for TAP TSI, where currently different reference codes are used/ foreseen
- Most companies use the same processes/ systems for short term and long term path requests. Currently, TAP TSI covers short term only. The TAP TSI solution could be recommended for long term planning as an industry standard outside the Regulation
- As GSM-R seems to be the most common means for a train ready message, this is considered as one option to satisfy this part of TAP TSI
- New messages have to be created, not yet foreseen in B.30, to fulfil requirements from Basic Parameter 4.2.12 (information provision in the station area). These message will cover the operational information on change of tracks/ platforms, the cancellation of stops or (parts of) a train journey as well as rerouting
- The storage of service disruption information is not considered useful for handling passenger rights. It is likely to be a change request to remove this requirement and store the train running information instead
- The requirement to store reference data on maintenance workshops is not used in any (other) part of TAP TSI and should be deleted.

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<sup>8</sup> See Annex A

<sup>9</sup> The requirement to build on existing TAF messages derives both from an industry view (IMs do not want to have different systems for freight and passenger RUs) and the TAP TSI Regulation itself, e.g. Chapter 7.5.2: "Where change control management affects elements which are in common use within the TAF TSI, the changes shall be made so as to remain as close as possible to the implemented TAF TSI in order to achieve optimum synergies."

<sup>10</sup> That is the case e.g. for the circumstances and timing of when to deliver a train ready message

### 3.1.3 State of Phase One Project Work

#### 3.1.3.1 Planning

Planning is related to Short Term Path Request (STPR, Basic Parameter 4.2.17.1).

##### **Key findings from the legacy survey**

- 75% of respondents use the processes/ systems for short term and long term path requests. Long term planning is not in scope of TAP TSI
- Long term planning shall be taken into account when drafting IT Specifications. A TAP TSI solution could be recommended for long term planning as an industry standard outside of the Regulation
- More than half of responding companies use same processes/ systems for domestic as well as international path requests. Most companies support the geographic scope, where no difference is made for the way of requesting domestic or international paths
- Most content of STPR is already supported, but “Path Details Refused” and “Booked Path no Longer Available” are not covered by more than two thirds. New content means “not just changing the messages, but the processes and programs behind” potentially resulting in expensive implementation.

##### **Work done**

The short term path request processes of TAF TSI have been reviewed and accepted. The scenario of “one RU and one IM”, where no harmonisation between different actors (cross border and/ or between companies) is needed, has been additionally identified. This can be treated as a sub-scenario of existing ones.

Path Request and Path Details messages have been fully discussed, with some additional elements added for passenger purposes. Other elements have been changed or corrected.

##### **Work in progress**

Messages for Path Confirmation, Path Details Refused, Path Cancellation, Path Not Available, Dossier, Answer Not Possible (error message) and Utilisation Notification have to be discussed. As most of these messages use the same elements as Path Request, time can be recovered. Writing of the implementation guide will follow afterwards, based on the TAF Implementation Guide (IG). It is assumed that the TAP IG will be very similar to the TAF IG. The EG 1 Leader and the Work Stream Leader will prepare that comparison.

#### 3.1.3.2 Train Run/ Operations

##### **Key findings from the legacy survey**

- Only 10% of respondents use IT for train ready indications, one third use GSM-R, the other respondents use manual train ready messages
- Wider use of GSM-R could be seen as one (additional/ alternative) solution
- More than one third of those using IT solutions use the UIC message for change of tracks. Mitigation: As this information is required in TAP this needs to be reflected in a message, based on the UIC message.

- Nearly all answering companies exchange service disruption information manually, although lots are using IT solutions as well. Currently, information is incident based (two thirds) rather than train based (around half<sup>11</sup>). The move to train based message can be used to provide train specific information (as required by TAP TSI).

### Work done

New process description and the messages for Train Ready and (new) optional Train Not Ready have been reviewed and accepted. Processes and messages for Train Running Information and Forecast and Delay Reason have been fully discussed.

### Work in progress

The processes and messages for Service Disruption are under review. Currently TAP TSI requires the Service Disruption message to be stored for 12 months in order to comply with passenger rights requirements. As this information only gives an indication that a train has come to a stop without a forecast (giving no indication if the train continued after a few minutes or after some hours only) this information is not useful for handling passenger rights. It is proposed to delete this requirement. The train running information contains the relevant data for train delays and is more suitable for passenger rights handling.

Basic Parameter 4.2.12 (information provision in station area) requires information on deviations from plan. To fulfil these requirements work on new messages, not existing in B.30 nor in TAF TSI is foreseen covering Change of Track/ Platform<sup>12</sup>, Cancellation of Stops/ (parts of) the train.

### 3.1.3.3 IT Architecture/ Reference Data

#### Key findings from the legacy survey

- Half of the respondents currently use the same location coding for operational and commercial purposes. Currently TAP TSI location reference should be the same for both RU/ IM and retail. This needs further evaluation, as B.9 for retail is not in line with the location reference data of TAF TSI
- Only 20% of companies transmit reference data for vehicles at every single path request (as implicated by TAP TSI). The remaining respondents use other means (predefined data sets, reference data stored at IM). Specification should look into the possibility of using both variants: transmitting all relevant data with all path requests or use predefined data sets
- The TAP TSI Regulation requires a central reference file on maintenance workshops. These can be coded as normal subsidiary locations using the location reference file. No special reference file is needed. Further, this information is not used in any part of TAP TSI. As a consequence, it is proposed to delete the requirement for a central reference file on maintenance workshops from the TAP TSI.

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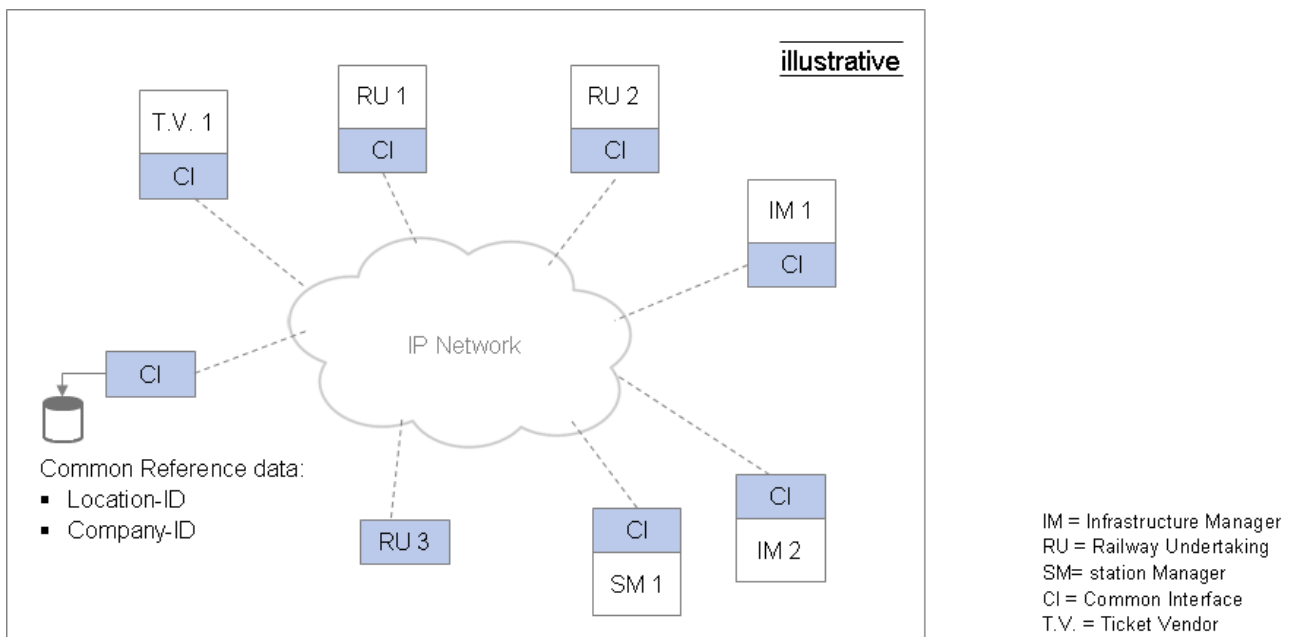
<sup>11</sup> Overlapping answers were allowed when companies use both ways

<sup>12</sup> The use of platform and track seems to differ between British English and "continental English". Likewise, other terms are used with different meaning. The Phase One project tries to identify these in an enlarged glossary of the final deliverables

## Work done

The location coding as well as the reference file for locations and companies from TAF TSI have been accepted for the purpose of TAP RU/ IM communication.

The general architecture has been discussed and agreed, similar to the TAF TSI architecture. The technical solution for the location reference file proposed by TAF TSI allows different layers of access rights (CRUD<sup>13</sup>) to the location data. Different definitions of roles are possible, for example only a central entity is allowed to create new company codes, national entities allowed to code primary locations, different companies with different rights per country to code subsidiary codes etc.



The graph above shows the general architecture of the RU/ IM communication. Companies' legacy systems will be linked via an open network (the use of private networks is possible, too), using a common interface (CI)<sup>14</sup>. The common interface used by a company can be either a centrally build CI or another development. In case a company (in the picture: RU 3) develops and builds new programmes, the message exchange can be according to TAP TSI, with no special interface needed.

Common reference data are stored once, with different possibilities to access them (messages, bulk data load, web interface).

## Work in progress

The work on train identification is done in parallel to work on the messages. Covering the phased approach of using TAP TSI messages without, and later with, a Train ID (as proposed by TAF TSI) is taken into account: the messages have different mandatory information for both scenarios. The current discussion proposes the use of the reference train number and the operational train number, as it is used today according to UIC leaflet 407-1 and in RailNetEurope's Train Information System.

<sup>13</sup> Create, Read, Update, Delete

<sup>14</sup> The Common Interface of the TAF Common Components Group is verified vis-à-vis the passenger requirements and could be one option for individual companies

Work on coding, data quality requirements and service level obligations is ongoing.

The functional requirement specifications for the TAF Common Interface have now been made available to the Phase One project. These are now being validated for passenger RU use.

Solid analyses between the Retail and RU/ IM Work Streams have started for needs on common elements (mainly location reference file, company and train identification). So far, possibilities to use the RU/IM location reference file as a master for all location files identified. Basically, codes for every purpose (such as reservation, tariff codes, tariff zones, commercial timetable) remain and are entered into the TAF/ TAP location reference file, being allocated to physical locations. Thus, unambiguous relations between different codes and a physical station can be assured. The more detailed solution is now being verified in the Work Streams.

The analysis of Train ID<sup>15</sup> showed limited benefit for Retail and TAP RU/ IM, especially as most applications have established rules to identify trains on train numbers, which will remain valid after the introduction of the Train ID. Retail will however evaluate the least costly way of linking train numbers with the Train ID.

### 3.1.4 Alignment between TAP TSI and TAF TSI

It was requested at the Steering Committee/ Project Team kick-off and the IMs to have one harmonised RU/ IM message catalogue for TAF and TAP wherever possible. Therefore an intensive liaison with the TAF TSI community has been established with TAF Chairs involved in all Phase One RU/ IM Expert Group meetings, the Phase One Project Manager being part of the TAF Joint Sector Group and the RU/ IM Work Stream Leader of Phase One joining the TAF IM Cluster.

The following process was agreed for the harmonisation of results:

#### 3.1.4.1 Alignment Work

TAF Work Group leaders meet with corresponding Phase One EG Leaders<sup>16</sup> to compare the different statuses of messages and implementation guides.

At these meetings two categories of dissimilarities need to be addressed:

#### Case A)

In case dissimilarities can be aligned **without** the **change of functionality**, for instance

- aligning the name of an element
- making a mandatory element from TAF TSI not needed in TAP TSI (or vice versa) technically optional in the joint message and declaring it mandatory for TAF TSI in the implementation guide

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<sup>15</sup> The Train ID identifies a train service uniquely and unambiguous throughout Europe and throughout the “lifetime” of the train from planning to operation. The proposed solution requires 24 characters in planning and 32 characters in operational messages.

<sup>16</sup> Where appropriate accompanied by the TAF Deployment Manager and the TAP RU/ IM Work Stream Leader

this shall be agreed in above-mentioned meetings and the final result shall be reported to the corresponding TAF and TAP groups.

### **Case B)**

In case dissimilarities can only be aligned **with a change of functionality** (e.g. new mandatory elements) a draft proposal will be developed in the above-mentioned meetings. This proposal should then be discussed in corresponding TAF and TAP groups, ideally jointly.

In the unlikely case that no alignment is possible, the message in question would have to be different in TAF and TAP, but this would require decisions by the TAP and TAF Steering Committees based on Project Team recommendations.

The results of above work should be accepted (exclusively) by the TAF and TAP SteCos.

#### **3.1.4.2 Timeframe**

- TAF/ TAP leader meetings are planned to take place in January/ February 2012
- If needed in Case B, TAF/ TAP experts should be consulted latest in March
- In case A, (joint) Change Requests (CRs) can be drafted from February/ March 2012 on
- In case of B, CRs (of those messages in question) cannot be drafted before March
- It is understood that the joint CRs only have to be submitted once, either in the TAF or the TAP Change Control Management Process (CCM). Those CRs relevant to TAP only will have to be submitted separately to the TAP CCM.

#### **3.1.4.3 Details on Messages**

In case a TAF TSI message contains a mandatory field not in use (or not mandatory) for TAP TSI, it will become optional in the joint message. The implementation guide will declare it mandatory for TAF TSI (works also the other way round).

#### **3.1.4.4 Details on Implementation Guides**

It is assumed that the Implementation Guides (IGs) can be put together without changing much of the functional content. However, as the TAP IGs are not intended to be EG/WG-reports, they might be changed in order and information not needed for implementation (such as mandates, number of meetings, ...) might be deleted. Subject to confirmation by the TAF WG leader this shall not be understood as a change of the IG.

In case functional content is different between TAF and TAP, the IG will have a clearly visible subsection "this concerns TAF only"/ "this concerns TAP only". This shall not be understood as a change either.

### **3.1.5 Functional Governance for RU/ IM**

At the beginning of TAP Phase One, no description of the TAF TSI functional governance was available for TAF TSI, especially while Chapter 7 of the TAF TSI was being replaced.

The discussion and development of this has started in discussions between the Phase One Governance Work Stream Leader, the RU/ IM Work Stream Leaders and TAF TSI representatives. The tasks for the governance have been identified and need to be described in the remaining time of the Phase One project.

### **3.1.5.1 General Governance Requirements from RU/ IM**

All codes, reference files and specifications resulting from TAP TSI have to be accessible to all stakeholders implicated by the Regulation. As a consequence, these cannot be handled in 'closed clubs'. The governance has to take into account the interaction of IMs, RUs, SMS, PTAs, NSAs, TVs etc., irrespective of them being member of a representative body or not.

Both the application of existing standards as defined in Phase One and the ongoing development of these standards should to be covered.

In order to take business requirements from implicated stakeholders into account, the future governance should include continuous/ ongoing Expert Groups. These groups should be open to experts from all affected stakeholders, taking into account their companies requirements and discussing Change Requests. Options for the organisation of this activity are described in the later section on Governance.

### **3.1.5.2 Tasks for Governance**

The administration and provision of the following objects and services will be the responsibility of the proposed Service Management Groups, as defined later in this document:

- Location Reference Files (CRUD-Rights)
- Database evolution
- Handling of complex code lists (esp. location subsidiary type code) incl. CRUD
- Handling of simple code lists and CRUD
- Evolution/ongoing development of messages
- Evolution of data quality (requirements, checking, improvement)
- Access to specifications for Common Interface to reference data
- Access to specifications for Common Interface for messaging
- Usage of data
- Technical tasks such as development and maintenance of databases and certification of network access
- System specification maintenance
- Technical assistance, consultancy to stakeholders for common elements.

### **3.1.6 Next Steps**

Currently, work on planning (EG 1) is delayed by approximately five weeks, due to detailed analysis of the complex path request messages. It is assumed that this time can be recovered as



- the following message re-use elements already discussed in the path request message and
- the work on the implementation guide can be limited following that the TAF TSI processes have been approved without change. The TAF IG is available and is a solid basis for the development of the TAP IG on Short Term Path Request.

Work on operational messages (EG 2) continues on time with the new messages Change of Track/ Platform, Cancellation of Stops/ (parts of) the train. Drafting the implementation guide will require more work, as these are created new. However, input for these has already been drafted in parallel to the work on the messages.

Work on the Common Interface will start as of now, as the functional requirement specifications from TAF TSI have just been made available. The requirements laid out there will be checked vis-à-vis the passenger RU requirements.

The alignment work between TAF TSI and TAP TSI has been agreed on working level. It will result in work to align the official data catalogues of TAF and TAP in the official ERA CCM processes afterwards.

It is understood that there will be one message catalogue for TAP RU/ IM and TAF RU/ IM only, although containing some elements not relevant for the other TSI. The question whether this should include parts such as the TAF RU/ RU communication (not relevant to TAP) is open and has been addressed to the TAF Deployment Team.

The structure of the deliverables is planned to be one implementation guide for all RU/ IM Basic Parameters, including process descriptions, the meaning and use of message elements, functional governance, and data quality description. This will be annexed with one XML message schema. These two elements will be key to the implementation by individual companies.

Further deliverables will be

- Change Requests with explanation for change of TAP TSI
- Architecture description
- CRs to the functional requirement specifications for the TAF TSI Common Components Group Common Interface and the Location Reference file database, if needed

These deliverables will be used for the implementation of common elements and an update of the TAP TSI.

Technical specifications are part of the RU/ IM Work Stream. Commercial specifications (e.g. terms and conditions of common elements) are not subject to the RU/ IM Work Stream and are either covered by the Governance Work Stream or on a commercial basis between the actors involved.

## 3.2. Retail

### Key information to take away:

- Small RUs and RUs that are not members of rail sector representative bodies did not answer the surveys (apart two cases) nor took part in the expert groups; it cannot be excluded that those railways could experience significant problems when implementing the TAP TSI
- A majority of the responding RUs already comply with the Technical Documents related to timetables, fares and reservations
- Many RUs use for international journeys a type of ticketing (TLT) which is not taken into account in the TAP Technical Documents
- Many RUs do not publish any more their IRT fares in off-line mode, because they are yield managed and change too frequently
- The sector is moving towards a generalised on-line way of selling tickets; TAP TSI needs to be flexible so as not to “freeze” traditional ways of rail retailing

### 3.2.1 Introduction to Rail Retailing

The retail part of TAP TSI defines standards for the exchange of data to facilitate the interoperability between RUs, to improve customers' travelling experience and to push intermodal distribution via third party ticket vendors.

TAP TSI requires, amongst others, that RUs make all their:

- timetable data available in a defined format
  - tariffs and fare tables available in a defined format
- to other RUs, Public Bodies and Ticket Vendors subject to certain conditions.

In addition, TAP TSI suggests the use of standards described in the Annex 3 of the Regulation:

- all RUs to make their Tariffs/ Fares available to other RUs and Ticket Vendors (if a commercial agreement exists and allows it)
- all RUs to send Reservation information (seat availability, booking, cancellation) to other RUs and Ticket Vendors (subject to commercial agreements)
- all RUs to exchange data for the ticketing elements to other RUs and Ticket Vendors (subject to commercial agreements).

The Regulation requires from Phase One the submission of deliverables in three areas:

- Detailed IT specifications
- Governance (see Chapter 3.3)
- Master plan (see Chapter 3.4)

In particular the detailed IT specifications must include *“The outline of the global architecture of the system. It shall describe how the requisite components interact and fit together. This shall be based on the analysis of the system configurations capable of integrating the legacy IT facilities, while delivering the required functionality and performance.”*

### 3.2.2 Retail Specifications

#### 3.2.2.1 TAP TSI Legacy Systems Survey Findings

In order to take into account the legacy of the existing systems, the representative bodies of the RUs and of the third party Ticket Vendors have performed surveys among their members to collect information on how the retail business is currently performed, in particular in the domains of Schedules/ Timetables, Tariffs/ Fares, Reservation and Fulfilment.

The survey and the following analysis of its results have been performed with two distinct though coordinated approaches, depending on the target:

- one aimed at the legacy systems of the Railway Undertakings
- the other aimed at the legacy systems of the third party Ticket Vendors.

To this scope the Work Stream Leaders, with the help of the Experts Groups, have carried out a range of surveys<sup>17</sup> to study the rail retail legacy in order to gain a solid understanding of the baseline and to identify issues and opportunities for the Phase One project to address. The results of surveys have been enriched with Project Team experiences and Expert Group members' input.

Invitations to take part in the surveys have been sent:

- Concerning RUs, to all RUs listed in the ERADIS database of ERA, to all UIC members, and to the members of UITP and EPTO through their representatives in the TAP Phase One Steering Committee
- Concerning Ticket Vendors, to all members of ETTSA and ECTAA<sup>18</sup> through the Full-Service Model Work Stream Leader.

The four questionnaires addressed to the RUs received a number of answers ranging between 15 and 18. The questionnaire addressed to the TVs found a larger audience with over 150 answers. For the RUs most answers came from incumbent companies, with a wide geographical coverage. For the TVs, although multiple reminders were sent and translation into French carried out, there was an unbalanced response from a geographical point of view. The Scandinavian countries were particularly well represented and the Southern Europe countries to a lesser degree.

A summary of the main findings resulting from each questionnaire is presented hereunder. A more detailed analysis of the answers to all questions in the questionnaires can be found in Annex B. The results are in any case presented in a neutralised statistical form, to comply with RUs' and TVs' confidentiality requests.

#### Schedules/ Timetables

Main findings:

- In between the official annual/ semi-annual releases, the timetables are updated weekly or daily

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<sup>17</sup> See Annex B

<sup>18</sup> Overall more than 1,000 parties

- A majority of answering RUs provide a web-based journey planner to their customers many which are
- A majority of the answering RUs are members of the MERITS community
- Half of the answering RUs provide their timetable data to third parties

### **Tariffs/ Fares**

The questionnaire was divided in two sections, a first one regarding fares for trains operated solely by the Company answering the questionnaire, the second one regarding trains cooperated by it and other RU(s). This reflects the basic difference by which an RU unique owner of a train can decide autonomously its pricing system, while if the train has more than one owner “compromise” rules can apply.

It is also to be noted that the questions were only asked with reference to the two tariff systems acknowledged in the TAP TSI, i.e. NRT and IRT. Nevertheless several RUs reminded that a third form of pricing is being commonly used, the so called TLT (Train Linked Ticket). This is addressed in the Full-Service Model Work Stream.

#### **Main findings:**

- For NRT trains of first section the price of the same ticket is normally different when sold by the train owning RU or another retailer; most pricing systems are distance based, but the price can vary with the time the train runs or the channel where the purchase was made
- For NRT trains of the second section the situation is more stable, since the price of a ticket in most cases does not change if it is sold by the owner or a third party, nor according to the time the train runs or the sales channel
- For IRT trains of both sections the price is normally the same independently of who sells the ticket, while it varies by definition with other parameters like the tariff. Most RUs use the technique of pricing points inside a tariff.

### **Reservation**

The reservation questionnaire was also divided in two sections, in this case the first one concerned the role of the answering RU as receiver of reservation requests for its own trains, the second one the mirroring role of the RU as sender of reservation requests to other RUs.

#### **Main findings:**

- Many RUs store their inventory in multiple systems
- All answering RUs accept reservation requests for their trains according to the protocols of TD B.5 (UIC 918-1)
- Most RUs are able to book trains in the inventories of other RUs
- The average number of reservation requests sent monthly in 2010 by the answering RUs to their most significant reservation partners ranged between 4,500 and 1,500,000.

### **Fulfilment**

The questions concerned the formats used when issuing tickets, and were grouped in three sections respectively for:

- trains operated solely by the answering RU (or domestic sections of international trains co-operated by it)

- cross border or foreign sections on international trains run in co-operation by the answering RU and another
- trains not (co-)operated by the answering RU.

#### Main findings:

- Tickets on paper ATB format are still the most used form of ticketing among answering RUs, followed by home printed tickets according to UIC 918-3 (TD B.7)
- Very few RUs use the ISO format (aka Credit Card Size), none in international traffic
- Around half of answering RUs offer Ticket on Departure (TOD), also outside their own country.

#### Ticket vendors

The respondents were companies involved with different roles in the rail distribution chain, they each declared the type of activities in rail as follows:

Seller: Provider of rail journey planning and ticketing to end traveller	78.3%	123
Distributor: Provider of systems for other companies to sell rail to end traveller	4.5%	7
Both Seller and Distributor	6.4%	10
Do not handle rail travel	10.8%	17

The Sellers completed section A of the survey whilst the Distributors completed section B and those that did not handle rail were asked just two questions in section C. Each section is summarised below.

#### Section A – Ticket Sellers

Just over half the Sellers gave answers to the detailed questions about their sales activities. Two thirds of these operated travel agency desks, half internet sites and 35% had telesales operations. Sales to businesses both large and small dominated the client groups being sold to. When asked about the mix of travel products sold almost all who answered the question, sold Rail but on average the value it represented of their travel business represented only 14% for domestic and 8% for International rail whilst Air travel represented 50%.

55% of International rail sales by value were for outbound travel from the sellers' country to a neighbouring country whilst 21% were for travel entirely in a single foreign country with significantly less involving travel across one or more borders. Rail travel is sold to an average of 9 foreign countries although many sell to well over twice that number.

About half answered a question about the value of their International rail sales and 54% of responders indicated their International rail sales were less than 250 EUR per annum whilst 24% were between that and 1m EUR, 13% between 1m and 5m EUR and 5% between 5m and 25m EUR – note that several were unable to give this information.

## Section B – Distributors

10 responders indicated that they were both sellers and distributors however although they all completed section A, none of these 10 completed section B as requested which indicates that the survey logic may have failed to allow this.

7 responders indicated they were Distributors only and hence went straight to section B however no questions had more than 3 responses and many had only 1 or 2 responses making the results statistically valueless. It is likely that this part of the survey may be re-run with the 10 who completed section A where these can be identified.

## Section C – Respondents who do not sell Rail

There were 17 responders in this section. 50% of them indicated that rail was currently of minor importance and 33% of no importance to their business.

### **Conclusions from the survey and the Ticket Vendor experts opinions**

- There is firm indication, albeit from a relatively modest survey sample, that there is unsatisfied demand from TVs for the ability to sell international rail efficiently alongside other modes
- There is also widely held support for the underlying drivers of the TAP TSI – that if the retailing of international rail products can be more easily achieved it will result in wider distribution and that this will in turn lead to an increased market for rail
- Availability of information to support all the stages of the FSM will facilitate distribution.

### **3.2.2.2 Retail Expert Group Findings**

Working groups composed by experts from both RUs and TVs in the same domains that were object of the surveys (Schedules/ Timetables, Tariffs/ Fares, Reservation and Fulfilment), plus IT Architecture, have debated the issues and opportunities arising from the surveys, as well as from their long experience in the field.

The work conducted in this part of TAP Phase One, focused on the surveys and the analysis of their results has been a very positive experience in terms of:

- Mutual knowledge of the experts from the rail sector and from the Ticket Vendors industry, with good understanding of each other's needs and goals;
- Establishment of a collaborative approach that will accompany the next phases and especially the Full-Service Model Work Stream, that is expected to shape the interoperability for the years to come;
- Occasion to detect errors and imperfections in the TAP Technical Documents; problem unavoidable when considering that those documents were derived from UIC leaflets created by different teams in different moments, with mismatches that only a general review like the one requested by the TAP can bring to surface.

All valid comments received from the experts, as well as problems already known to the Project Team from their personal experience, have been discussed by the competent

Expert Groups in dedicated meetings held in the first decades of September and of November, and via frequent exchange of e-mails.

A detailed report on the issues detected and the decisions made by the Expert Group on how to deal with them can be found in Annex B.

As far as the opportunities were concerned, the general understanding of all groups was that they must be taken into account in the Full-Service Model Work Stream. Therefore in the same Annex B the expressed opportunities are listed without further comments.

There is no separate chapter in Annex B for Full-Service Model issues and opportunities, because the third party Ticket Vendors' remarks were fully expressed during the four dedicated meetings and are included in what follows.

In general, all the issues discussed by the experts have been assigned to one of the following groups:

- Some of them are editing or trivial errors, change requests should be submitted without need of any further study;
- Some have an identified solution but it implies material changes, therefore the opportunity of a change request must be coordinated with the Technical and Commercial Groups of UIC;
- Some already have working groups (UIC or other) which are preparing a solution, therefore it seems logic to wait for those solutions to be finalized and then to evaluate if they fit our needs;
- Some will be further studied by the Expert Groups and the solutions will be described in the Implementation Guides that will be completed in Phase One;
- Some will be studied in the Full-Service Model Work Stream, and a possible solution will only come in a phase subsequent to Phase One.

Two cases require a special attention, because their solution does not seem limited to a simple CR. The first is the business process related to tariffs and fares and the second related to the fulfilment.

### ***Tariff and fares***

Traditionally railway distribution activities have been based on two tariff types: NRT (non-integrated reservation ticket) and IRT (integrated reservation ticket). The difference is that for IRT the ticket requires a specific seat allocation.

NRTs were created decades ago, but now show many limitations, for example:

- Generally speaking, NRT fares are never the cheapest
- Trust-based settlement is inappropriate in more competitive times
- No differentiation is possible between two carriers on the same route
- No differentiation by product categories possible
- No differentiation by sales channel possible.

IRTs are more recent and are usually associated with a range of tariffs and journeys. The same routeing can have different prices. They are often associated with quotas and yield management and passengers with tickets for the same journey bought at different times may have paid different prices.

UIC members can publish certain IRT tariffs and fares to be sold by other UIC members on a static UIC database. Many RUs consider this solution inappropriate as a sale always involves an interactive enquiry. In consequence, the static data quality has fallen which leads to further reductions in its use.

A new tariff has also been introduced the latter years – Train-Linked Ticket (TLT) – that covers tickets for a specific train but without a seat reservation. TLTs can be associated with a range of tariffs, and are quota managed. Again, passengers with tickets for the same journey bought at different times may have paid different prices. There are no UIC leaflets nor TAP Technical Documents in place to exchange TLT data between the actors, although some actors have developed customised solutions to manage booking of a TLT. UIC is currently defining both the way how to distribute TLT through retailers different from the product owner as well as the ticket layout.

However, it seems like time has gradually undermined the business process that led to the current UIC leaflets/ TAP Technical Documents. Improved telecommunications has allowed the distribution process to become interactive. Static distribution data becomes increasingly inappropriate with rapid rail product development. Yield management allows to offer the customers a wider range of good value fares. Therefore the whole sector of the tariffs and fares, as it is represented in the TAP and its Technical Documents, seems inadequate because:

- B.1 reflects an old situation and is unfit for the recent push towards competition (two carriers on the same route) and liberalization (a carrier operating trains outside of its national territory)
- B.2, being an offline standard, can accommodate the tariffs (terms and conditions) but not the rapidly changing yielded fares
- B.3 has never been used by any RU
- A way to distribute yielded NRT tickets which have evolved rapidly in the past years does not exist.

A global solution to those problems can come from the implementation of the new business model, where all tickets are sold via an online transaction, also the NRTs. This change is not only technical, because it also implies deep organisational changes (the settlement of the NRTs will be done by the product owner and no more by the retailer as today)

### ***Fulfilment***

The print@home type of fulfilment (the only kind of e-ticket described in TAP, as long as the open points are not closed), seems inadequate as it is represented in the TAP and its Technical Documents because B.7 :

- has sections never experimented by any RU (in particular with the exchange of the XML messages for the collection of security certificates)
- only describes how to create a print@home ticket, but does not define how to modify or cancel it, therefore forcing the RUs to only use it for non exchangeable and non refundable tariffs.

A solution to those problems (or at least the second one) could come from the adoption, as a new TAP Technical Document, of the recently approved UIC leaflet 918-4, defining the conditions for after sale of a print@home ticket. Nevertheless it is advisable to



proceed to such incorporation in a few years, when a significant number of RUs will have implemented this new leaflet and proven its adequacy.

Note: This chapter has been written on the basis of the inputs collected in the Expert Groups, in which so far only incumbent RUs and third party Ticket Vendors have taken part. Small RUs and RUs that are not members of rail sector representative bodies are still not taking an active role despite having been invited and reminded. The Project Team can therefore not rule out that those railways could experience problems when implementing the TAP TSI.

### 3.2.2.3 Next Steps

The work of the retail experts will now continue with the drafting of the Implementation Guides, drawing amongst others on manuals from the airline and other industries. Further meetings of the groups have already been scheduled in the following time slots 2012:

30 January – 2 February  
27 February – 1 March  
19 March – 22 March

In addition some meetings will be needed to harmonise the work of the retail experts with the one of the operations experts, especially on what concerns the codification of the basic elements used by both domains (locations, trains, companies, etc.). A first such meeting has taken place on 1 December 2011.

### 3.2.3 Retail Architecture

#### Key information to take away:

- RUs could make timetables available via an FTP address and this solution may be complemented by a voluntary central database
- RUs could make tariffs and fares available via an FTP address and this solution may be complemented by a voluntary database for NRTs
- The transfer protocol for the reservation/ availability/ cancellation message should be either the one currently used by many RUs or another one for Ticket Vendors
- Print@home ticketing may use a File Transfer Protocol so that distributors can receive the public certificates
- Reference data exchange architecture still needs to be defined

#### 3.2.3.1 Organisation of Architecture Work

The Architecture Work Stream involves approx. 20 experts from both railways and Ticket Vendors and also draws on Project Team experiences in related matters. Three expert meetings have taken place so far:

- September: Understanding the Regulation and drawing the line between the Full-Service Model (enhancements of the Regulation to better match with the current commercial needs) and the TAP TSI requirements as they stand

- October: Agreement for Phase One scope alignment. Agreement to build on pragmatic extensions of solutions with which railways have gathered broad experience using the TAP Technical Documents (UIC leaflets)
- November: Solution scenarios for the main retail Basic Parameters.

The presence of the Ticket Vendor experts in this Work Stream has been highly beneficial both in terms of the TV experts learning about the systems and challenges but also enabling the perspectives of the third party Ticket Vendors to be recognised.

### 3.2.3.2 Outline of the Architecture Work Stream

#### Reminder of TAP TSI Regulation 454/2011

*“Over time this subsystem will see the growth and interaction of a large and complex telematics rail interoperability community with thousands of participating actors (railway undertakings, infrastructure managers, third parties such as retailers and public authorities, etc.), which will compete and/ or cooperate in serving the market’s needs.*

*The network and communication infrastructure supporting such a rail interoperability community will be based on a common ‘**Information Exchange Architecture**’, known and adopted by all those participating in it.*

*The proposed ‘Information Exchange Architecture’:*

- *is designed to reconcile heterogeneous information models by semantically transforming the data that are exchanged between the systems and by reconciling the differences in business processes and application- level protocols,*
- *has a minimal impact on the existing IT architectures implemented by each actor,*
- *safeguards IT investments already made.*

*The Information Exchange Architecture favours a mostly Peer-to-Peer type of interaction between all actors, while guaranteeing the overall integrity and consistency of the rail interoperability community by providing a set of centralised services.*

*A Peer-to-Peer interaction model allows the best distribution of costs between the different actors, based on actual usage and, in general, will pose fewer scalability problems.”*

### 3.2.3.3 Main Findings to Date

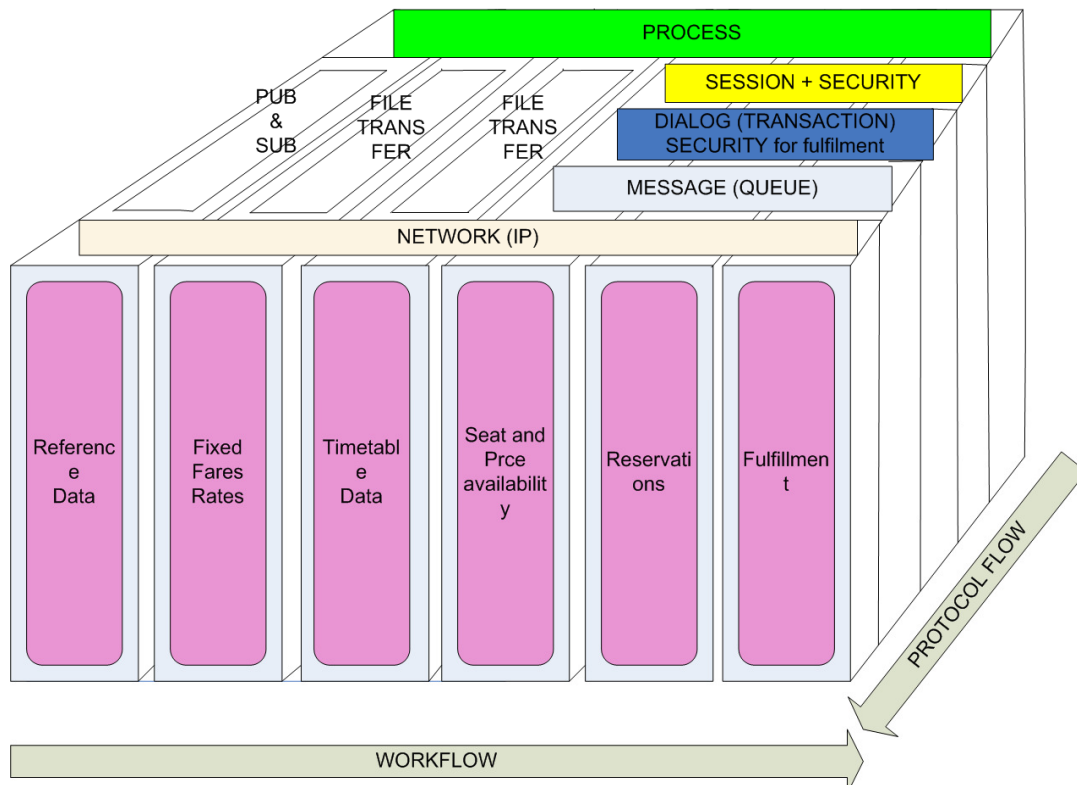
#### General

In order to come to an accurate identification of the “data exchange architecture” for the Basic Parameters of TAP TSI Phase One, and to generate Guidelines and Procedures from it, it is important to qualify the expression “data exchange” by identifying *patterns* of interactions: this is necessary because, at the architecture level, not everything is ‘data exchange’ and different Basic Parameters of interoperability may require different micro-architectures, or “architectural patterns”.

The following classification applies:

1. **File transfer pattern.** These are used for asynchronous copying of data organised in files across systems. This pattern applies to Basic Parameter 4.2.2 related to Technical Documents B.1, B.2, B.3 (Tariff data for NRT, IRT and Special Offers) and to Basic Parameter 4.2.1 related to TD B.4 (Time table static data TSDUPD and Schedule Updates SKDUPD).
2. **Transactional service requests** using a **synchronous** request/ reply message exchange pattern. This pattern applies to Basic Parameters 4.2.7, 4.2.8 and 4.2.9, related to TD B.5 (Reservations, Cancellations, Confirmations, Availability Enquiries)
3. **Orchestration or Choreography:** Transactional service requests with multiple participants. This pattern applies to Basic Parameter 4.2.11.2 related to TD B.7 (generation of “certificates”) and Basic Parameter 4.2.6.2/3 related to TD B.10 (Assistance to PRM)
4. **Centralised data store** of “master” data such as Location or Passenger Code Lists. Although Basic Parameters 4.2.18 and .19 related to TD B.8 and B.9 (Numerical Coding of IM/ RU and Locations) and Passenger Code Lists only specify naming or numbering conventions, it may be envisaged that these codes of general use be stored in a centralised data store with CRUD and import/ export capabilities. However, such “master” data could be distributed using File Transfer patterns as well.

The following graph describes the scope of Architecture for TAP TSI:



### 3.2.3.4 Schedules/ Timetables

Basic Parameter 4.2.1 asks all RUs to “*ensure that timetables comprising the data elements defined below shall be made available to another railway undertaking, to third parties and to public bodies. This basic parameter shall further ensure that each railway undertaking shall provide accurate and up-to-date timetable data.*”

This covers planned timetables, not real time journey information.

It is based on technical document B.4 which is in the EDIFACT standard.

#### **Architecture scope is:**

- to give a solution to make timetables available so that RUs can fulfil their obligations and
- to give a solution to authorised users of timetables to access to them so that other actors can exercise their rights.

The specifications for properly applying the Technical Document B.4 will be described in the implementation guides.

#### **Facts and findings:**

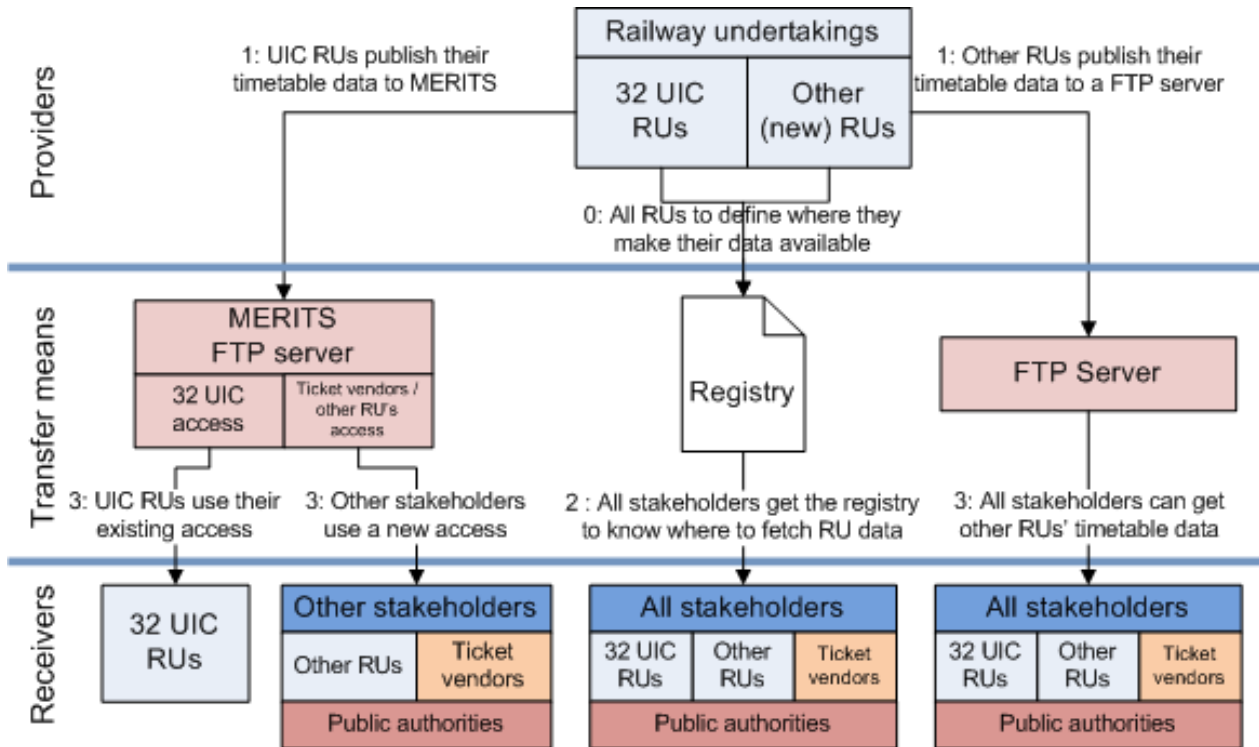
- 32 RUs members of UIC exchange their timetable data following B.4 (UIC leaflet 916-1). Data is delivered to the MERITS database
- Those 32 RUs are delivering their data to a database created and governed by UIC
- Due to the fact that timetables are country focused, international routes have to be created by the other actors by assembling different timetables and adding some rules (logical checks) to get the level of quality required for Journey planners. This function is the main added value of the current timetable used by the 32 RUs
- Hundreds of other European RUs do not use the MERITS database and do not even exchange their timetable data in the EDIFACT format following Technical Document B.4). They do not have cross-border routes
- The TAP TSI Regulation does not ask RUs to all join in a single European timetable database
- The MERITS timetable database is private, owned by UIC members, but it seems fit to comply with the TAP TSI obligations and could easily accommodate new actors/users
- Third party Ticket Vendors are very focused on solutions that allow instant response to a timetable request i.e. response time is key
- Third party Ticket Vendors favour a push option rather than the pull one in case of changes, should the solution be based on a central or a distributed solution.

#### **Initial conclusion:**

Although Ticket Vendors have expressed an interest to find all timetables in a single place, it is suggested to consider solutions that reflect the *stricto sensu* of the regulation, not least because even this would require a considerable change for many RUs lacking any experience with the Technical Documents.

**A possible solution could be:**

Each RU makes available its timetable data at an FTP address and gives it to anyone who wants to access its timetable (subject to agreements as per the Regulation). The MERITS railways will open the MERITS database to non-UIC railways enabling them to participate on a voluntary basis.



- The data is exchanged through files in EDIFACT format.
- 0: RUs publish the location (FTP server) of their timetable data file in a global registry.
  - 1: RUs publish their timetable files to the aforementioned locations.
  - 2: All stakeholders use the registry to know where to fetch the timetable files.
  - 3: All stakeholders fetch the timetable files they are interested in.

The Push or Pull option will be assessed in more detail.

**Requirements for the solution**

- Each RU shall ensure that the timetable data are accurate and up-to-date. The timetable data shall be kept available at least for 12 months after such data have expired. The annual timetable shall be made available at least 2 months before it comes into force, and any changes to it in a series of timetable updates shall be made available at least 7 days before those changes take effect (if the RU knows it more than 7 days in advance)
- When an RU operates a transport service for which it is one of the joint carriers, it shall ensure, together with all the other joint carriers, that its part of the timetable is accurate and up-to-date
- UIC to open the MERITS system for non-UIC members.

**Consequence of the solution**

- All FTP addresses should be known by all actors (registry to be managed by the TAP governance body)
- Existing RUs using a database could give an FTP address for this database; the more RUs join the easier it is for the others to have access to them.

**Limitations of the solution**

Although the quality of data is excellent for routes involving one single RU only, it is a challenge to create international routes crossing one or several borders. Assembling different domestic route from those files needs a coordinating function that currently only exists in the existing database used by 32 RUs.

However, as most European RUs serving an international route are already using the same database (same FTP address), and as other RUs are primarily focusing on their own domestic routes (individual FTP addresses), users will have limited problems to construct international end-to-end routes.

**More ambitious solution**

A single European database where all timetables from European RUs are stored is the best solution to put in place. The Regulation does not require such but it might be a need in the future if the FTP solution is not satisfactory.

However, the law may not be needed if all RUs progressively see an interest in participating in a single database, should the cost of implementing an FTP server being more (or equally) expensive than participating in the single database.

**3.2.3.5 Tariffs/ Fares**

Basic Parameter 4.2.2 asks all RUs to *“make available all its tariffs (including fare tables) by guaranteeing access to the railway undertakings and third parties to which it grants authorisation to sell according to distribution agreements and to authorised public bodies. The railway undertaking shall ensure that the tariff data are accurate and up-to-date.*

*Where a railway undertaking operates a transport service for which it is one of the joint carriers, the railway undertaking shall ensure, together with all the other joint carriers, that the tariff data are accurate and up-to- date.”*

This covers three types of tariffs/ fares:

- NRT (Non-Integrated Reservation Tickets, “open tickets”)
- IRT (Integrated Reservation Tickets, “Global Prices” or “market prices”)
- Special offers that can be compared with negotiated fares for NRT tickets.

The basic parameter is therefore based on three different Technical Documents:

- B.1 (NRT)
- B.2 (IRT)
- B.3 (Special offers).

**Architecture scope is**

- to give a solution to make Tariffs/ Fares available so that RUs can fulfil their obligation towards authorised Public Bodies and other RUs and Ticket Vendors authorised to sell
- to give a solution to authorised users of Tariffs/ Fares to access to them so that Public Bodies, Ticket Vendors and RUs can exercise their rights.

The specifications for properly applying the Technical Documents B.1, B.2 and B.3<sup>19</sup> will be described in the implementation guides.

**Facts and findings**

- 32 RU members of UIC exchange their NRT fares on a yearly basis, following the UIC 108.1 leaflet (B.1)
- Some UIC members exchange their IRT fares on a yearly basis even though it is possible to update the data more frequently than NRT. This is mainly due to the fact that fares are now yield managed and can therefore change very quickly
- No UIC members exchange their special fares as no existing UIC standard is deemed fit to meet their commercial needs (quota managed fares); B.3 is based on a UIC document that was never approved and accepted as a UIC standard by its members and never used.
- Some RUs deliver data (except special fares) in a database created and governed by UIC
- Due to close relationship between timetable data and NRT data, certain quality checks are performed insuring alignment of the data so that users can generate the appropriate fares
- Hundreds of other European RUs do not use the database and do not even exchange their tariffs/ fares data following Technical Documents B.1, B.2 or B.3
- TAP TSI favours the use of TDs B.1, B.2, B.3 if RUs expect to exchange fares data with Ticket Vendors or other RUs
- TAP TSI does not require RUs to all join a single European Fare/ Tariff database
- UIC Tariffs/ Fares database is private, owned by UIC members.

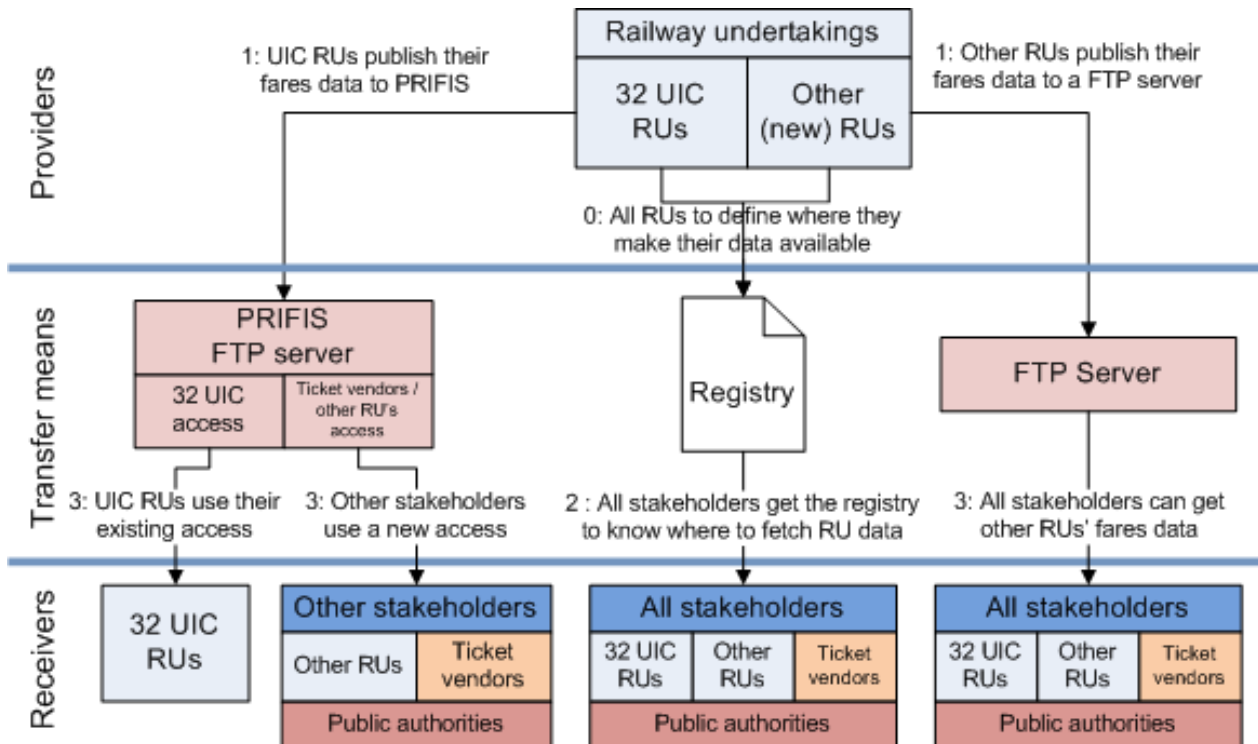
**Initial conclusion**

Although Ticket Vendors express an interest to find all tariffs/ fares in a single place, it is suggested to consider solutions that reflect the *stricto sensu* of the regulation, not least because even this would require a considerable change for many RUs lacking any experience with the Technical Documents. It is also not in the interest of RUs with yield managed fares (so-called closed systems) and quota managed fares (in an open system) to have their volatile fares in a database that will not show the right fare at the right time.

**A possible solution could be:**

**Each RU makes available its tariffs/ fares data at an FTP address and gives it to Public Authorities or other RUs or Ticket Vendors authorised to sell. The UIC members using PRIFIS will open this database to non-UIC railways enabling them to participate on a voluntary basis.**

<sup>19</sup> Unless the Steering Committee in January approves to focus attention on elaborating dynamic data exchange (see Chapter 4 Conclusions and Recommendations)



The data is exchanged through files in the following formats: NRT TD B.1, IRT TD B.2, Special prices TD B.3

- 0: RUs publish the location (FTP server) of their tariffs/ fares data file in a global registry.
- 1: RUs publish their tariffs/ fares files to the aforementioned locations.
- 2: All stakeholders use the registry to know where to fetch the tariffs/ fares files.
- 3: All stakeholders fetch the tariffs/ fares files they are interested in.

### Requirements for the solution

- When an RU operates a transport service for which it is one of the joint carriers, it shall ensure, together with all the other joint carriers, that its part of the fares is accurate and up-to-date.

### Consequence of the solution

- All FTP addresses should be known by all actors (registry to be managed by the TAP governance body)
- Existing RUs using a database could give an FTP address for this database.

### Limitations of the solution

- Each RU cannot give anything else than the full fare with NRT
- Each RU cannot ensure IRT fares can be available at time of booking.

### More ambitious solution incorporating additional RU and TV commercial needs

As the Passengers' Rights Regulation requires RUs to provide information on their best fares to customers across the EU and as those fares can only be known in real time, a promising candidate solution could be to rely on a **Transactional service request** using a **synchronous** request/ reply message exchange pattern<sup>20</sup>. Systems need to

<sup>20</sup> To be validated



communicate in real time to get the right fare at the right time for the customer. This synchronous request/ reply does not exist at the moment.

The solution proposal is addressed in the Full-Service Model Work Stream, based on previous sector work, and will fit with the commercial needs of closed and open systems. It will also be able to manage special fares in their different shades.

However, to take into account hundreds of RUs that may just use NRT fares for their open systems, a central solution will be further investigated so that it will host all NRT fares for RUs not able to build a link between their system and the others.

### 3.2.3.6 Reservation

Basic Parameters 4.2.7, 4.2.8 and 4.2.9 *“lay down the manner in which the railway undertakings shall deal with reservations for the accommodation of bicycles, cars and passengers. It shall ensure that the issuing and attributing railway undertakings shall exchange appropriate availability and reservation information. The attributing system shall be able to handle at least messages according to the protocol specified in the technical document B.5.*

*The provisions of this basic parameter shall be applied if an agreement between the requesting and the attributing parties exists in respect of services which may be reserved or are subject to mandatory reservation.”*

#### Architecture scope is

- to give a solution to newcomer RUs and Ticket Vendors to exchange appropriate availability, reservation and cancellation information for retailing purpose (subject to agreement)
- not related to private solutions (existing or future ones).

The specifications for properly applying the Technical Document B.5 will be described in the implementation guides.

#### Facts and findings

- Among the RU UIC members, some are based on pure Open systems with no need of reservation for trains (sales are locally made thanks to timetable (B.4) and NRT data exchange (B.1) without the needs of transactional requests between systems)
- Some other RU members are based on Open systems with reservation possibility on designated trains: sales are composed of Travel on one side and dissociated Reservation on the other side. For such cases, the Reservation needs to be exchanged through a transactional request/ answer between the requesting system and the attributing one, the travel still being processed locally (B.4 and B.1)
- Some RUs are based on closed systems with mandatory reservation on designated trains: sales cover both the travel and the reservation without possible dissociation of the two. For such cases, a transactional exchange is mandatory between the requesting system and the attributing one
- Lastly, some RUs are using Open systems and quota managed fares for designated trains (Train Linked Tickets – TLT) which requires a transactional exchange to get the best fares for open tickets in real time
- All UIC RUs using transactional exchanges are using the Hermes network to transport the message (B.5)

- Some RUs use a private solution between their each other's systems (host to host)
- Some RUs use a private solution between their system and some Ticket Vendors
- Hit Rail<sup>21</sup> proposed to Ticket Vendors three possibilities to use the existing Hermes network:
  - First: Gateway filters messages, only authorized ones enter the network.
    - Pros: gateway can translate formats, less traffic on the network, virus proof
    - Cons: all TVs have to support this method, an audit system is needed to track illegal access; gateway is bottleneck, if it fails all fails.
  - Second: Gateway only translates, security performed by allocator. Needs a directory.
    - Pros: It allows one allocator to sell more than B.5
    - Cons: More network capacity is required, possible performance problems.
  - Third: Enterprise service bus.
    - Con: More complicated to define the commercial rules (who can sell what).

An XML version of 918.1 already exists and the Regulation may change to allow this new format. There will be an XML-918 translator next year. The translator only translates messages, it does not change the method.

- Ticket Vendors will assess whether it would be appropriate for them to use a solution as offered by Hit Rail or whether other solutions are preferred. The next architecture Expert Group mid-December will focus on this subject.

### **Initial conclusion**

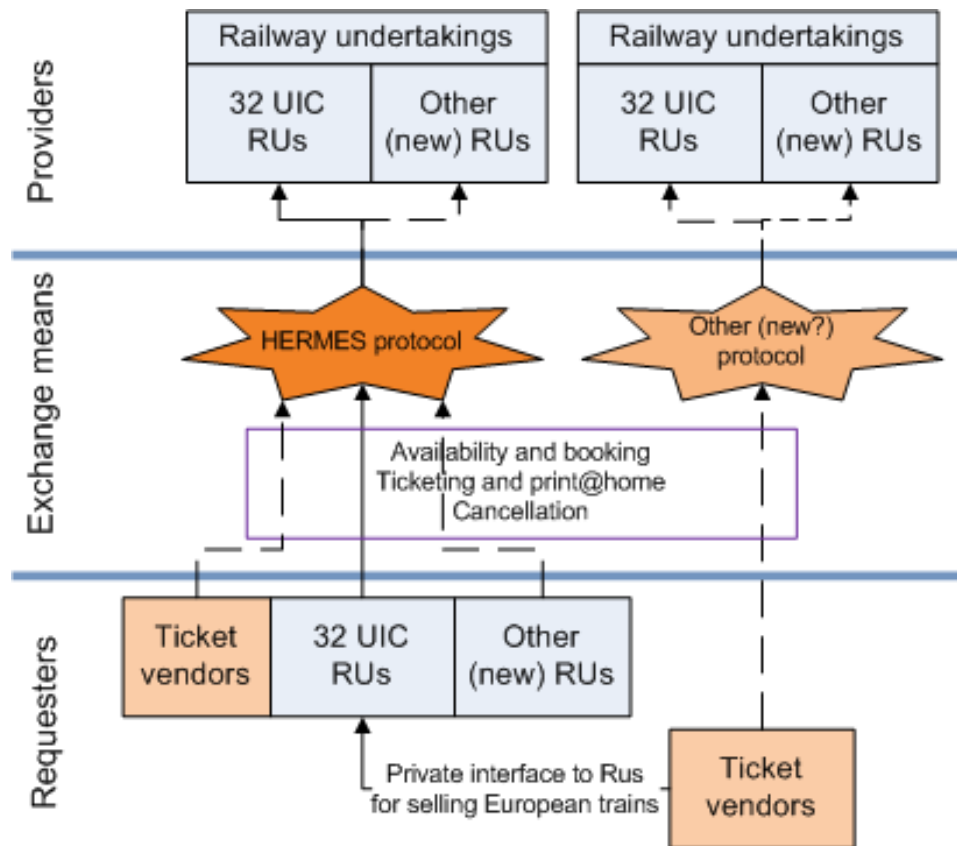
Ticket Vendors will study whether they use one of the Hit Rail proposals or their own solution, the fourth architecture meeting being a focus on this subject.

In case the Ticket Vendors deem it more beneficial to have a more far-reaching solution, this can be either global (i.e. all GDSs come to the same solution) or individual (each GDS has its own solution). It could also be that one GDS uses a Hit Rail solution, for instance, and another one use a separate solution.

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<sup>21</sup> Private company owned by 12 European RUs and IMs and mandated to procure and manage a virtual private network (VPN), called Hermes network, for the use of RUs, IMs and their associated bodies (UIC, Raildata, ...)

The potential architecture could be the following:



Currently connected RUs use the HERMES protocol for transporting B.5 requests.

Dotted lines are links that do not exist currently, but could be built in the target architecture between Ticket Vendors systems and RUs systems.

New RUs that want to distribute other RUs' tickets need to come to an agreement with those RUs and then build a HERMES connection.

Depending on business agreements, Ticket Vendors could continue to use their private interface to RUs to sell European trains.

### Requirements for the solution

- If a request for reservation of places has been validly formulated according to the process described in B.5, the attributing system shall send an availability/ reservation response for the requested train to the requesting distribution system.
- The main types of reservation responses shall be:
  - Reply about availability
  - Confirmation of reservation request
  - Confirmation of partial cancellation request
  - Confirmation of complete cancellation request
  - Replacement proposal

- Negative reply.

### Consequence of the solution

- If one of the Hit Rail solutions is adopted, RUs will be using their usual interface, knowing that they are not anymore talking to an RU but to a distributor. Solution to be further studied in the coming architecture meetings)
- If other(s) solution(s) are chosen, an impact assessment should be driven to evaluate how important the changes are with this (these) new protocol(s). Solution(s) to be studied in the upcoming Architecture meetings.

### Limitations of the solution

- To be further studied in the coming architecture meetings
- Whatever the solution, the settlement aspects are not covered. Without this, selling rail products through a transportation protocol for B.5 is not possible.

### More ambitious solution incorporating additional RU and TV commercial needs

As EU pushes RUs to give their best fares to customers across Europe, the best solution relies on using the same protocol for exchanging fares based on **transactional service requests**.

The Full-Service Model Work Stream has to fill the gaps and notably the one on identification of sales point and settlement.

### 3.2.3.7 Fulfilment

Basic Parameter 4.2.11 *“shall ensure that the issuer or Ticket Vendor shall issue tickets according to standards that ensure interoperability between railway undertakings. For the purposes of issuing tickets for international and foreign sales, railway undertakings shall use at least one of the fulfilment types listed”* hereafter:

- RCT2 ticket according to Technical Document B.6 covering
  - Ticket and reservation, Ticket only, Reservation only, Supplements
  - Upgrade, Change of itinerary, Boarding pass
  - Special fares in conjunction with national railcards
  - Group ticket
  - International rail passes of various kinds
  - Accompanied vehicle coupon
  - Travel voucher for compensation
- Print@home ticket according to Technical Document B7 covering:
  - Open ticket (travel only)
  - Open ticket + reservation (travel and reservation)
  - Open ticket + supplement (travel and supplement)
  - Open ticket + reservation + supplement (travel, reservation and supplement)
  - Global price ticket (travel and reservation).

**Architecture scope is**

- to give a solution to RUs and Ticket Vendors to exchange appropriate data to print ticket for Print@home solution (subject to commercial agreement)
- not related to the RCT2 solution as it relies on a layout that the distributor needs to strictly apply, based on the data received at the time of the reservation process (B.5).

The specifications for properly applying the Technical Documents B.6 and B.7 will be described in the implementation guides.

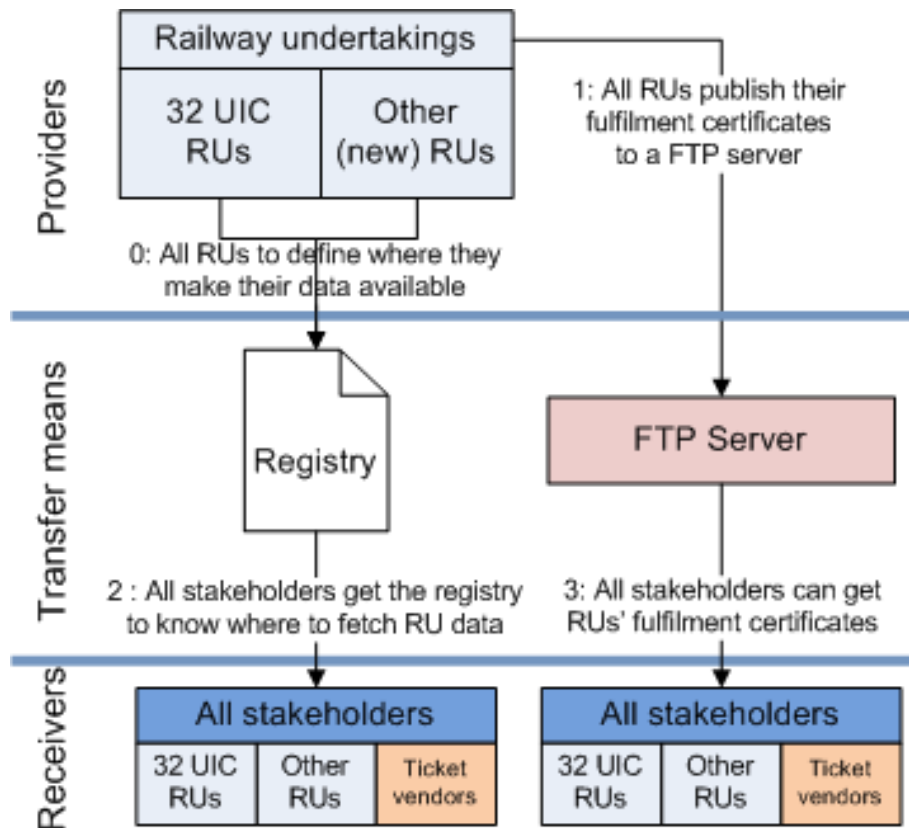
**Facts and findings**

- There is no architecture subject related to RCT2: it is a simple lay out described in B.6
- 43% RUs responding to the questionnaire are using the B.7 for the print@home solution based on exchanging certificates
- The two other possibilities of B7 based on XML are not used by any RU
- Most of RUs are using other ticketing modes in their domestic market, but those modes are not based on UIC standards or TAP Technical Documents. They can be all different approaches
- Two of those approaches (Ticket on Departure, Manifest on List) are foreseen to be standardised but, since there were no such standards at the time the Regulation was written, they are open points
- ERA mandated CEN to close those open points
- Ticket vendors use e-ticketing for airlines and private solutions for RUs they are selling (e.g. SNCF e-billet).

**Initial conclusion**

No initial conclusion has been reached so far. An FTP solution could fit the needs to exchange certificates. Further study will be conducted in the coming architecture meetings.

The potential architecture could be the following:



Data are exchanged through files according to encryption solutions for the certificate; only public keys are concerned. Private keys remain on the Product owner side.

0: RUs publish the location (FTP server) of their fulfilment certificate files in a global registry.

1: RUs publish their certificate files to the aforementioned locations.

2: All stakeholders use the registry to know where to fetch the certificates.

3: All stakeholders fetch the certificates they are interested in. The use of those files should be subject to commercial agreements.

### Requirements for the solution

- Security aspects should avoid fraud.
- B.7 is only for non-exchangeable and non-refundable products

### Consequence of the solution

- A registry needs to be managed by the TAP Governance body
- To be further defined in the coming architecture meetings

### Limitations of the solution

- Covers limited range of products
- To be further studied in the coming architecture meetings.

**More ambitious solution incorporating additional RU and TV commercial needs**

When open points will be closed, other ticketing solutions will be made available.

The Full-Service Model Work Stream should solve first the settlement subject prior to ticketing.

**3.2.3.8 Reference Data**

Reference data are covered in Basic Parameters 4.2.18 and 4.2.19 related to Technical Documents B.8 (Numerical Coding of IMs, RUs and other companies involved in the transport chain) and B.9 (Numerical Coding of Locations).

Passenger Code Lists are also part of these reference data (naming or numbering conventions)

Those reference data need to be used by all actors of the Architecture exchange system.

Regulation requires the following:

*“Where reference data or reference information is used in order to meet the requirements of this TSI, the actors addressed by this TSI shall guarantee the coherence between the reference data or reference information and the data or information used in the basic parameters of this TSI (examples: coherence (i) between location reference codes and train running information or (ii) between railway undertaking reference codes and fulfilment shall be ensured, etc.).”*

**Architecture scope is**

- To give a solution to all RUs, Public Bodies and Ticket Vendors to exchange reference data
- Be able to cross reference data that are commonly used in TAF and TAP.

TAP TSI-Technical\_Document-TAP\_Passenger\_Code\_List is the document used to describe the passenger code lists.

**The main findings so far are**

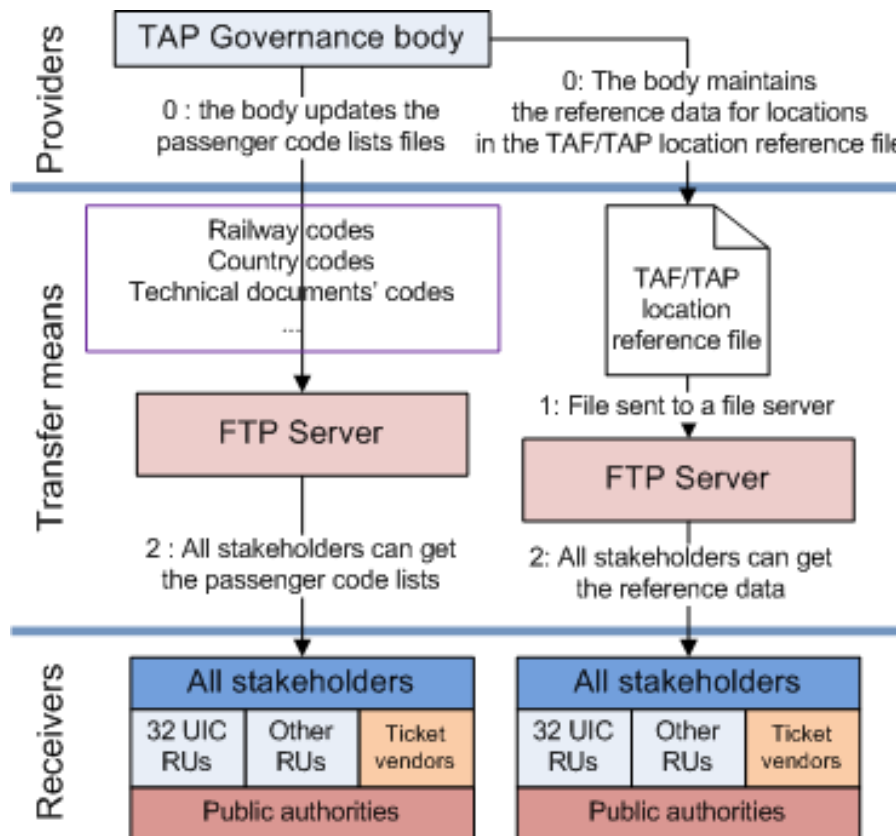
- There was no discussion yet on this topic in the Architecture Work Stream. It is part of the remaining subjects architects need to study during the coming architecture meetings.
- There was a dedicated meeting on reference data that may drive us to solutions on architecture side, the TAF-TAP common database being a key element to reach harmonisation between TAF and TAP and to get accurate and reliable data.

**The potential architecture could be the following<sup>22</sup>**

It may be envisaged that these codes of general use be stored in the TAF-TAP centralised data store. However, such “master” data could be distributed using File Transfer patterns as well.

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<sup>22</sup> The graph has not been shared yet with the members of the Architecture Group, but will be discussed in the meeting mid-December



Data are exchanged through files.

0: The TAP Governance body maintains the reference data for locations (stations, sales offices etc.) in the TAP/ TAF common database. The body also maintains the passenger code lists files and uploads them to an FTP server

1: The TAP/TAF common database is extracted into a file; the TAP governance body uploads it to an FTP server

2: All stakeholders can get the reference data for locations, Railway Codes, Country codes and the passenger code lists files.

**Note: this can also be used for BP 4.2.3 (Handling of info on contacts details of the RU)**

### Requirements for the solution

*“All those to whom this TSI is addressed shall be responsible for making available up-to-date, coherent, accurate and complete data at the appropriate time and in the appropriate format to other railway undertakings, or to infrastructure managers, or to a third party. Each actor addressed by this TSI shall be responsible for publishing up-to-date, coherent, accurate and complete information at the appropriate time and in the appropriate content to the customers (passengers), or to other railway undertakings, or to infrastructure managers, or to a third party.”*

### Consequence of the solution

- Will be studied shortly.

### Limitations of the solution

- Will be studied shortly.



**More ambitious solution incorporating additional RU and TV commercial needs**

- To be studied shortly.

**3.2.3.9 Next Steps**

Four other meetings have already be planned to take place between December 2011 and March 2012, covering experts' views on:

- Final solution for timetables to be suggested, with detailed architecture specifications
- Final solution for fares to be suggested, with detailed architecture specifications
- Transportation protocol for exchanging reservation/ availability/ cancellation will be agreed by architects and further detailed
- Final solution for exchanging Print@home Certificates will be detailed
- Reference data storage and access will be further studied and detailed.

Small RUs may find an interest in building their FTP server in which they could place timetable, fares and fulfilment certificates at the same time. If they do not offer reservations for their trains, they do not need to exchange information through transactional request/ answers from their system. This appears to be a cost effective solution.

**3.2.4 Beyond TAP TSI – The Full-Service Model (FSM)****Key information to take away:**

- FSM has been introduced as a proposed enhancement beyond the provisions of the TAP TSI
- FSM architecture will probably contain more than one solution for the making available of schedules and fares
- FSM architecture will need to describe alternative solutions for the offer of different rail products, corresponding to different RU retail strategies
- Consequently, FSM architecture may need to be a suite of voluntary reference standards
- FSM architecture will allow for the provision of components (including any Central Services that may prove necessary) by any appropriate player, subject to positive economic evaluation according to the TAP governance process.

**3.2.4.1 Introduction**

As has been said above, the general understanding within the project is that the Full-Service Model Work Stream shall take into account the opportunities and consequent enhancements beyond TAP TSI.

Nevertheless, there has been some natural overlap of expert discussions especially between the Architecture and FSM Work Streams, as the solutions to issues arising in each proves relevant and, in some cases, in conflict with the solutions in other Work Streams. These may give rise to changes that need to be implemented in the following circumstances:

- in an immediate TAP TSI change request to be submitted to TAP CCM
- in a feature of a future enhanced architecture to be described by the FSM Work Stream
- in both: i.e. signalling a need for both short-term and longer-term solutions.

In this section we examine the findings around the types of enhancements which would be required to support the Full-Service Model, regardless of any prior need (in the shorter term) identified as pre-requisite for RUs/ TVs to meet their obligations or enjoy their rights under Regulation 454/2011.

### 3.2.4.2 What is the Full-Service Model?

One of the early achievements of the FSM Work Stream was to brainstorm on requirements attached to each stage of the Traveller’s experience, from “pre-purchase travel options consideration, customer information and decision support” (through, ‘shopping’ (timetables, fares and availability), booking, payment, fulfilment, post-sales, to Journey (pre-, intra- and post-) customer information and support.

In each case, customer-centric requirements from the Traveller/ End-consumer perspective were elaborated, together with the consequent requirement ramifications for Ticket Vendors and RUs.

Set-up configurations were also addressed, covering non-customer aspects such as Ticket Vendor licensing, agency and interline settlement, and back-office accounting/ sales reporting.

The document (in its unrefined draft state), is available at Appendix C and although certainly incomplete, has yielded some key elements which help to define the Full Service Model.

The table below shows some highlights of the requirements from an end-consumer / traveller perspective which have been deliberately extracted on the basis of their ‘distance’ from today’s rail-shopping experience:

Pre purchase customer inform	Look - Timetables	Look - Fares	Purchase/Book	Payment	Ticket Fulfilment
Can I or must I mix other modes with rail	Understand the journey: routes, permitted routes, itinerary, schedule	I need to be able to compare tariffs and products across EU carriers	I want all the segments of my multi-carrier journey to be under one contract of responsibility	I want to pay multi segment multi carrier in one shot (I want the shopping cart)	CN: I want a single ticket to travel whatever the railway
CN: I want to be able to get the best choice of trip plans based on important criteria for me (e.g. price, calendar, class of service, travel duration, mode of transport, Carbon footprint, etc.) even if implies several railways	UD: I want a multimodal journey planner	IC: I want to be able to go to a single source and find all the best prices and travel options UD: If my starting date/time is flexible, I want to be shown prices +/- n days/hours	CN: I want to book easily and one shot for my whole trip	I wish to be able to use my credit card everywhere	I want no physical ticket

The following features stand out:

- a choice of Trip Plans (amongst RUs and other providers)
- a 'point of sale' intelligent enough to 'journey plan' (amongst RUs and other providers)
- to be able to make comparisons without visiting other sites
- to book, pay and ticket in one shot
- to travel light and simply (a single entitlement and no physical (losable) ticket).

The common themes: comprehensive choice, ease, simplicity, and speed, can be seen running through the end-consumer's desired pre-shopping, shopping, purchase, and travel, experiences. This confirms and elaborates the findings of Eurobarometer No. 228, where lack of information, uncompetitive pricing and cumbersome ticketing solutions were found to be the biggest obstacles for consumers in regard to international travel in the EU.

### 3.2.4.3 The Distribution Landscape: A Variety of Value Chains

End-consumer requirements are key, but it is also important to understand the landscape of how Rail Products and Services are currently supplied:

- **Railway Undertaking (RU) – direct distribution**  
Normally sells/retails tickets from its own inventory, at stations, and at its own outlets including online own-brand websites. May also sell services from other RU inventories, depending on commercial agreements in place, through these same channels. May distribute, under licence directly to Travel agencies and Specialist Rail Agencies, as well as to Global Distribution Systems.
- **Specialist Rail Agency (SRA) – e.g. thetrainline.com or Evolvi – specialise in selling directly to consumers as well as providing technologies to third parties including GDS, Travel Agencies, TMCs and Tour Operators, to book rail tickets.** In most cases, the specialist rail agency is the Ticket Seller, has a licence to sell tickets from the content owner (RU), and is sourced directly by the RU(s). Where the Specialist Agency provides its technology to third parties to book, it may also provide a sub-licence meaning that the third party would not need a separate relationship with the RU.
- **Global Distribution System (GDS) – e.g. Sabre, Travelport, Amadeus - does not actually sell or retail rail tickets, but provides the technology and other services to their clients (travel sellers) to be able to sell a ticket under separate licence with the appropriate RU.** It is usually up to the Travel Seller (which may be a traditional travel agency, a TMC<sup>23</sup>, an OLTA<sup>24</sup> or a Tour Operator) to obtain the right to sell in whichever markets it wants to.
- **Travel Agency or Travel Management Company (TMC) – these are actual Travel Sellers that sell to the end customer (traveller).** The end customer may be a business customer who is booking under his/her company's agreement with that TMC, or a leisure traveller booking for private travel. In this case, the Travel Agency may use a system provided directly by the RU or by a GDS, SRA or alternative technology

<sup>23</sup> Travel Management Company (e.g. Carlson Wagonlit Travel, BCD, Hogg Robinson Group)

<sup>24</sup> On-Line Travel Agency (e.g. Expedia, Priceline.com, Travelocity)

provider, but in every case needs the appropriate licence to sell the content to the traveller.

- **Tour Operator** – is usually responsible for creating and selling travel packages, typically a hotel plus travel (air or rail). They will require a specific licence from the RU to sell the rail ticket; often this may be a bespoke range of ITX (Inclusive Tour) net fares which may not be commissionable and may not have the price printed on the ticket. They may source their Rail content directly from an RU, or depend on a SRA, or a GDS.
- **On-line Travel Agency (OLTA)** – sells to the online Travel Shopper and requires a specific licence from the RU to sell their content. Arguably maintains the most sophisticated online Retail technology, since it caters for the mass of un-informed Travel Shoppers, and has very fast performance requirements in terms of response time from the ‘low fare search engines’ which are typically (although not always) hosted by GDSs or SRAs.

#### 3.2.4.4 How Might Requirements and Landscape Shape FSM Architecture?

Whilst this is still very much ‘work in progress’ initial findings by the experts suggest that the relevant architecture to be defined will be a suite of voluntary Reference standards that co-exist with the mandated architectures of the TAP TSI.

This is based on the following primary findings:

- that end-consumers vary, and that different categories are serviced by different value-chains from the plurality of distribution models comprising the distribution landscape. This gives rise to a potential need to support parallel but equally valid architectural options.
- that end-user requirements for intelligent routing and journey planning, together with requirements for simplicity and speed of purchase, demands that different Rail products be combined for shopping, booking, payment and fulfilment purposes.
- that Rail Services may be combined by Ticket Vendors in the retail process (without the need for RUs to have formally agreed such combinations) or they may be combined, in inventory, as a result of commercial agreements between RUs (e.g. Interline, Joint Venture). This gives rise to alternative architectural arrangements between functional components conditional upon RU retail strategy and decision-making.

If one key high level objective is to facilitate innovation within the industry, it becomes clear that a Reference Architecture providing a choice of recommended options, will serve its evolution far more effectively than a single imposed architecture based upon the risky pre-definition of a single RU/ Ticket Vendor interface.

It is important to stress that this is not to escape the obligations of Regulation 454/2011 which helpfully address the minimum requirements around the ‘making available’ of key Rail product information; it is more to avoid ‘straitjacketing’ the industry by casting a

single architectural net over the dynamics between business requirements and the technological solutions emerging to meet them.

A couple of examples help to illustrate these findings:

### **End-consumer segmentation**

At one end of the spectrum end-consumers know exactly what they want in terms of brand and product type, and wish to get direct access to specific timetable, fares, and availability information in correspondence with a specific origin and destination.

Architecturally speaking, this type of end-consumer can be serviced using the sort of real-time interactive messaging which largely characterises today's interface between RUs and Ticket Vendors, mirroring the interface the Retailing and Inventory components of the RU direct sales channel.

This image of the end-consumer is typically ingrained in 'legacy Rail mentality' and the weight of this legacy risks a natural blindness with regards the rapidly evolving variety of consumer pre-shopping and shopping behaviour as brokered by the increasing sophistication of internet retailing techniques.

So, for example, it is equally clear that at the other end of the spectrum, end-consumers will be completely ignorant of brand and product type, as is almost certainly the case for non-European travellers, and at the same time, may even wish to engage in an initial 'electronic window-shopping' exercise using fairly approximate criteria around budget and destination:

e.g. "Where could I go in Europe, for around 'X' EUR, to take in some historical sights, for a couple of weeks during this winter?" is an increasing type of pre-shopping query on the internet.

In response, a new trend in 'semantic search' engine growth is evident. Whilst this is entirely within the Ticket Vendor's domain, the base requirement from an OLTA, for example, is the same (although more extreme) as for any query concerning any two designated cities within Europe i.e. to produce, within a split second, a list of 200-300 recommendations comparing different and mixed Travel Provider itineraries, which are all fully priced, available, and ticketable according to ticketing agreements and fare rules / restrictions.

Clearly, the legacy real-time interactive messaging architecture which characterises the Rail Industry and which fits more closely with the other end of the spectrum, is inadequate to meet this type of retailing opportunity, and it should come as no surprise that the range of European Rail Products is, today, virtually invisible at this end of the consumer spectrum.

The type of architecture which can meet these requirements is one consisting of mechanisms which guarantee the 'pre-priming' of search engine databases with locally accessible, and up-to-date, timetable, fares / fare-rules, availability, and ticketing agreement information: the 'real-time' processing window in this example has to be reserved for massive computation on locally primed data: interactive messaging is too slow. This type of solution requires an architecture which can deal flexibly with the bulk transfer of Rail product schedules and tariffs

By looking at both ends of today's end-consumer spectrum, we can see, therefore, that more than one type of architecture may be valid and relevant: and one size may not necessarily fit all. A Full-Service Model architecture is almost certainly to be characterised by different flavours and needs to be able to service the full spectrum of end-customer scenarios.

### **Product type combination**

It is evident that there are a variety of Product Types available on the market (e.g. IRT, NRT, Zonal, TLT<sup>25</sup> or Yield-managed, interline and Joint Venture) and it is equally evident that not all RUs, as Product Owners, support all types. As a consequence, the legacy RU reservation systems themselves display differences in sales processing with some corresponding differences in the architectural relationships between components (e.g. reservation, payment and ticketing).

If the Full-Service Model is to support itinerary requests which are cross border, then, typically, architectural solutions for the combination of Product Type, across different RU system architectures, will need to be defined.

An 'Add-On' approach, which may satisfy product combinations, not subject to formal RU commercial agreement, demands an architecture which can maintain discrete payment, ticketing and settlement processes per Product Owner, even if presenting a 'single transaction' appearance to the consumer using clever 'holding' mechanisms in the background.

However, the architecture required to support an Interline Agreement marketed with a single 'through fare', for example, will require single payment and ticketing processes. Clearly, RUs with different retailing strategies, and the freedom to enter, or not, into different supporting types of commercial agreements, are going to require a reference architecture that supports these requirements.

### **Further influencing considerations - opportunities**

In a period of financial crisis and uncertainty, recent and ongoing international de-regulation, and with complete domestic de-regulation around the corner (2017), the prospect of investment in even minor architectural evolution, is viewed with justified concern: and particularly if subject to 'legal obligation'.

However, although unquantified in most cases (some funded research would be appropriate), a number of market trends and existing factors promise some counter-balancing opportunities. A few are listed below:

- The domestic market itself has the opportunity to increase as Airlines transporting non-European travellers into Europe look for local transport partners to take care of the 'door-to-door' or onward travel requirements of their passengers
- The size of the existing cross border market is largely unquantified, but is certainly larger than the RU's modest share of it might suggest (as Low cost carriers, Car Rental and Motorway Toll operators could probably attest)
- EU transport vision objectives to reduce intra-European Air Travel between cities less than 300-400 km from each other may create an increased demand for non-Air transportation, specifically rail

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<sup>25</sup> Train Linked Ticket

- In many instances, connections with Ticket Vendors whose systems have developed hand-in-hand with the Airline sector's evolution over the past 30-40 years, confronting and overcoming many of the challenges that the Rail Industry is just now starting to face, can offer new and global distribution opportunities
- By the same token, it may be possible to leverage existing technological developments (e.g. for Airline distribution) to assist in the implementing of some of the anticipated FSM distribution architectures, along with corresponding cost-savings e.g. electronic ticketing saved the Air Industry billions in the elimination of paper tickets, and their corresponding hardware, and manual processing procedures
- The sort of collaboration that the TAP TSI project will engender amongst the industry's RUs and Ticket Vendors, together with its continuity under a proposed TAP governance structure, will allow, where economically justified, the designation of Central Services, the cost of which can be spread across the industry rather than borne by any one individual or newcomer entity.

### **The New Price Message opportunity**

Work on a dynamic exchange of tariff/ fare data already underway within the RU community<sup>26</sup> has been recognised as being highly relevant and well aligned to the FSM. TV experts are participating with RUs in a working group to move from Technical Documents on fares to a more appropriate data exchange process. Other sector work that has already been done in this area will be added to this, too.

### **3.2.4.5 Likely Features of the FSM Architecture**

As a consequence of the shaping influences described above, it is likely that the high level features of the FSM Reference Architecture will include at least the following:

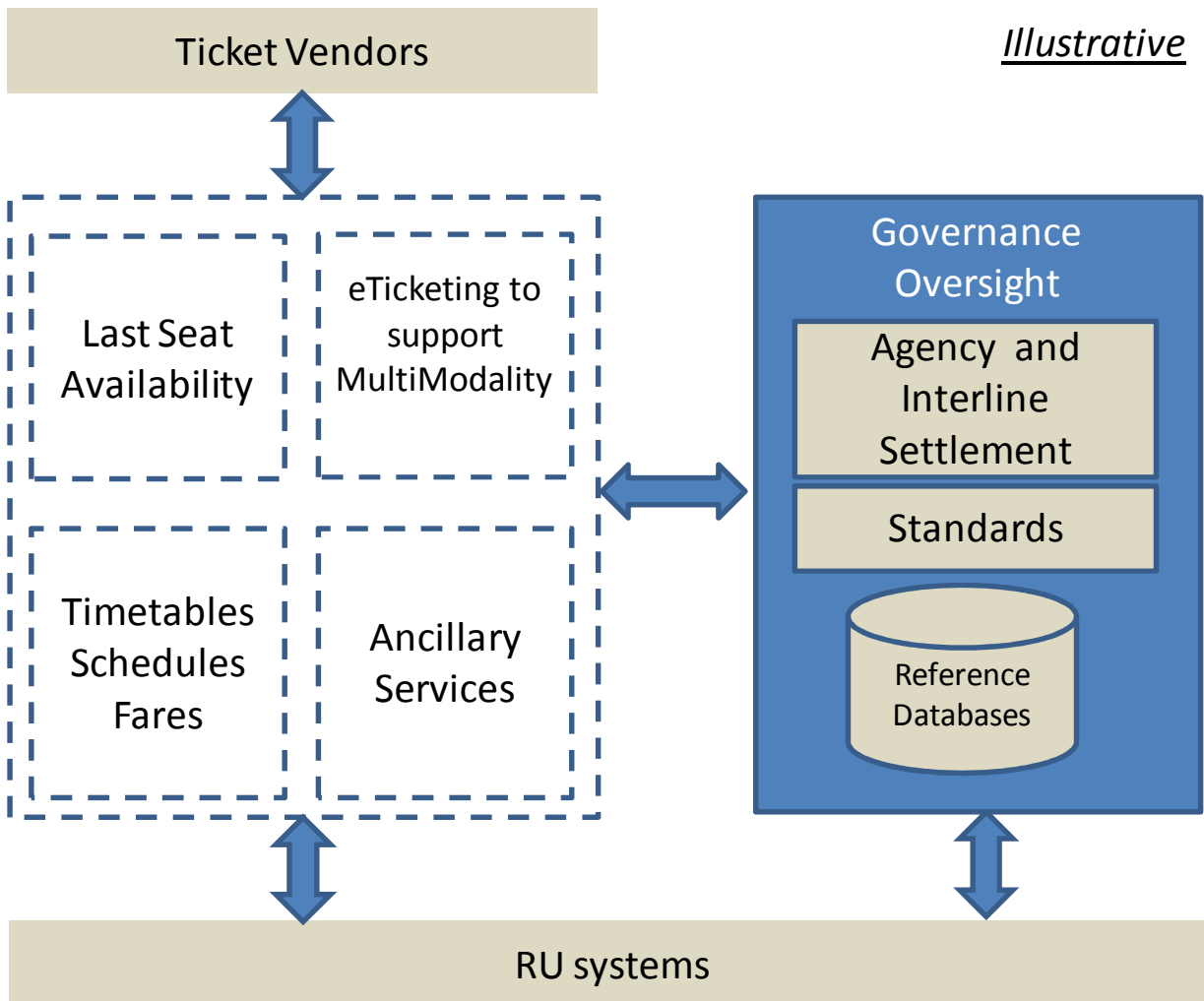
- It may need to provide more than one valid solution in order to cover the full range of distribution models, whilst at the same time defining minimum connections that should allow optimum RU participation in that full range.
- It will provide solutions for handling combinations of different product types across different RU system architectures.
- It will offer generic options which support different types of RU commercial agreements which can help stimulate RU collaboration to improve the sector's competitiveness with respect to other transport modes.
- It will define interfaces between generic systems and components, rather than between pre-defined entities such as 'RU' or 'Ticket Vendor'
- It will allow the same components to be provided by different players depending on the context, without any need to adjust the architecture, and enabling funding of the solutions by players other than RUs.
- Certain components or systems are likely to suggest their candidature for a 'Central Service' solution where prohibitive development costs at individual level could be shared advantageously amongst the community of Industry players (e.g. agency and interline settlement).

The figure below is a high-level representation of one possible FSM Architecture that is offered for illustrative purposes.

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<sup>26</sup> Known as "New Price Message" work

## A Potential Logical View of FSM Architecture



### 3.2.4.6 FSM Sub-Group and Methodology

As some of the above analysis demonstrates, the rail business environment is subject to an accelerating dynamic. Consumer wants and expectations are changing as exemplified by “generation internet” and “generation app”: consumers are increasingly agnostic as to the RU or transportation provider who they wish to book with, and put themselves into the position of a “shopper” demanding clear choice. As a consequence, the FSM team dedicated a good deal of its initial efforts to understanding the current and emerging user requirements and associated use cases in order to identify what architecture is required to support and enable such requirement.

Equally, it is apparent that delivery of the FSM reference architecture is an ambitious task within the timeline of the Phase One project.

The FSM has meanwhile created a sub-group, consisting of 3 representatives from the RU expert community and 3 representatives from the Ticket Vendor expert community.



The sub-group will determine the optimum split of the work to be undertaken, together with advice on how to proceed in developing each 'package'. The high level business scenarios/ consumer Use Cases which define the FSM will be identified, along with, in each case, the high level requirements at each component level (e.g. Timetables, Fares, Availability, Reservation, Payment, Ticketing, Post-sales, Settlement). The FSM team has chosen this approach with the objective of accelerating the next phase of work towards the deliverables, and combining a critical mass of expertise for a quality output.

On completion of the initial analysis, further sub-groups will be assigned to carry out more detailed work on the individual 'work packages' at component(s) level, and to develop the features needed to meet the requirements rendered by each high level business scenario/consumer use case.

In this process, the sub-groups will exchange information detailing the processing and content dependencies they may have on other components, so establishing the interface network that the reference architecture will support. A final re-integration exercise will be required to identify opportunities for architectural synergy across components.

#### **3.2.4.7 FSM Gap Analysis, Planning and Recommendations**

In parallel, the sub-groups will distinguish those component features and interfaces which are fully or partially supported by the current TAP TSI specifications from those which are not. This work will feed directly into the gap analysis deliverable, whilst at the same time providing indications as to how each of the gaps may be tackled. Some examples of how these could be implemented:

- via change requests to modify current TAP TSI and submitted to TAP CCM
- via a Central Services approach that may be driven by the TAP Governance Board
- via FSM as an addition to the TAP TSI provisions within the current project timelines
- via FSM as an addition to the TAP TSI beyond the current project timelines (if possible) or funding a future TAP TSI project (if necessary).

Planning looks likely to be split between Phase One elements (TAP CCM change requests and FSM additions to TAP TSI within the current project timelines) and a Post-Phase One plan, inherited by TAP governance with respect to the provision of Central Services and ongoing management of the FSM project.

Finally, the Sub-Groups' detailed work should enable the FSM Work Stream to make recommendations identifying which currently un-supported FSM features should be covered by the regulatory framework, and which should remain conditional on RU retail strategy decision-making.

#### **3.2.4.8 Next Steps - Highlights**

There are no final conclusions with regards to the specifics of the FSM architecture at this stage of the project: two topics, highly summarised, are presented here as simple illustrations of the types of discussions and thoughts which are ongoing

- The 'making available' of data – is part of the regulatory TAP TSI framework and has impacts on Timetables, Tariffs and Fares, Availability and PRM. The requirements from different distribution models yield a number of possibilities as to how the concept of 'making available' might be implemented:
  - Real-time provision of data on request (pulling data at transactional level)
  - Posting of an address from which data, in bulk, can be pulled in advance (with and without pushing notification messages when new data is available)
  - Pushing data at key points to update working caches
  - Pushing data, in bulk, at regular intervals
  - Does bulk data need to be provided as full replacement data or as a delta of changes?
  - What sort of data validation and synchronisation checks need to be in place with regards to bulk data transfer?

Real time data pulling looks certain to remain a valid implementation for certain types of data (perhaps availability, IRT and TLT fares) and/ or distribution channel (perhaps direct and SRA channel).

For those data (static timetable and fare/ fare-rule data) and channels (GDS) which demand bulk transfer mechanisms, the implementational aspects start to look costly for individual players from a purely bilateral standpoint, already suggesting a potentially strong case for a 'Central Service' solution which manages data parameters (e.g. push-pull, distribution target, full replacement/delta) customisable per interfacing system, and provides community validation and synchronisation/mediation services.

- e-Ticketing – as 'represented' by the print@home format in TAP, lacks provision for handling post-sale transactions (cancellation, modification, exchange, refund). Whilst this certainly encourages the need to review UIC leaflet 918-4 for possible inclusion in TAP, FSM reflections on the difficulties of Interline Ticketing also encourage a glance at the e-Ticketing architecture used within the Airline Industry.

This solution, which covers both post-sales and Interline Ticketing may suggest useful ideas for single architectural solution for these items, as well as creating an opportunity for the industry to realise the same paper-and paper-handling cost savings that has been successfully achieved in the Airline industry.

Just to re-iterate, the FSM Work Stream has made no final determinations on these topics: it will start detailed work on these and many other items once its sub-group reports back (19 December).

At time of this interim report, the FSM sub-group is currently finalising the split of business scenarios/ consumer use cases according to Product Type, RU commercial agreement, RU system architecture and distribution model criteria.

### 3.2.5 Special Considerations for PRM Assistance

#### Key information to take away:

- Implementation of IT messages according to BP 4.2.6 is one technical possibility, but assistance to PRMs (where available) is in any case guaranteed by other means (phone, fax, e-mail)
- The use of IT messages according to BP 4.2.6 is rather complex; probably most RUs will prefer a user-friendly web application (still perfectly satisfying the PRMs' needs)

The safeguard of rights of persons with reduced mobility (PRMs) has always been a main concern and TAP TSI takes this fully into account, in accordance also with Regulation 1371/2007 on rail passengers' rights and obligations (PRR).

There are three specific PRM requirements in TAP TSI:

#### I) Basic Parameter 4.2.6.1 about information on accessibility of rail services

BP 4.2.6.1 requires the RUs to publish at least on their official websites information such as the trains where PRM facilities are available, the methods of requesting assistance, etc.

The obligation is imposed on the single RUs and no relevant task must be performed by the Project Team, apart from taking into account the forecast fulfilment of the obligation in the TAP master plan.

From the IT point of view, each RU will be free to choose the format to give to the information on its website; the only contribution that the Project Team can give is a reminder of the web content accessibility guidelines which take into account the needs of people with auditory and/ or visual impairment. Such reminder will be included in the Implementation Guide on information to the public.

#### II) Basic Parameters 4.2.6.2 and 4.2.6.3 about booking of assistance

Those two BPs describe the method for requesting and according assistance for boarding and disembarking from trains. It is important to note that:

- The assistance for boarding and disembarking is not a universal right, it can only be granted in the stations where such service is available, at dates and times when it is available and provided the available resources are not already booked for another customer;
- The process of requesting assistance for boarding and disembarking is completely independent, on the IT point of view, from the process of reserving a place on the train where the PRM will travel (obviously it is useless to book assistance if the train cannot be booked, but the two processes must be coordinated manually by the PRM him- or herself or by the assistance centre/ travel agent executing the booking. The reservation of PRM places on trains is dealt with under following point C);
- The specifications provided by the TAP for the purpose of booking PRM assistance only apply if the parties requesting and according the assistance use IT communication. Such use is not mandatory by law, the assistance can be negotiated with every other communication means (phone, fax, e-mail): the use of

IT can facilitate the process, but the quality of the assistance is independent from the method used to book it;

- Even when IT is used, the requesting and answering systems can use a standard different from the one defined in Technical Document B.10, if there is a specific agreement in this sense.

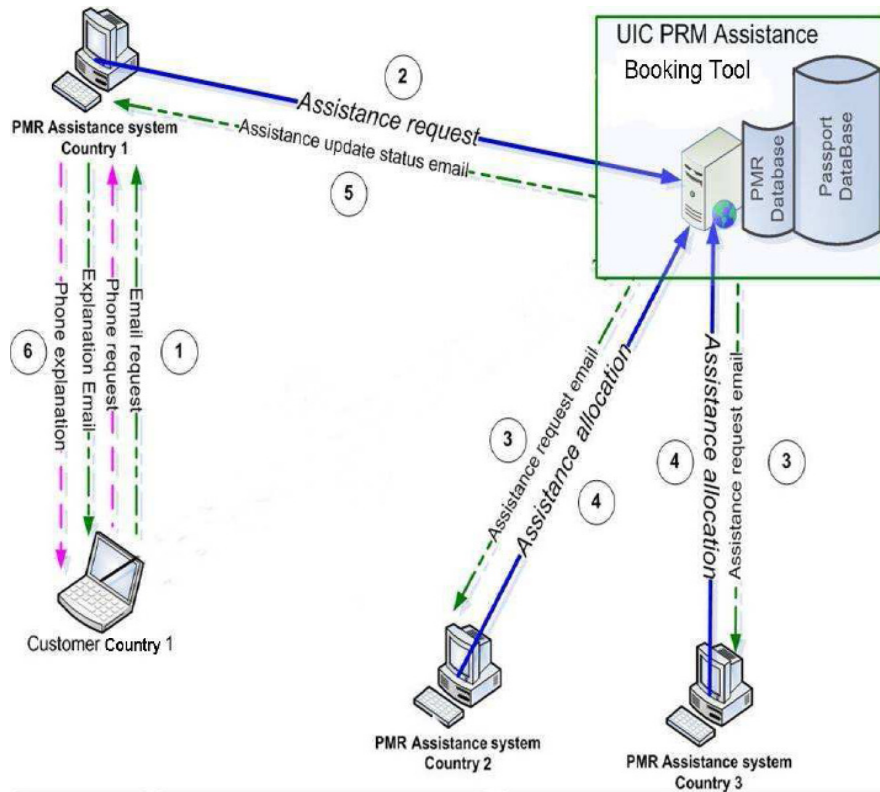
Without prejudice of all the alternative possibilities described above, in the absence of a more developed approach the basic method indicated by the TAP TSI for the exchange of the messages needed to book PRM assistance is the one described in Technical Document B.10.

B.10 is de facto a set of documents: apart from the text itself of the Technical Document, and the usual reference to code lists contained in the document "ERA\_TAP\_Passenger\_Code\_List.pdf", B.10 contains links to special IT documents of the type XSD (XML Schema Definition). In particular Chapter 2 states *"This Technical Document is accompanied by XSD schema files defining the messages. These schema files are part of the Technical Document. Future changes of the Technical Document have to ensure to keep the model definition in the Technical Document and the accompanying schema files consistent."*

*The Technical Document is accompanied by an XSD schema file documentation generated from the schema files. This documentation is provided for the convenience of the reader only, the valid specification is defined in the schema files."*

The XSD schema files are an essential part of Technical Document B.10 but at present they are not available on the ERA website (there is only a static HTML version that does not offer the flexibility of analysis reached with an XSD). It is important to fill this gap before the RUs start working to implement B.10.

The principle of B.10 is based on an exchange of messages between IT systems. As a matter of experience to date, as reported by RUs having experience of the Technical Document, this solution is rather complex and expensive, and it is very likely that most RUs abandoning the "manual" systems (phone, fax and e-mail) will prefer to adopt some form of exchange of assistance requests based on web applications.



One such application has been implemented by the UIC and is currently used by 12 European RUs. The PRM assistance request is introduced in the system via browser by the staff of the RU assistance centre contacted by the PRM, and the request is automatically transmitted to the persons responsible for assistance in the stations where the PRM will board or leave the train. The latter can then reply, also via browser, confirming or rejecting the assistance request. In this way the messages in B.10 are not used in the UIC system although the construction of the booking tool database is modelled on it. Only the Belgian railways until now have developed a dialogue of their national system with the UIC tool based on the B.10 messages.

The Implementation Guide on PRM assistance that the Project Team will develop during the second half of Phase One will take into account both above types of interconnection.

### III) Technical Document B.5 and related code lists about reservation

The procedures for the reservation of seats/ berths, described in Basic Parameter 4.2.9 and Technical Document B.5, are derived from the UIC leaflet 918-1, in use since decades and well tested. Those documents allow sending reservation requests specifically aimed at PRMs:

- regarding the accommodation (code list "Compartment request"):
  - code 01 = Passenger needing assistance / disabled passenger
  - code 06 = Wheelchair places with an additional normal place
  - code 08 = Places with easy access - PRMs
  - code 56 = Wheelchair places without an additional seat
- regarding the tariff (code list "Tariff code"):
  - code 96 = Wheelchair
  - code 97 = Accompanying person.

One final consideration can be made in order to further improve the rail travel experience of PRMs: to avoid fraud, the access to some benefits (reduced tariffs, possibility of free travel for an accompanying person) requires the proof that the concerned person is really a PRM. This is done usually by means of a disability card released by the relevant authorities of the PRM's country of residence. Since those cards are national, a PRM travelling e.g. by plane to another European country and wishing to visit there by train cannot benefit of the special PRM tariffs. Given the wide disparity of national entitlements, RUs have decided not to offer mutual recognition of each other's PRM disability cards. However, a more limited offer based on an existing RU-based common discount scheme is under study within the UIC.

### 3.3. Governance

**Key information to take away:**

- TAP TSI governance needs a permanent statutory body with a defined range of responsibilities
- One of these must be the ability to change and adapt itself in the light of experience and market developments

#### 3.3.1 Background

The ideas set out in this report are based on a review of the governance rules and procedures studied in an existing set of equivalent organisations. These include the rail, air and payment industries. There are major differences between the approaches taken by these organisations, as well as many ideas in common.

The organisations studied were:

- IATA – International Air Transport Association
- EPC – European Payments Council
- OTA – Open Travel Alliance
- RSP – Rail Settlement Plan

This was in addition to CER and UIC which both provide trade association services to the European rail industry. The results of this research have been documented in a working paper.

In addition to the basic research, the ideas set out in the interim report have been discussed in the Project Team and elsewhere. Further detailed discussions are needed before the governance can be agreed.

In addition to the basic research, the ideas set out in the interim report have been discussed in the Project Team and elsewhere. Further detailed discussions are being undertaken before deciding on a final governance proposal.

However, in principle agreement is being sought for by the end of February 2012 so that the costs of the proposed governance can be estimated. If anything is to happen in 2013, these costs must be agreed in principle by the funding bodies during the spring of 2012. The need for funding body agreement is fundamental if the masterplan timescale (see Chapter 3.4) is to be adhered to.

#### 3.3.2 Approach to TAP TSI Governance

##### 3.3.2.1 What is TAP TSI Governance

The TAP TSI Regulation 454/2011 defines rights and obligations for RUs and IMs. The Regulation also defines rights for Ticket vendors (TVs) and some other parties. However, none of those affected by the Regulation can meet their obligations or enjoy their rights

independently. They all need some services to be provided in common, as indicated in the Regulation itself.

TAP TSI governance is needed to make sure these services are available to RUs, IMs and others under fair and reasonable terms so that they can meet their obligations and/or enjoy their rights as defined in the Regulation.

The work on the requirements for TAP TSI governance recognises the links to the TAF TSI Regulation 62/2006. The two Regulations comprise the full set of telematics TSIs and there are important dependencies between them.

### **3.3.2.2 Governance Task Deliverables**

Governance is made up of four key elements:

- the initial set of services needed so that affected parties can meet their obligations and/ or enjoy their rights as defined in the Regulation
- an executive entity or organisation to provide these services
- a set of rules that govern the responsibilities of this entity and the way its work is carried out
- an oversight body that monitors the executive entity and adapts the rules and services according to commercial and policy developments.

The deliverables from the TAP Phase One project governance task will be:

- definition of the services that the executive entity is to provide to those parties affected by the Regulation
- description of the executive entity – TAP entity in shorthand – and its components
- description of the rules and policies that control the responsibilities and way of working of the TAP entity
- costed and budgeted plan for the creation of the TAP entity and its transfer into operation.

### **3.3.2.3 TAP Entity Responsibilities**

In summary, the proposed services to be provided by the TAP TSI executive entity are:

- Architecture Board
- Administration services including reference data
- Technical and specifications support
- Conciliation service
- New projects including projects resulting from the Full-Service Model Work Stream

The entity will provide no services and have no part in any commercial aspects of ticketing or operational rail business such as dealing with track charges, payment, apportionment and settlement. It will provide conciliation services in respect of technical matters only and never in respect of commercial matters.

Taken together, these can be referred to as interoperability services. They are what is needed by parties affected by the Regulation so that they can meet their obligations and/or enjoy their rights as defined in the Regulation.



As suggested below, the TAP entity responsibilities will be treated separately for the business of planning and operating trains and for those of creating and selling products.

### **Architecture Board**

The entity will create and maintain an Architecture Board.

The Architecture Board will have two primary roles. The first is to monitor telematics developments as appropriate in rail operations, rail ticketing, other transport ticketing and in other relevant sectors. In this way it will be able to provide expert advice on wider industrial developments and recommend generic changes to the TAP TSI architecture.

The second role is to review all change requests and ensure that they comply with the documented TAP TSI architecture. In addition, the Architecture Board will ensure that all change requests have properly taken into account the wider impacts of the specific change under assessment.

### **Administration Services Including Reference Data**

The entity will procure and provide access to a reference data service that covers all data elements held in common, such as locations, companies and other codelists. Changes to reference data will be subject to change control processes, but in a manner suited to the characteristics of the data.

The administration of this activity will be coordinated with the TAF TSI governance entity in a manner to be determined, given the overlap of location and company reference data between freight and passengers. Work has already started on developing the options for this coordination, as mentioned in the RU/ IM section above.

Other common services will also be required, as determined by the proposed TAP TSI architecture.

The entity will provide other administration services as required, including:

- security key and credential management
- registration of parties and objects defined in the TAP TSI architecture
- management of access control to common services
- management of charging for common services
- annual request to RUs and IMs to report TAP TSI Basic Parameter compliance and implementation plans
- member and third party communication.

There needs to be an emphasis by the entity on member communication, especially where it relates to new or changed Regulation obligations, or issues and problems identified in respect of meeting those obligations.

The entity will also need to communicate outside its membership. There will be various classes of recipient, including service recipients, European Institutions, Member States, industry organisations, professional press, other press, non-European rail and distribution companies etc.

**Technical and Specifications Support**

The maintenance of specifications is a primary responsibility of the TAP TSI governance. There are many parties using them or considering using them. These parties will have to be provided with the specifications mandated in the Regulation. In addition, they will need other documentation held outside the Regulation such as implementation guides and test schemes that explain how to use the specifications and that define how compliance can be checked.

Data quality test specifications will also be needed in order that parties can demonstrate compliance with data quality requirements in the Regulation.

The specifications are and will be subject to continuous change and the TAP TSI entity will procure the technical studies and industry business cases needed by its members and by the TAP Change Control Management process.

The entity will use subject experts to carry out change request (CR) technical studies. Technical studies will need to provide information including:

- outline project plan for implementing CR
- proposed changes to all impacted specifications
- revised user guides and test and data quality specifications
- obligations in respect of the use of the changed specification
- identification of any audit, legal, or administration impacts
- costed changes needed to operational processes run by the entity.

Parties affected by the change will use this information to study the impact on their own organisation and to generate their element of the overall industry business case. This information will feed into the TAP CCM meetings and provide the objective information needed for decision making.

Where specifications are changed, the entity will manage the migration process as a project. Depending on the significance of the change, these projects will vary in size and scope, although in some cases they can be expected to last several years. The entity will be able to procure special services such as protocol converters to support extended migrations.

More or less formal links will be needed with other standards-making bodies where their scope covers rail retail in whatever form. This will include for example OTA, ISO and CEN Technical Committees, but also other industry-based standards activities such as the relevant parts of the mobile telecommunications industry and the payment industry.

Not all of the change control process requires technical expertise and more generalist administration will be needed by the entity to manage the overall flow of change requests. The entity management will need to choose suitable tools for document and specification management, providing the usual facilities of workflow and version control.

Operational relationships between parties subject to the Regulation need to be defined and adhered to. These relationships can, as a minimum, be defined in a code of practice. Individual RUs and IMs can decide if a more formal relationship is needed in certain

cases, for example in the form of a contract with defined service levels and performance requirements, but the entity will only procure and disseminate codes of practice.

Examples where a code of practice will be needed range from normal operating conditions to those following service disruption. As an example in the former case, where a ticket controller has captured the machine readable data from a ticket, who should it be sent to, in what manner and how quickly. As an example in the latter case, how can a station manager contact urgently the passenger's ticket retailer if the passenger has missed an onward connection and where the station manager is not related to the carrier of the onward connection.

Complications in the case of service disruption increase significantly with the growth of competition. Despite this, a minimum level of reliable cooperation will be needed between parties for rail transport to work and for passengers to retain a positive view of rail travel.

RUs, IMs and others will require skilled technical system advice. These "customers" of the entity will use technical system services procured and provided by the entity, such as networking, security and reference data. Even with compliant systems, there will be service issues that have to be resolved. The entity will therefore need to offer both incident and problem management systems and adopt a formal methodology for service management.

Independently of the provision of support in respect of common services, incident and problem management support may also be needed for connections amongst RUs and IMs. For example, where two pairs of RUs are having the same problem, resolution of the problem is likely to be quicker and more robust where the problem is treated once and the solution made available once.

### **Conciliation Service**

The entity will offer a conciliation service for parties subject to the Regulation. The procedures will be based on adjudication procedures used in civil contracts involving an external expert.

The conciliation service does not remove the right of parties to make civil claims in law if they are not satisfied with the independent adjudication provided by the entity.

The conciliation service would not act in law on behalf of any party subject to the Regulation and would have no enforcement role in any court decisions.

### **New Projects Including Full-Service Model Project**

It is expected that the Full-Service Model (FSM) task in the TAP Phase One project will recommend that a project is set up after the completion of Phase One. This FSM project will develop a business case for the FSM proposals based on a wide industry review, seek funding, procure revised specifications, and initiate an implementation project based on timescales coherent with Interoperability Directive requirements.

Once the TAP TSI entity exists, it will take charge of this project and will procure the necessary project management and technical expertise needed to properly supervise the FSM project.

A similar process will be followed for other TAP TSI Regulation-related projects that are in due course allocated to the entity. These may include other as yet undefined projects needed to provide the support for RUs and IMs in their implementation of the TAP TSI obligations.

### **3.3.2.4 Regulatory and Commercial Interoperability**

Railways and their partners need interoperability services that cover their entire business, including logistics, payment, after-sales activities, usage data collection and the provision of management information. The scope of the Regulation is limited to a part of operational and distribution activities but does not cover all business activities.

Railways and their partners, who together can be expected to be the primary actors in TAP TSI governance, will have an imperative need to manage and control in an integrated manner all the interoperability services that underpin their businesses. This management and control will be based on commercial imperatives, independently of whether or not subject to the Regulation.

There are three options for dealing with this issue:

- the Regulatory organisation could deal with those interoperability services subject to the Regulation and a separate sector organisation could deal with everything not covered by the Regulation. In this case both organisations would need to work together to make sure that changes made by either of them were correctly reflected in consequential changes in the other – for example a distribution change requiring an accounting change. Railways and others affected by the Regulation would need to have two separate sets of specifications and services for their business
- the Regulatory organisation could deal with those interoperability services subject to the Regulation. A separate sector organisation could simply copy those things subject to the Regulation into its own specifications and services, after working with the Regulatory organisation to make sure that changes made by either of them were correctly reflected in consequential changes in the other. Railways and others affected by the Regulation would at least be able to work with a single set of specifications and services
- the Regulatory organisation could procure the regulated interoperability services from a sector organisation already providing such interoperability services to its members. Where Regulatory matters were being dealt with the TAP TSI governance rules and policies would be applied, as defined in the procurement contract. Railways and others affected by the Regulation would have a single set of specifications and services.

The third option provides the Regulatory control needed by the public interest. It also minimises the cost to all concerned of managing the full set of interoperability specifications and services needed by railways and others affected by the Regulation. The appropriate option is to be determined by the Steering Committee.

### **3.3.2.5 TAP TSI Governance Scope**

The TAP TSI governance covers two quite different business areas:

- a. planning and operating trains

## b. creating and selling products

These two specialist business areas are separated in most railways. Ticket Vendors and third parties (as defined in the TAP TSI) are mostly involved in providing information and selling products. It can be discussed that each business area has its own separately managed interoperability services, although with some services in common, for example for vital reference data sets. The Steering Committee is requested to give its advice on the two options.

This management could be done through two independent governance entities, or two operational divisions of a single governance entity. The approach to be taken will be affected by an equivalent discussion in the TAF TSI governance task and both options remain open at present. Guidance from the Steering Committee will also be sought on this matter.

Ad a) The business of planning and operating trains covers:

- Long term planning
- Short term planning
- Operation of services including the change of status from RU preparation to RU/ IM operation of the train
- Management of disruption
- Accounting for service running
- Accounting for service disruption
- Management of connections between trains (in case of deviation)
- Management of alternatives (in case of deviation, e.g. rerouting, replacement services...)
- Management information provision.

Only some of this business is covered by the Regulation. This is because the Regulation does not cover all the business areas (e.g. accounting, management information) and RUs and IMs may in some cases use their own proprietary specifications for activity otherwise covered by the Regulation.

Ad b) The business of creating and selling products covers:

- Service planning
- Product development
- Product distribution (timetables, tariffs, prices, yield-managed fares setting, reservations)
- Information provision before and during travel
- Product sale (booking, fulfilment)
- Product after-sale (changes, product usage, refunds)
- Apportionment (between carriers) and settlement
- Management information provision.

Only some of this business is covered by the Regulation. This is because the Regulation does not cover all the business areas (e.g. service planning, product development, yield-managed fares setting, product usage, apportionment and settlement) and not all the

services run by the operator are subject to the TAP Regulation (where a product owner sells its own products).

### **3.3.3 Options for Governance Management**

#### **3.3.3.1 TAP TSI Stakeholders**

Stakeholders in the TAP TSI entity fall into four main groups:

- RUs and IMs having obligations and rights under the Regulation
- Third parties (including Ticket Vendors) and Public Bodies having rights under the Regulation
- Service and system suppliers contracted (or potentially contracted) to those above to provide services and systems that are compliant with the Regulation
- Other parties such as the ERA, DG MOVE and passenger representatives.

Under the first two headings, further categorisation may be considered, for instance:

- Open access/ franchised/ PSO-contracted RU
- Member or not of a sector representative body
- Carrying out none/some/much interoperable business.

The stakeholders will have different levels of interest and competence in the technical characteristics of the TAP TSI governance and will therefore have different expectations of the entity.

Some may choose to have an active participation, whereas others may be satisfied with non-discriminatory and cost-based access to those services needed by them to meet their obligations.

Stakeholders must therefore be given the option to be directly involved in the governance, to participate through a representative body, or simply to use the services provided. This flexibility is essential.

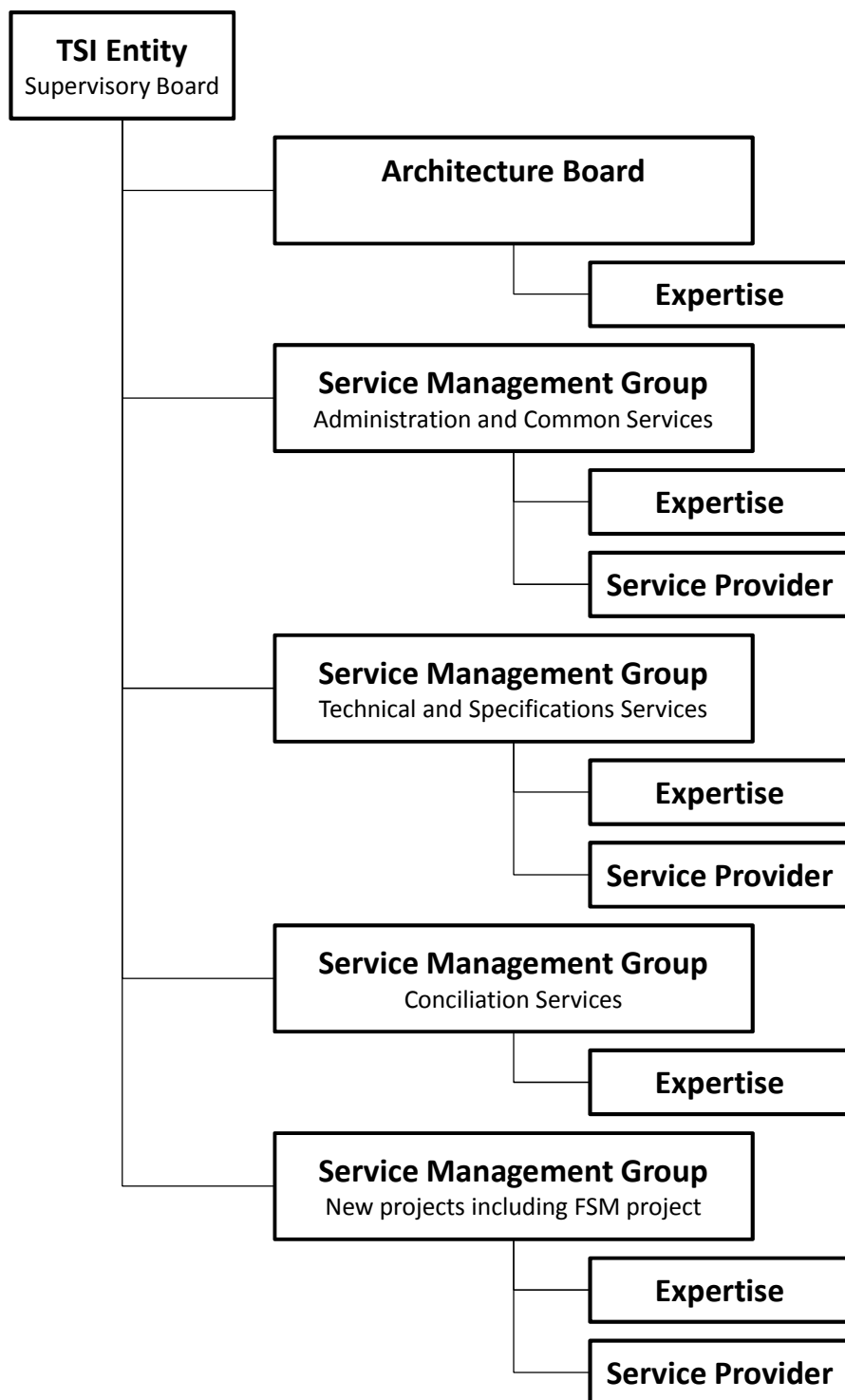
#### **3.3.3.2 TAP TSI Executive Entity**

In the earlier sections, the responsibilities of the entity have been defined. A structure is needed, therefore, for each entity to carry out its responsibilities. In summary, the structure is made up of:

- a definition of the services that the executive entity is to provide to those parties affected by the Regulation
- a description of the executive entity and its components
- a description of the rules and policies that control the responsibilities and way of working of the executive entity.

The rest of this section provides a suggested approach that can meet those three requirements. Once the broad framework is agreed with the Steering Committee, the components parts can be designed and developed in appropriate detail for the final report and for the costing work.

The following diagram sets out a proposal for the structure of the executive entity:



The TSI Supervisory Board will be the ultimate decision-making body. It will be representative of those organisations making up the business value chain as represented in the sector representative bodies. The terms of reference and operating rules of the Supervisory Board are to be agreed. For example, and learning from the other governance structures studied, it could be proposed that members will be nominated by the sector representative bodies in numbers corresponding to their value in the chain. Members could serve for a fixed period. Voting could be one member one vote. Significant matters could require unanimity and lesser matters simple majority.

The TSI Supervisory Board will determine policy and will agree and monitor the plans and investments of the subsidiary Service Management Groups (SMGs) and the Architecture Board. It will be assisted by a secretariat, providing administrative support to the Groups. The Board will also have access to a procedures committee that monitors the overall performance and effectiveness of the entity's procedures, on its own initiative makes changes and improvements that do not affect policy, and makes recommendations to the Supervisory Board in respect of significant changes to the rules.

The form of participation of DG MOVE and ERA is to be decided. The key requirement is that all changes to the entity rules of operation, as referred to above, will require the agreement of DG MOVE and RISC. In this way, the industry will be able to conduct its own business efficiently but subject to rules that enforce the public interest and the network benefits.

The form of participation of DG MOVE and ERA is to be decided. The key requirement is that all changes to the entity rules of operation, as referred to above, will require the agreement of DG MOVE and RISC. In this way, the industry will be able to conduct its own business efficiently but subject to rules that enforce the public interest and the network benefits.

Membership of the SMGs and the Architecture Board is also to be determined. For example, it could be nominated by the TSI Entity Supervisory Board. Membership could reflect the sector allocations in the TSI Supervisory Board. Members could serve for a fixed period. Voting could be one member one vote. Significant matters could require unanimity and lesser matters simple majority. In all events, SMGs will carry out the responsibilities placed on them, subject to the budgetary control of the TSI Entity Supervisory Board.

The Board and the Groups will need chairs. This could be decided from amongst their members by simple majority.

SMGs will carry out their responsibilities through a series of procurements, both of expertise and out-sourced service provision. Expertise covers both the provision of experts but also the management and administration of the groups in which the experts work. Working groups will be open to experts from all organisations that are members of their sector representative bodies. Other parties such as suppliers can attend working groups at their own expense, subject to demonstrating appropriate expertise. DG MOVE and ERA can participate in working groups.

The Project Team is aware of the breadth of responsibilities proposed for the governance. Next, the Project Team will seek ways to minimise the cost of the governance compared to the existing activities devoted to European passenger rail interoperability.



### 3.4. Masterplanning

**Key information to take away:**

- It is essential to understand the different characters of Phase Two and Three. It is therefore proposed that there should not be one governance for Phase Two and a new and separate one for Phase Three
- Phase One will deliver designed costed and budgeted plans for the TAP entity formation and for TAP common services procurement

#### 3.4.1 Relationship of Phases Two and Three

Article 2 of the TAP TSI Regulation states:

*“The TSI shall be implemented in three phases:*

- *a first phase establishing detailed IT specifications, governance and master plan (phase one),*
- *a second phase concerning the development of the data exchange system (phase two), and*
- *a final phase concerning the deployment of the data exchange system (phase three).”*

Phase One has already started as a project involving several stakeholders and with the governance described in Chapter 7 of the Regulation.

It is important, at the outset, to understand the essential difference between Phases One and Two and Phase Three. Phases One and Two are essentially projects – their whole purpose is to create something and then disappear. Phase One creates the design, governance and masterplan for Phases Two and Three. Phase Two creates the things that are currently missing but which are essential for those parties with obligations and rights under the Regulation.

Phase Three, in complete contrast, is not a project. Phase Three will last for ever. The obligations on railways persist in perpetuity. Neither the Regulation, nor Directive 2008/57 from which it derives, has any provisions for termination. The word termination is not even mentioned.

The Project Team has considered this phasing matter in detail and has learnt from the experience with TAF TSI and other commercial developments. It therefore proposes that there should not be one governance for Phase Two and a new and separate one for Phase Three.

Phase Two is essentially concerned with setting up executive entities, procuring services and running projects as defined in Phase One. It is fundamental for good contract procurement and management reasons that whatever entity will run the services and projects after the end of Phase Two is the same one that procures the services and manages the projects during Phase Two. If this is not done, there will always be

difficulties, delays and additional costs as the successor entity will quite sensibly refuse to novate any contracts and projects to itself until all risks have been removed.

Therefore, and this is key, although there will be a Phase Two and Phase Three as required by the Regulation, there will be a single executive entity responsible for both phases and its creation will be the first step for Phase Two. Until it exists, the Phase One Steering Committee will retain overall responsibility, but once it does exist the entity will take over all regulatory responsibilities. This is different from the original arrangements designed for TAF TSI and the approach is essential to avoid the difficulties experience by the parties involved in that Regulation.

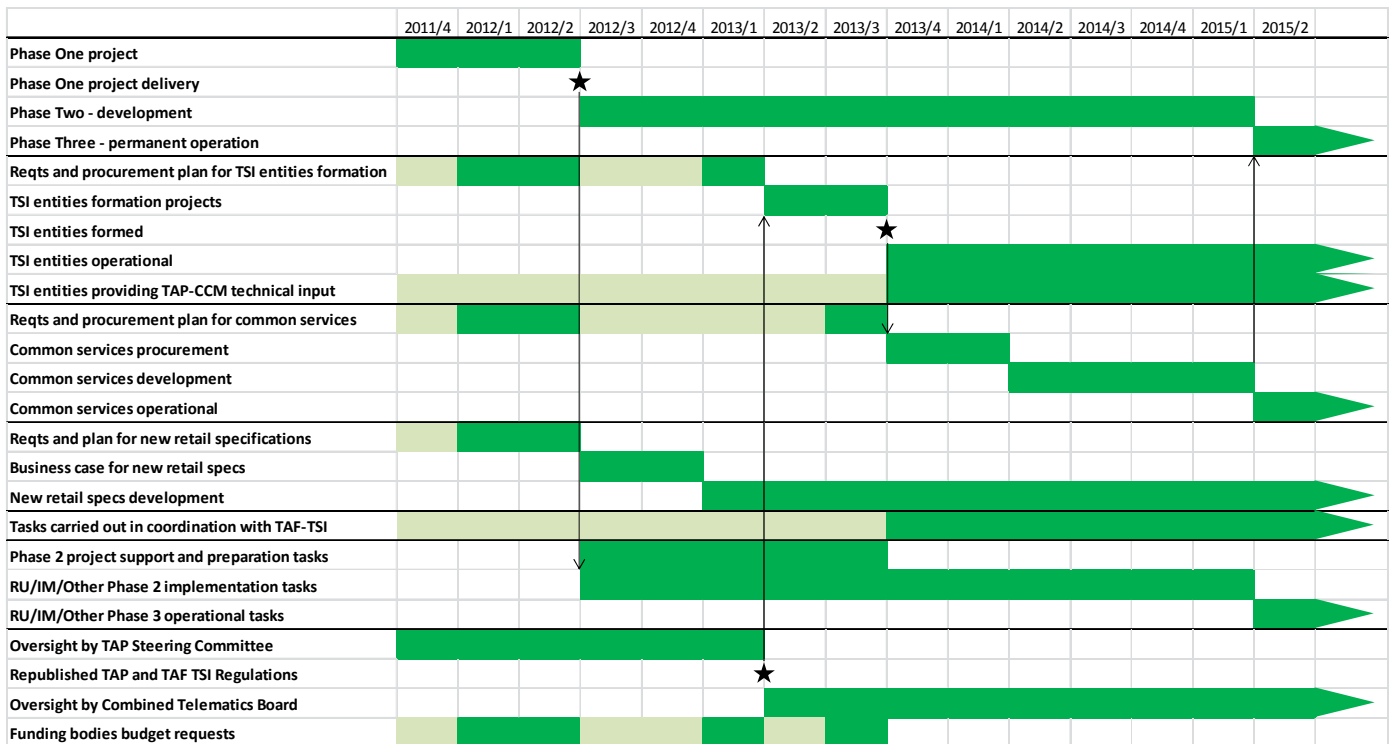
The procurement of the common services will be the first and most important task in Phase Two, after the executive entity has been created.

### **3.4.2 Key Elements of TAP TSI Masterplan**

There will be a set of key elements for the TAP TSI masterplan produced in the Phase One project, as follows:

- a costed and budgeted plan for Phase Two covering
  - the formation of the TAP TSI executive entity described above
  - together with a costed and budgeted plan covering the procurement of the common services needed for Phase Three by that entity
- a set of tasks, as yet to be defined, of work to be done in conjunction with TAF TSI
- a staged project plan for the Full-Service Model project as described above
- a plan of Phase Two activities through which RUs and IMs prepare and mobilise for projects through which they will meet their individual Regulatory obligations
- a set of project support activities needed for this RU/ IM preparation, although currently such support is neither planned nor budgeted by the sector.

These key elements are set out in outline the following diagram, and will be developed further for the final deliverable, taking Steering Committee advice and resolutions into account:



There are four important links in the diagram, to be read from left to right. The first is the completion of the Phase One project, which links to the start of the Phase Two RU/ IM preparatory tasks and the related (and as yet unbudgeted by the sector and Commission) support activities.

The second link marks the republishing of the Regulation with the revised Chapter 7 containing the results of the Phase One project. Once the Regulation is republished, the formation project to create the TAP TSI executive entity can start.

The third link marks the formation of the executive entity. Once in existence and operational, the entity will be able to start the procurement of the common services and the transfer of management of projects such as FSM. It has been noted that the FSM project will need to provide an open cost benefit analysis for any changes it may propose to the TAP TSI Regulation.

Clearly, some limited work can be done in the interim both on entity formation and service procurement. However, until the Regulation is republished and until the entity is operational, formal procurements cannot start.

The final link is the start of Phase Three. This phase starts when the common services are operational, or at least those common services that are essential for RUs and IMs to meet their obligations. One year has been shown in this draft masterplan. The length of time will be determined by the requirements for common services to be identified in the other Work Streams.

Note that on this basis the earliest that Phase Three can be anticipated to start is sometime during 2015. A better estimate will be made in the final report once the duration of the full set of common service development projects has been determined by the Phase One project.

Despite this, individual RUs and IMs will be strongly encouraged to start working on their own implementation plans immediately following the conclusion of the Phase One project. Advance notice of this obligation will be given at the TAF TSI master planning meeting on 26 January 2012. In addition, and assuming resources are made available for the Phase Two project support and preparatory tasks, similar TAP TSI implementation planning meetings will be held in early autumn 2012. The Phase One project will prepare the background information needed for these meetings.

### 3.4.3 Economic Evaluation

The method to be used for economic evaluation is as follows:

All architecture and governance proposals will be designed to balance two objectives. The first is that the total cost to the rail industry is minimised and the second is that of equity where there should be no undue adverse impact on any individual RU or IM or groups of RUs or IMs. Individual RUs and IMs should not be obliged to make changes or investments for which there is no prospect of a commercial business case. In addition, all architecture and governance proposals will seek to make a significant reduction to the cost of retail distribution and train operation over the planned life of the investment.

Consumer surplus estimates will not be used in any business case calculations. These calculations will be solely concerned with tangible costs and benefits. The key economic evaluation criteria will be pay-back period and access to project funding by implicated RUs and IMs. Where required, a discount rate of 14% will be used.

Economic evaluation requires the comparison of a base position and a changed position following an investment. The base position is that which meets the requirements of the Regulation at the lowest total rail industry cost, subject to the equity condition applying. The Phase One Project Team will identify what forms the base position.

For this project, changed positions will follow industry-wide changes to the base position, achieved either by agreement or by the application of further regulation. An example of such a change could be a common timetable service.

RUs and IMs are unable to provide the Phase One Project Team with accurate and detailed material that is commercially important in good time, even though Chapter 7 of the Regulation says in paragraph 7.2.2.1.6 that they should support the project. In consequence, all estimates of costs and benefits will be made by the Project Team, based on their own expertise and on publicly available published data. This is an acceptable position for the ERA for TSI-related economic evaluations<sup>27</sup>.

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<sup>27</sup> As understood from the ERA/ PM jour fixe on 5 December 2011.

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## 4. Conclusions and Recommendations

A large number of **non-UIC railways** have been invited to take an active role in Phase One, but they have only shown **minor interest or lack resources to follow the project**. A working assumption has been that they have little knowledge of the content of the TAP Technical Documents (mostly former UIC leaflets).

The aim of the Project Team is to **ensure cost-effective solutions for all** parties that need to fulfil the requirements of the Regulation. The goal is to **get everyone on the same level**. It is therefore proposed to **focus Phase One work in the Retail Specifications and Architecture Work Streams on the pragmatic but still beneficial scenarios** outlined in this report. It is suggested that the Steering Committee re-affirms this working assumption.

In retail, the **rail sector has solutions for almost all Basic Parameters** in place. **Some parts** of specifications have never been used and tested and **should therefore be replaced** and/ or enhanced (e.g. B.3) in due course through the TAP CCM process. **Some** are deemed **less adequate** to deal with in an increasingly **liberalised market**, especially in the fares and tariffs area. Work on defining requirements for a dynamic tariff/ fare data exchange, which could eventually replace Technical Documents B.1 – B.3, had already started at the UIC and is now being reviewed and challenged by the Ticket Vendors. The Railteam member<sup>28</sup> companies have also agreed to grant TAP TSI the right to re-use work done for the Broker project (licensing procedures are under investigation).

In RU/ IM, validated solutions from TAF TSI are available or will be available before the end of Phase One. It is agreed that the passenger RUs will make best use of these. Therefore a **solid basis for the development of common elements between TAP and TAF** exists as well as for the individual RU and IM implementation planning. It is recommended that all Phase One RU/ IM Expert Group results will be the basis for this planning without waiting for the formal approval by the CCM Board. It is also **recommended to follow the step-wise approach<sup>29</sup> under discussion within TAF TSI** instead of a big bang implementation.

**More innovative solutions in retail** are possible and **will be further investigated** in the Full-Service Model Work Stream. However, this appears to require more time than available in Phase One. It is therefore proposed to **extend** the work of the **Full-Service Model Work Stream beyond mid-May 2012**. The period between submission of the Phase One deliverables and the re-published TAP TSI Regulation is believed to offer a very suitable timeslot for this. Furthermore, although unquantified in most cases - some funded research would be appropriate - a number of market trends and existing factors promise opportunities highlighted in the FSM work.

In order to provide a stable organisational framework for this work, but also for the Phase Two formation activities, it is **recommended that the established TAP Steering Committee stays on** beyond May 2012. The Project Team will propose an organisational set-up for this period in the February SteCo meeting. For the January SteCo meeting, the

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<sup>28</sup> DB, SNCF, Eurostar, NS, ÖBB, SBB, SNCB and Thalys

<sup>29</sup> Step by step implementation of functionalities taken individual evolutions of IT landscapes into account currently

Project Manager will provide additional reasoning for the recommended work on a dynamic tariff/ fare data exchange. Irrespective of this, the SteCo needs to be aware that the **staffing and funding of post-Phase One activities need to be addressed soon.**

The Project Team sees a great need to keep the momentum and to **ensure the trustful working relationship will persist in and beyond Phase One.** The Steering Committee can help the Project Team by keeping TAP TSI on the agenda of their constituencies.

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## Abbreviations

<b>ATB</b>	Air Ticket & Boarding
<b>BP</b>	Basic Parameter
<b>CCG</b>	Common Components Group
<b>CCM</b>	Change Control Management
<b>CCS</b>	Control Command and Signalling
<b>CEN</b>	European Committee of Standardisation
<b>CEO</b>	Chief Executive Officer
<b>CER</b>	Community of European Railways
<b>CI</b>	Common Interface
<b>CIT</b>	International Rail Transport Committee
<b>CR</b>	Change Request
<b>CRUD</b>	Create, Read, Update, Delete
<b>CSC</b>	Common System Components
<b>CSI</b>	Carrier System Interface
<b>DG MOVE</b>	Directorate-General for Mobility and Transport of the European Commission
<b>EC</b>	European Commission
<b>ECTAA</b>	European Travel Agent's and Tour Operator's Associations
<b>EDIFACT</b>	United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport
<b>EG</b>	Expert Group
<b>EIM</b>	European Rail Infrastructure Managers
<b>ENEE</b>	European Railway Location Database
<b>EPC</b>	European Payments Council
<b>EPF</b>	European Passengers' Federation
<b>EPTO</b>	European Passenger Transport Operators
<b>ERA CCM</b>	European Railway Agency Change Control Management process
<b>ERA</b>	European Railway Agency
<b>ERADIS</b>	European Railway Agency Database for Interoperability and Safety
<b>ETTSA</b>	European Technology and Travel Services Association
<b>FSM</b>	Full-Service Model
<b>FTP</b>	File Transfer Protocol
<b>GDS</b>	Global Distribution Systems
<b>GSM-R</b>	Global System for Mobile communications - Railways
<b>IATA</b>	International Air Transport Association
<b>IG</b>	Implementation Guide
<b>IM</b>	Infrastructure Manager
<b>IRT</b>	Integrated-Reservation Ticket
<b>ISO</b>	International Organisation for Standardisation
<b>ITX</b>	Inclusive Tour fare arrangements
<b>MERITS</b>	Multiple European Railway Integrated Timetable Storage
<b>MS</b>	Member State of the European Union
<b>NRT</b>	Non-Integrated Reservation Tickets
<b>NSA</b>	National Safety Authority
<b>OD</b>	Origin Destination
<b>OLTA</b>	On-Line Travel Agency
<b>OTA</b>	Open Travel Alliance

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<b>P2P</b>	Point-to-point
<b>PCS</b>	Path Coordination System of RailNetEurope
<b>PET</b>	Paperless Electronic Ticketing
<b>PF</b>	Passenger Forum
<b>PID</b>	Project Initiation Document
<b>PM</b>	Project Manager
<b>PRIFIS</b>	PRICES and Fares Information System
<b>PRINCE</b>	PRojects IN Controlled Environments project management methodology
<b>PRM</b>	Person with Reduced Mobility
<b>PRR</b>	Passenger Rights Regulation (Regulation (EC) No 1371/2007)
<b>PSO</b>	Public Service Obligation
<b>PTA</b>	Public Transport Authority
<b>RCT2</b>	Rail Combined Ticket (version 2)
<b>RISC</b>	Railway Interoperability and Safety Committee
<b>RSP</b>	Rail Settlement Plan
<b>RU</b>	Railway Undertaking
<b>SKDUPD</b>	Schedule Update Interactive Message
<b>SM</b>	Station Manager
<b>SMG</b>	Service Management Group
<b>SRA</b>	Specialist Rail Agency
<b>SteCo</b>	Steering Committee
<b>STPR</b>	Short-term Path Request
<b>TAF TSI</b>	Telematics Applications for Freight services – Technical Specifications for Interoperability
<b>TAG</b>	Ticketing Action Group
<b>TAP TSI</b>	Telematics Applications for Passenger services – Technical Specifications for Interoperability
<b>TCV</b>	Standard International Passenger and Baggage Tariff (Tarif Commun pour Voyageurs)
<b>TD</b>	Technical Document of the European Railway Agency
<b>TEN</b>	Trans-European Networks
<b>TIS</b>	Train Information System of RailNetEurope
<b>TLT</b>	Train Linked Ticket
<b>TMC</b>	Travel Management Company
<b>TOD</b>	Ticket On Departure
<b>TSDUPD</b>	Timetable Static Data Update
<b>TSI</b>	Technical Specifications for Interoperability
<b>TV</b>	Ticket Vendors
<b>UIC</b>	International Union of Railways
<b>UITP</b>	International Association of Public Transport
<b>UNIFE</b>	Association of the European Rail Industry
<b>WG</b>	Working Group
<b>XML</b>	Extensible Markup Language
<b>XSD</b>	XML Schema Definition



## **Appendix**

- A) RU/ IM Legacy Survey Report**
- B) Retail Legacy Survey Report**
- C) Draft Full-Service Model Requirements**
- D) Summary of TAP TSI Basic Requirements**

More material will be published on the project website.