

TAP TSI

Telematics Applications for Passenger Services
Technical Specifications for Interoperability

RU/IM LEGACY SYSTEMS DELIVERABLE

Project: TAP Phase One

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1 Progress History

1.1 Document Location

The actual version of this document is on Sebastian Naundorf's PC. Only the version on Sebastian Naundorf's PC is going to be updated. A copy of the final document shall be made available on the TAP Phase One Extranet and will be circulated to the TAP Steering Committee.

1.2 Revision History

Date of this revision: 3 November 2011

Date of next revision: not foreseen

Revision date	Previous revision date	Summary of Changes	Changes marked
30 september 2011		First issue for Expert Group Leader review	
5 october 2011	30 september 2011	Updated issue for Expert Group Leader review	None
25 october 2011	5 October 2011	Updated issue including PM suggestions	None
3 november 2011	25 October 2011	Minor corrections (no change of content) and readability improvements	None

1.3 Approvals

This document requires the following approvals.

Name/ Entity	Title/ Remark	Approval	Date of Issue	Version
TAP Phase One Project Manager				
TAP Phase One Steering Committee				

1.4 Distribution

This document is distributed to:

Name/ Entity	Title/ Remark	Date of Issue	Version
Expert Group Leaders		30/09/2011	0.1
Expert Group Leaders		05/10/2011	0.2
Project Team	TAP Phase One Project Team	27/10/2011	0.2
Expert Groups	All members of the RU/IM Expert Groups	14/10/2011	0.2
ERA		25/10/2011	0.3
Extranet	Available to all Experts of TAP Phase One, the Project team and members of the Steering Committee	04/11/2011	0.31
SteCo	TAP Phase One Steering Committee	tbd	1.0

2 Table of Contents

1	Progress History	2
1.1	Document Location.....	2
1.2	Revision History.....	2
1.3	Approvals.....	2
1.4	Distribution.....	3
2	Table of Contents	4
3	Purpose	5
4	Management Summary	6
5	Background	7
6	Organization of work.....	8
7	Results of survey	9
7.1	General remark.....	9
7.2	Coverage	9
7.2.1	Functional coverage	9
7.2.2	Geographical coverage	10
7.3	Technical Results	11
7.3.1	Means of RU/IM communication (Use of IT)	11
7.3.2	Use of XML.....	12
7.3.3	Use of UIC leaflets:	12
7.3.4	Amount of messages (or cases for which such a message is needed).....	12
7.3.5	Usage of codings.....	14
7.4	Process findings	14
7.4.1	Short Term Path Request.....	14
7.4.2	Train Ready.....	14
7.4.3	Service disruption.....	15
7.5	Adaption to TAF TSI.....	15
7.6	Individual findings	15
7.6.1	Short term path requests.....	15
7.6.2	Train running info and forecast.....	17
7.6.3	Service disruption.....	17
8	Issues and opportunities	18
8.1	General remark.....	18
8.2	Individual comments.....	18
8.2.1	Short Term Path Request.....	18
8.2.2	Train Ready.....	19
8.2.3	Train Running.....	19
8.2.4	Service Disruption	19
8.2.5	Location Reference data	20
9	Appendices.....	21

3 Purpose

The purpose of this document is to provide an overview on the current use of RU/IM communication related to / relevant for the Basic Parameters of Regulation 454/2011 TAP TSI.

This document reports on a survey amongst affected stakeholder. The survey was undertaken in July – September 2011 and addressed railway undertakings, station managers and infrastructure managers in the European Union and Switzerland. The results shall contribute to describing the detailed IT specifications for RU/IM and will be provided to the RU/IM Expert Groups.

It is Delivery 1.2 of the Phase One project and will be submitted to the Phase One Steering Committee for their assessment.

4 Management Summary

The RU/IM legacy survey, comprising answers from 27 companies operating passenger train services in 17 European countries, shows the current situation of communication between railway undertakings and infrastructure managers (RU/IM).

Results show that today IT is not used in all areas covered by technical document B30¹, especially not in train ready. Most processes are used with manual and IT support in parallel.

If IT is used, only limited solutions use XML, as required by TAP TSI. Thus, changes required by TAP TSI will be a major change in these IT-landscapes.

The processes, how and when to use the messages, are by far not harmonized. As a result TAP will assist in providing standardized IT-Messages. This will be just one step to interoperability, as railway companies will still have to check national rules to know when and how these messages are applied.

The amount of required messages vary; very often between some large and many small volume users. Common IT-components, if needed, should take scalability into account.

For some TAP TSI requirements UIC-leaflets covering similar functionalities are available today. These seem to be the most widespread common message formats used today. However, a large number of companies use individual standards only.

Similar elements to TAP are foreseen in TAF TSI, and some IMs plan their implementation between now and 2017, thus providing some frame for a possible TAP implementation as well.

¹ The Technical Document B.30 ("SCHEMA - MESSAGES/DATASETS CATALOGUE NEEDED FOR THE RU/IM COMMUNICATION OF TAP TSI") covers messages related to Train Ready, Train Running Information, Train Running Forecast, Service Disruption and Path Requests (BPs 4.2.14 to 4.2.17).

5 Background

The TAP TSI Phase One shall amongst other tasks describe IT specifications for the target system for telematics applications for passenger services, taking into account issues and opportunities of legacy systems. The Phase One project team decided to launch an online survey amongst all stakeholders to collect information on the current situation. This approach has been approved by the Steering Committee. The results of this report shall provide a valuable input into the work of the RU/IM Expert Groups (EG 1, EG 2 and EG 3²) when writing the detailed IT-Specifications.

² EG 1 „Planning“ (covers Path Requests), EG 2 „Train run“ (Train Ready, Train Running, Service Disruption), EG 3 “IT Architecture” (Reference files, Common Interfaces)

6 Organization of work

The survey was created by TAP TSI Experts including the RU/IM Workstream Leader, Expert Group Leaders of EG 2 and 3³ and the Common Support Group of CER, EIM and UITP.

The survey was launched as an online survey from 19.07.2011 until 27.09.2011. The originally foreseen deadline for answers (End of August) was shifted on request of several participants.

The survey was intended to be answered by all RUs, IMs and SMs falling under the regulation TAP TSI. The invitation to the survey was issued to a list of RUs from ERA (the so called ERADIS). To reach dedicated experts more directly the invitation was also sent to all Expert Groups members as well as mailing lists from UIC, CER, UITP and EPTO.

The Project Team and EG Leaders involved in the analysis of the responses adheres to a strict rule of confidentiality, i.e. individual company responses have not been, and will not be, disclosed to anyone outside of this small group of people unless authorized by the individual company.

³ EG leader for EG 1 was not known at the time

7 Results of survey

7.1 General remark

All companies' replies were treated equally in the evaluation of this survey. No normalization according to size, number of trains operated or whatsoever has been applied. Replies for message volumes have been manually separated to show IM results.

Note that any percentages mentioned usually refer to the amount of valid answers to this specific question (and not to all companies).

7.2 Coverage

7.2.1 Functional coverage

The survey received 27 answers covering members of CER, EIM, UITP and EPTO, thus giving an overview on the infrastructure side, long distance and regional train operators and incumbents as well as new entrants. The following table shows how the respondents classified themselves:

Type of company (multiple answers possible)	Response Percent	Response Count
Railway undertaking (RU) with interoperable/international trains	59,3%	16
Railway undertaking (RU) with domestic trains only	14,8%	4
Infrastructure Manager (IM)	37,0%	10
Station Manager (SM)	7,4%	2
other	3,7%	1

7.2.2 Geographical coverage

Companies replying are related to train operations in 16 EU Member States and Switzerland. The following table lists the number of companies answering from EU-Countries and Switzerland:

Please specify the country in which you operate and for which your answers in this questionnaire are valid (multiple answers possible).	
Austria	3
Belgium	1
Czech Republic	1
Denmark	1
Finland	1
France	2
Germany	7
Italy	2
Latvia	1
Netherlands	3
Norway	1
Poland	1
Slovakia	1
Slovenia	1
Sweden	1
Switzerland	1
United Kingdom	1

No answers were received from the following EU-Member states:

Bulgaria	0
Cyprus	0
Estonia	0
Greece	0
Hungary	0
Ireland	0
Lithuania	0
Luxembourg	0
Malta	0
Portugal	0
Romania	0
Spain	0

Some of these Member States do not operate railways with the potential for interoperability (such as Malta, Cyprus and to a certain extent Ireland). The remaining ones however are fully affected.

7.3 Technical Results

7.3.1 Means of RU/IM communication (Use of IT)

The current use of Information Technology for RU/IM communication depends on the functional use. Very often, IT is used in parallel to manual processes for the same function. The following tables show the use of IT vs. manual processes per function:

7.3.1.1 Short term path requests:

How do you currently request short term paths? (multiple answers possible)	Response Percent	Response Count
manually (phone, Fax...)	69,6%	16
per mail (formatted)	65,2%	15
IT solution from the IM	52,2%	12
IT solution from RU with interface to IM	39,1%	9
<i>answered question</i>		23

7.3.1.2 Train Ready

How do you currently indicate the readiness of a train to access the network? (multiple answers possible)	Response Percent	Response Count
manually (using a telephone on board the train)	45,5%	10
manually (using a telephone on the platform)	31,8%	7
manually (manual input by staff into a system)	31,8%	7
via GSM-R	31,8%	7
IT solution from the IM	0,0%	0
IT solution from RU with interface to IM	9,1%	2
None (indication, when train is not ready)	27,3%	6
<i>answered question</i>		22

7.3.1.3 Train running information

How do you currently exchange train running information? (multiple answers possible)	Response Percent	Response Count
manually (phone, Fax...)	54,5%	12
IT solution from the IM	77,3%	17
IT solution from RU	18,2%	4
<i>answered question</i>		22

7.3.1.4 Train running forecast

How do you currently exchange train running forecast? (multiple answers possible)	Response Percent	Response Count
manually (phone, Fax...)	68,2%	15
IT solution from the IM	63,6%	14
IT solution from RU	18,2%	4
IT solution from IM with interface to RU	18,2%	4
<i>answered question</i>		22

7.3.1.5 Service disruption

How do you currently exchange information on service disruption? (multiple answers possible)	Response Percent	Response Count
manually (phone, Fax...)	87,0%	20
IT solution from the IM	60,9%	14
IT solution from RU	21,7%	5
IT solution from IM with interface to RU	17,4%	4
answered question		23

7.3.2 Use of XML

The use of XML for current RU/IM communication is limited. Out of the total answers, the following summary table shows how many companies use XML messages (in relation to the functions covered in TAP TSI).

XML based IT solutions for	Yes
(Short term) path requests	10
Train ready	4
Train running (info and forecast)	6
Service disruption	4

IT-Solutions for Path requests are the main function currently operated with xml-messages.

XML is the message standard required by technical document B30. The current use of XML does not mean that content and structure of the messages used today are equal to those required by TAP TSI.

7.3.3 Use of UIC leaflets:

UIC currently has leaflets in effect that specify some messages with a similar function to train running information and forecasts. These specifications are used by a number of stakeholders. If other standards are used these were reported to be national industry standards. The following summary table shows the use of UIC leaflets:

Use of UIC 407 (if IT is used)	yes
Do you use the UIC leaflet 407.1 message 2102 train running?	6
Do you use the UIC leaflet 407.1 message 2105 additional delay	6
Do you use the UIC leaflet 407.1 message 2154 change of tracks?	5
Do you use the UIC leaflet 407.1 message 2101 train running forecast?	4
Do you use the UIC coding for delay minutes?	8

7.3.4 Amount of messages (or cases for which such a message is needed)

The amount of messages mostly shows two clusters: one with small amount of messages (usually the larger cluster) and one with a large amount of messages. In some

cases there is a gap between these not used by any company (e.g. train running forecast). The following tables show the amount of messages (or business cases) needed. (Note different time frames in the header of the table.)

How many short term path are requested on an average <u>day</u> ?	Response Percent	Response Count	...of which IM
< 50	60,9%	14	5
51-100	13,0%	3	2
101-200	4,3%	1	1
201-500	4,3%	1	0
>500	17,4%	4	1
<i>answered question</i>		23	

What is the maximum of train ready messages you require in peak times for your whole network (train ready per <u>minute</u>)?	Response Percent	Response Count	...of which IM
up to 10 per minute	50,0%	8	3
11 to 20 per minute	12,5%	2	
21 to 30 per minute	6,3%	1	
More than 30 per minute	31,3%	5	3
<i>answered question</i>		16	

What is the maximum of train running messages you require in peak times (train running info per <u>minute</u>)?	Response Percent	Response Count	...of which IM
Less than 250 per minute	52,9%	9	3
250 to 500 per minute	11,8%	2	1
500 to 1000 per minute	23,5%	4	1
1000 to 1500 per minute	0,0%	0	
More than 1500 per minute	11,8%	2	1
<i>answered question</i>		17	

What is the maximum of train running forecast messages you require in peak times (train running forecast per <u>minute</u>)?	Response Percent	Response Count	...of which IM
Less than 250 per minute	75,0%	12	4
250 to 500 per minute	6,3%	1	
500 to 1000 per minute	0,0%	0	
1000 to 1500 per minute	0,0%	0	
More than 1500 per minute	18,8%	3	2
<i>answered question</i>		16	

What is the maximum of service disruption messages you require in peak times (service disruption per train per <u>minute</u>)?	Response Percent	Response Count	...of which IM
Less than 10 per minute	78,9%	15	6
10 to 50 per minute	5,3%	1	1
50 to 100 per minute	0,0%	0	
More than 100 per minute	15,8%	3	1
<i>answered question</i>		19	

7.3.5 Usage of codings

Around half the companies do not make a difference in location reference coding for operational and commercial purposes. A majority currently uses ENEE-Codes as opposed to national industry standards for the remaining ones.

Which type of location reference data do you use?	yes	Response Count
Do you use the same coding for operational purposes (e.g. path request) and commercial purpose (e.g. ticket sales)?	9	19
Do you use ENEE (European Railway Location Database)?	12	20
Do you use another location standard (please specify)?	8	18
<i>answered question</i>		20

7.4 Process findings

The aim of TAP TSI is to set interoperable standards for the IT-communication. It is not the aim to set the standards for the operational processes itself. To understand how and when communication takes place a number of process questions were asked as well. Basic finding of these questions is that the processes vary strongly. Harmonizing these would be a great effort outside the scope of TAP TSI as this would not only involve standardization of information exchange but also a change in operational rules.

7.4.1 Short Term Path Request

Definition of Short Term varies widely. Maximum time frame from which short term is applicable varies between 85 weeks and 1 day before departure, with a majority starting more than 18 weeks before the train runs. Minimum time frame until a short term path request can be ordered varies between 10 weeks and 0 hours with a majority allowing between 6 and 0 hours before the train run. (Note that some countries have separated processes for “very short term”).

7.4.2 Train Ready

Train ready indications have to be given between 90 minutes and 0 minutes before departure, with most replies covering 5 to 0 min before (average 11,76 min).

Train ready indications are used before train is leaving its first station by a vast majority. Other occasions are widespread but not commonly used.

When are you using train ready indications?	Response Percent	Response Count
before train is leaving sidings	31,6%	6
before train is leaving first station	78,9%	15
when train changes direction	26,3%	5
when train changes train number	36,8%	7
when train formation is changed	36,8%	7
at intermediate stops (please indicate briefly for what reason)	10,5%	2
<i>answered question</i>		19

7.4.3 Service disruption

Service disruption information have to be given between 0 minutes and 30 minutes after the train has come to a stop, with an average (and most replies) of 10 minutes.

7.5 Adaption to TAF TSI

Up to six IMs have answered the intended year to implement TAF TSI solutions/messages (no answers by RUs, as they are not implicated). Individual answers are listed below, showing a wide range between already implemented and 2017.

Intented year for implementation of TAF TSI		
Train Run Info	Forecast	Service Disruption
2017	2017	2014
2014	2016	2016
2016	2012	2013
2012	2010	2016
2016	2014	2010
2010		2014

7.6 Individual findings

7.6.1 Short term path requests

Most companies make no difference for path requests, no matter if domestic, interoperable and short term and long term planning (however, definition of short term and long term is unclear, see 7.4.1 above).

IT-Solutions for Short term path request	yes	Response Count
Are they xml-based?	10	18
Are the same systems used for short term and long term path requests?	15	20
Are the same systems used for domestic and international path requests?	10	18
answered question		20

If IT is used for short term path requests, most of the content of TAP messages is covered. Path details refused and booked path no longer available are not common today.

If you are using IT solutions, do they cover the following messages from TAP TSI (at least functional)?	yes	Response Count
Path request	17	18
Path details	15	17
Path not available	11	18
Path confirmed	14	18
Path details refused	6	15
Path cancelled	16	18
Booked path no longer available	4	16
Receipt confirmation	11	17
answered question		18

Harmonization for path requests is done by different means, with bilateral harmonization used by large numbers of RUs/IMs as well as Pathfinder⁴ and/or Forum Train Europe.

How do you harmonize interoperable train paths for short terms? Note: interoperable in this question means that more than one IM and/or more than one RU is involved.	Response Percent	Response Count
Pathfinder (already in use)	33,3%	7
Pathfinder (foreseen)	9,5%	2
Forum Train Europe	28,6%	6
bilateral/manual with one IM	23,8%	5
bilateral/manual with all concerned IM	38,1%	8
bilateral/manual with the other RU	38,1%	8
bilateral with IT support	0,0%	0
no interoperable trains	9,5%	2
answered question		21

Data used for Path request is mainly stored in IMs-Systems, but around one fifth of companies send all train data with each single path request:

⁴ Pathfinder is now called PCS (Path Coordination System) and is used for the communication and coordination of international path requests

How do you store reference data for vehicles used in path requests?	Response Percent	Response Count
IT solution at the IM	40,9%	9
IT solution at the RU	45,5%	10
IT solution from IM with interface to RU (and vice versa)	31,8%	7
Not at all (relevant data is transmitted with every path request)	18,2%	4
Other (please specify)	4,5%	1
answered question		22

7.6.2 Train running info and forecast

Around half of the companies use Europtirails⁵ for the exchange of train running information for international trains. Forecasts are less used.

Use of Europtirails	yes	Response Count
Do you use Europtirails for train running info?	7	14
Do you use Europtirails for train running forecast?	4	13

7.6.3 Service disruption

Information on service disruption is mostly a combination on train and incident based information.

If you are using IT solutions for the service disruption: Is the information based	Response Percent	Response Count
'per train' (single information for every affected train) or	57,1%	8
'per incident' (one information for all trains affected by the same incident)?	71,4%	10
Other (please specify)	7,1%	1
answered question		14

⁵ Europtirails is now called TIS (Train Information System) and is used for the exchange of train running data for international trains

8 Issues and opportunities

8.1 General remark

Issues and opportunities mentioned in this questionnaire are derived from above mentioned data. They are starting points for discussion within the RU/IM Workstream of the TAP Phase One project.

8.2 Individual comments

8.2.1 Short Term Path Request

Issue: Time span for “short term” vary widely. Harmonizing the messages but not the process requirements for these messages is one step to interoperability. It however leaves the companies with different (and thus not fully interoperable) requirements depending on countries/networks.

Mitigation: TAP process description will not set a timeframe.

Issue: More than half the companies using IT use xml messages:

Opportunity: change within xml is not as expensive as changing from another language

Issue: $\frac{3}{4}$ companies use the processes/systems for short term and long term path requests.

Issue: long term planning is not part of TAP

Mitigation: Long term planning shall be taken into account when drafting IT Specifications. TAP solution could be recommended for long term planning as an industry standard outside the law.

Issue: More than $\frac{1}{2}$ of the companies use same processes/systems for domestic as well as international path requests.

Opportunity: most companies support the geographic scope.

Issue: Most content of STPR is already supported, but Path details refused and booked path no longer available are not covered by (more than) 2/3!

Issue: new content means “not just changing the messages, but the processes and programs behind” potentially resulting in expensive implementation.

Issue: amount of STPR – data volume per day varies between large and small scale.

Mitigation: Architecture might have to be scale-able or one small, one large solution?

Issue: Train data for Path Requests is changed between once a year and every week →

Issue: flexible organisation required (or no harmonisation at all?)

8.2.2 Train Ready

Issue: Only 10 % use IT for train ready indications, 1/3 use GSM-R, remaining companies use manual train ready messages

As no IT processes are used so far, TAP would require big changes in handling.

Mitigation: check, if Train Ready message is needed for further IT-processes and if (current) manual handling allows input into IT with same result.

Opportunity: Large use of GSM-R could be seen as one (additional/alternative) solution.

Issue: Timespan for when to give train ready indication varies widely.

Harmonizing the messages but not the process requirements for these messages is one step to interoperability. It however leaves the companies with different (and thus not fully interoperable) requirements depending on countries/networks.

Mitigation: TAP process description will not set a timeframe.

Issue: amount of train ready – data volume per minute varies between large and small scale.

Mitigation: Architecture might have to be scale-able or one small, one large solution?

Issue: more than 2/3 of the companies do not need any train composition in the train ready message.

Opportunity: not fixing train composition by law was right.

Issue: need of 1/3 of companies is unsolved and might be treated by industry associations

8.2.3 Train Running

Issue: IT solutions are xml-based with less than 1/2 of the companies and around half of the RUs/IMs use UIC messages and Europtirails

More than 1/3 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.

Issue: amount of train running – data volume per minute varies.

Mitigation: Architecture might have to be scale-able.

8.2.4 Service Disruption

Issue: Nearly all exchange this information manually, although lots are using IT solutions as well. Currently, information is incident based (2/3) rather than train based (1/2).

Opportunity: Train based message can be used to provide train specific information (as required by TAP).

Issue: amount of service disruption – data volume per minute varies.

Mitigation: Architecture might have to be scale-able.

Issue: Time span for when to give service disruption information varies.

As this message has to be sent from an IM for its network, this does not hinder interoperability. Harmonizing the messages is the important step to interoperability. However, it leaves RUs (and their customers) with different (and thus not fully interoperable) information depending on countries/networks.

Mitigation: TAP process description will not set a timeframe.

8.2.5 Location Reference data

Issue: Half of the replying companies currently use same coding for operational and commercial use.

Issue: TAP location reference should be 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.

Issue: More than 1/3 of companies mirror location reference data, between daily and once a year.

Mitigation: Architecture should allow mirroring.

Issue: Only 1/5 of companies transmit reference data for vehicles at every single path request (as implicated by current TAP TSI). Remaining once use other means (predefined data sets, reference data stored at IM).

Mitigation: Specification should look into the possibility of using both variants: transmitting all relevant data with all path requests or use predefined data sets.

Issue: around 40% of the companies use UIC coding for delay minutes, remaining companies use national standards

Mitigation: UIC codes should be supported by TAP.

9 Appendices

A - The Cover letter for the survey

B - The Questionnaire

C - The results from survey monkey (all answers apart from company name and personal data)

Annex A - The Cover letter for the survey

Von: Sebastian Naundorf/DB AG/DE

Datum: 19.07.2011 10:42

Betreff: TAP Phase One Questionnaire RU/IM - please fill in the online form by August 26

Dear Sir / Dear Madam

This mail is sent to you with reference to the operational part (communication between infrastructure managers, railway undertakings and station managers; "**RU/IM**") of the recently approved European Regulation 454/2011 TAP TSI (Telematic Applications for Passengers – Technical Specifications of Interoperability)

<http://www.era.europa.eu/Document-Register/Pages/TAP-TSI.aspx> .

In particular **we ask your Company**, in the interest of the Company itself, **to contribute in the survey** required as a first step for implementation of TAP.

Note that there are separate surveys for the retail part, managed by Ugo Dell'Arciprete and Robert Parkinson.

Addressees of the survey

The Regulation applies to all European Railway Undertakings (RUs) licensed for passenger services, Infrastructure Managers (IMs) and Station Managers (SMs) the list of which, provided to us by the European Rail Agency, includes your Company. In case you are erroneously present in the list and you do not perform passenger services, please inform us so that we will not bother you with further mails. **In case you are a public regulator office** and not an RU, IM or SM, **please forward this message to all RUs, IMs and SMs** licensed for passenger services in your Country.

Background

The Regulation states that its own implementation will take place in three phases, the first one (Phase One) having the purpose of setting up the detailed IT specifications, governance and master plan needed for the subsequent development and deployment phases.

Among others, the Phase One will produce "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". A good knowledge of the existing systems is essential to avoid that the specifications for the implementation of TAP are developed in such a way to put at risk the huge investments already done by the RUs in this sector.

The questionnaire

To this scope the Project Team established to perform Phase One, where I belong, has prepared with the support of experts appointed by various European RUs and IMs a questionnaire concerning the communication for

- path requests,
- train ready indications,
- real time train running information including forecasts and disruptions and
- reference data.

The questionnaire has been created as an online form accessible via the following link:

https://www.surveymonkey.com/s/TAP_legacy_systems_RU_IM

For your convenience, we also attach a copy of the blank form that you can print and use as a guide while collecting the answers for your Company.

Deadline

Our work program needs the feedback to the questionnaires **by August 26**. We kindly ask you to collect your Company's answers to the questions in the questionnaires, and input them in the online forms before the said deadline. Of course the questionnaire must be filled up only once by a Company, therefore please make sure that only one person on behalf of your Company will do the inputting in the forms.

Confidentiality

Your reply to the questionnaire will be evaluated by the TAP Phase One project team. Aggregated results may be published within the work of TAP TSI Phase One. Individual responses to the survey will not be shared with the public or the industry unless you explicitly authorize the project team to do so (contact person to ask for authorization is the contact given in the questionnaire).

Contact

Should you need any clarification, myself and my colleagues Christian Weber (ext.sncfconseil.christian.weber@sncf.fr) and Andreas Abegg (andreas.abegg@sbb.ch) stay at your disposal.

Thank you and best regards

Sebastian Naundorf
TAP TSI Work Stream Leader RU/IM