FORUM TRAIN EUROPE
PLANNING TRAINS TO CONNECT EUROPE

Supporting RUs timetabling and capacity planning with common approaches on IT

- FTE IT Strategy -

Forum Train Europe FTE

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1. Management Summary

Supporting timetabling and capacity planning on the side of Railway Undertakings, RUs organized in Forum Train Europe decided to create an initial FTE IT Strategy during 2020.

As strategic approach the role of FTE shall be on the alignment of RU positions for IT in this functional scope, striving for common standards and/or influencing tools. FTE shall initially not be in the role of IT development or IT operations.

According to this strategy the following functional clusters shall be in scope:

- In Scope: Train Harmonization, Path Request, Timetable modifications, TCR handling, Capacity Needs Announcements, Master data and certain parts of Route Compatibility
- Out of scope: Operations, Production Planning, Route Compatibility

Further, the following guidelines are created

- Make use of the existing standards wherever possible
- Support the implementation of business needs (e.g. TTR)
- Respect the IT security policy of the members
- balance of minimum cost approach and benefit of digitalization of the sector
- allow sector solutions that can be useable for all RUs

Minimum requirements for IT shall follow state of the art requirements on IT security, transparency, architecture and requirements engineering.
As regards human factors, the way of involving business and IT experts from members both inside and outside the projects are a necessity and training aspects needs to be checked by every project.

Already existing FTE procedures shall be used where possible for the governance of IT projects, with different functions to be nominated and the resources committed prior to projects.

In addition, an initial portfolio of two projects and a set of activities are identified and attached to this IT Strategy document.

2. Purpose of this document

2.1. General purpose

This document serves as documentation of FTEs initial IT Strategy, describing all main findings of the Working Group IT in collaboration/consultation with WG Passenger and WG Freight.

The document serves as basis for the Plenary Assembly approval of the initial FTE IT Strategy.

The document serves as the basis for future project portfolios, project executions and future updates of the FTE IT Strategy.

2.2. Work flow of the FTE IT Stragey

The FTE IT Strategy has been drafted in workshops by the members of the FTE Working Group IT, established following a decision of the Plenary Assembly June 5th, 2019. The Joint Commissions of January 22nd, 2020 confirmed the task and timeline for the WG IT to draft the FTE IT Strategy until November 2020 (Plenary Assembly).

Together with WG Passenger and Freight in May and June 2020, the functional cluster, strategic requirements and initial business requirements for IT projects were clarified. On that basis, an initial project portfolio including project plans were drafted and consulted with WG Freight (07/10/2020) and Passenger (10/09/2020) before final approval by the Plenary Assembly.

3. Functional Scope and Strategic Approach

3.1. Overall aim of the FTE IT Strategy

In accordance with FTEs overall mission to facilitate timetabling, the related capacity management and to promote European train planning, the IT Strategy aims at supporting the Railway Undertakings in doing this business by aligning the RUs views in IT support in these areas.

FTE shall serve as a networking platform where RUs can learn about developments, align on their opinions and lobby towards these.

Generically, if topics concern

- mainly the RUs, alignment should usually be organized within FTE
- mainly the IMs, it should be left to the IM organization, common input from RUs shall be organized within FTE
- both RUs and IMs, then FTE can be used to bundle the RU requirements and, in a case-by-case decision strive for common work with the IM organization
- other parties (Regulatory Bodies, Safety Agencies…) then FTE can be used as network platform between RUs to align individual inputs.

If legal standards exist for the same or similar purpose, FTEs member shall decide whether to adapt these or keep a separate standard and maintenance.

For all topics the following requirements shall be considered:

- Make use of the existing TAF/TAP standards wherever possible
- Support the implementation of TTR
- Respect the IT security policy of the members
- balance of minimum cost approach and benefit of digitalization of the sector
- allow sector solutions that can be useable for all RUs (notwithstanding different cost contributions)

3.2. In scope

The following Functional Clusters have been identified as part of FTE IT Strategy. That means that these clusters are dealt within FTEs IT work. The way of dealing with these is subject to individual discussions and can evolve over time, the starting point is given in the strategic approach.

Nr	Functional Cluster	Strategic Approach
1	Path request (annual and late/ad hoc) incl. timetable modifications	FTE shall be used to align and steer the RUs needs, make the link to the IMs/RNE; Check if existing technology (PCS) can be enhanced to create a common tool fitting for the full path management cycle; Make use of existing standards (esp. TAF/TAP).
2	Train harmonization	FTE shall be used to align and steer the RUs needs, create a standard fit for use by RUs; Re-use existing standards (esp. TAF/TAP, potentially adapted).
3	Temporary Capacity Restrictions (TCR) handling - characteristic of TCR	The lead remains with RNE. FTE shall be used to align and steer the RUs needs towards RNE.
4	Capacity Needs Announcements	FTE shall be used to align and steer the RUs possibilities to harmonize and deliver common formats for capacity needs. FTE shall make the link to RNE.
5	Master data	The lead remains with various organisations. FTE shall be used to align between RUs which data sources/standards shall be used. This shall be used by RUs to lobby towards the leading organisations to use one source/environment for different processes (might be master data AND operational data).
6	Route Compatibility (non-safety related)	The lead remains with various organisations. FTE shall be used to align RUs opinions and commonly influence existing organizations for common standards, e.g. on used data.

Note: the table avoids an explicit ranking in between these clusters, as depending on members needs and members availabilities the working order might change.

3.3. Out of scope

In order to focus the limited resources of FTEs members and the organization, and in order to focus on the subject knowledge within the general mission of FTE, the following Functional Clusters have been discussed and considered not to be part of the IT work at FTE:

Nr	Functional Cluster	Strategic Approach
7	Production planning (e.g. engine, vehicle, staff planning)	These areas shall be left to the market. They are not considered as FTE core business.
8	Operations	This is organized by the European Railways Agency with RUs input organized via the Community of European Railways already. They are not considered as FTE core business.
9	Route compatibility – safety related (bridge compatibility, other times than for path planning)	This is organized by the European Railways Agency with RUs input organized via the Community of European Railways already. They are not considered as FTE core business.

4. Basic Requirements

Whenever common elements are created according to the FTE IT Strategy, these shall consider basic, common requirements on security and transparency. This shall also allow the interaction with individual RUs according to their security policy.

The following generic IT security requirements shall be reflected (partially based on the RailFreightForward group) and documented for every system:

4.1. Authentication and data security

- Access to data and services requires authentication of user
- Individual membership details regulate specific access
- Access to data is
  - Temporary: only valid for specific data within defined timeframe (e.g., consignment note during transport)
  - Constantly granted: can be used for development of smart services
  - Available upon request: if explicitly granted by owner(s)
  - Denied: if access is either retrieved from owner or not grated due to membership type
- Data objects need to be categorized in terms sensitivity to enable differentiation
- Ideally, a basic set of data types is shared per default (e.g., with lowest sensitivity level)
- End-to-end encryption
- Security certificates regular validity check (with monitoring tools)
- No website without https allowed
- Reasonably limited and well-known ports to the outside network
- The use of FTP should be avoided, SFTP should be used instead
- Ensure the data privacy

4.2. Transparency of data usage and data security

- Usage of data allowed for defined purposes only
- Platform has mechanisms in place to
  - Monitor and protocol data usage
  - Detect irregularities and notify owners
  - Suspend data access until clarification
- Owners can easily monitor usage of their data and grant/retrieve access to data
- Only registered users can use the data according to the privileges granted
- A user registration policy shall be restrictive one to respect the data access and security policy of the members

4.3. Architecture

The architecture needs to allow the participation of different levels (e.g. small RUs with GUI, larger RUs with electronic interfaces). The architecture shall be described on a case by case basis, considering security requirements, scaling to different volumes.

The system development must foresee separated environments:

- Development
- testing (serving for approval of development results)
- training (serves for the users to adapt to newest releases without impact on production; must contain documentation e.g. in form of wiki or content management)
- production (no release to production without approval in testing environment).

The basic IT system architecture requirements must be met:

- Reliability:
    - High availability: it is expected that systems are available at 99,5 % of time (24/7)
    - Redundancy: all the systems must have a backup system solution
    - Fail over mechanism: if one part of the system fails there needs to be an automatic handover to the backup solution according to redundancy concept
    - Load balancing (Robustness/resilience for the load expected): high load of applications must have a systems solution that is able to distribute the balance in the system landscape
    - For all systems a backup and data storage need to be organized, a backup policy needs to be agreed on at the beginning of the system setup: backup frequency, backup rotation policy, disaster/ recovery policy
- Integrity of data needs to be ensured
- A protection requirement analysis shall be done, including the levels of availability, confidentiality and integrity.

4.4. Requirements engineering

On a case by case base it shall be checked how requirements engineering is needed. Functional and non-functional requirements must be met.

4.4.1. Functional requirements

Functional requirements must be defined in cooperation with business experts (e.g. WG Freight, WG Passenger). These must include:

- Functional description of the use case
- Business process step
- Access level (which type of users are involved in the function)

This must be done for every function individually, with its own enumeration.

4.4.2. Non-functional requirements

Non-functional requirements must be defined in cooperation with business experts (e.g. WG Freight, WG Passenger for business needs) and IT experts (e.g. WG IT for technical possibilities). These shall include

- Performance requirements according to expected number of users
- Data size (size of messages/documents/number of parameters per page/document)

4.4.3. Technical requierements

Technical requirements must fit to the proposed system architecture defined by the IT experts (e.g. WG IT).

4.4.4. Acceptance criteria

If the project workload and timeline allow the detailed definition of test cases related to use cases these must be provided.

If project budget and timeline are restricted, at minimum the acceptance criteria for each function specified in the functional requirements list must be defined.

5. Human factors

In order to successfully implement FTEs IT strategy for the benefit of the RUs, it is necessary to motivate, learn from and teach the persons involved. For all activities and projects, this needs to be considered already when planning the work.

5.1. Motivation.

In order to have the right motivation for changes it is of importance to get the business needs first. It is of importance to ask the competent business bodies (such as WG Passenger, WG Freight, Commissions) for the business need on IT activities.

Further, the business bodies need to be asked on priorities and importance of the projects in order to invest the limited resources into the most important/most urgent topics.

Once starting activities/projects as identified by the business bodies, a close link needs to be maintained in order to remain aligned between business and IT. In case major challenges occur that hinder the timeliness of the work, close interaction between business bodies and IT shall be searched to commonly identify the way forward.

5.2. Learning

Using the experience of members is one of the core assets of FTE. For all projects, member representatives from business and IT side shall be asked before and during the process for best/worst practice; requirements and ideas for the individual tasks. This shall be done by establishing regular links (e.g. in Joint Working Groups, Sounding Boards, or by incorporating experienced members experts into the project structure).

5.3. Teaching

To successfully implement FTE IT results – tools, standards – it is necessary to organize teaching of all those not involved in the conception phase. As usually FTE as European organization will not be able to teach all involved persons on national and international level, different options shall be envisaged, such as (non exhaustive):

- Model a) "*Key users/train the trainer"*:
  - Some key-users with in-depth training per RU, others with basics (train the trainer)
  - Ideas: 2 days for key users (with experienced planners); ½ day for others (experienced planners)
  - Train the trainers might work with English only → higher organizational tasks for individual RUs

- Model b) "all users"
  - 2 days for every user
  - In this case, local languages would be needed
    → risk to organize all the languages centrally

- Model c) "Key users and on-demand"
  - like Model a)
  - plus, the service to send central trainer to each RU on request (and payment), with translation provided by each RU

- By experience it is recommended for first trial trainings to schedule 50 % of additional time as a buffer.

6. Generic Governance

6.1. Governing activities

To efficiently organize the activities these shall be executed in existing working bodies, such as WG Freight, WG Passenger, WG IT, using the established rules of procedures. For WG IT, the governance has been adapted to reflect the updated tasks. The link between activities shall be done in WG IT. The link between business and IT activities shall be done in the Joint Working Groups.

6.2. Governing projects

For each project the following functions shall be described and nominated with responsible persons before the project starts. Projects shall start after commitment of the relevant resources. Functions nominated shall include:

- Project Manager: responsible for the day-to-day management, organizing and steering the project members, responsible to keep the project in time, scope and budget.
- Substitute: assisting the project manager in a way that the substitute could take over in case of absence of the PM with limited ramp up time.
- Project members: expertise, role, the committed workload of RUs experts and their names
- Escalation body for project issues within FTE (e.g., the FTE Executive Board)
- Escalation body for issues outside FTE (e.g., TTR Steering Committee)
- Change Control Board for Change Requests in the Project (decision making level e.g. the FTE Commissions or Plenary)
- Sounding Boards for broad communication with members outside the project (business and IT experts e.g. the Joint Working Groups)
- Technical Board for broad guidance on overall technical questions (IT experts, e.g. in WG IT)
- Project reporting and communication (e.g. standard sheet for Executive Board to be prepared by PM)

6.3. Change Management process

For each project and system, the governance must foresee the change management process. This includes:

- Change Request definition according to functional requirements method
- Change requests must be enumerated and accessible for all stakeholders
- Acceptance criteria for change requests
- Each implementation project must specify and attribute the task of change control board (for prioritization and decision on the CRs to be implemented). These change control boards shall have the authority to decide within a given budget range.[1]
- Acceptance period defined (per change request): the project plan must include the timeslot for acceptance testing so that all involved stakeholders can validate the Change Request implementation according to the defined acceptance criteria

[1] The budget range shall be decided by the FTE Plenary Assembly.

6.4. Application of the FTE IT Strategy

For the application of the IT Strategy a portfolio of projects and list of activities shall be created and regularly updated. The project portfolio shall be accepted by the Plenary Assembly. The initial portfolio can be found in Annex 7.2.

6.5. Recommendations for updating the FTE IT Strategy

The FTE IT Strategy largely depends on the business needs and availabilities of its members. Therefore, new member needs should be considered whenever a significant number of FTE Members in the Plenary Assembly or the Commissions ask for that. In order to facilitate that it is recommended to have a bi-annual update of the FTE IT Strategy with scheduled discussion in the FTE Commissions. The first of these discussions should be end of 2022 or mid of 2023 (depending on the Plenary/Commission dates).

A complete revision of the FTE IT Strategy should be envisaged after 5 years.

Whenever a new overall FTE Strategy shall be adapted, it is recommended to link the FTE IT Strategy to the same timeline and align the content.

7. Appendixes

7.1. List of functional clusters and related functions

Appendix

The list of related functions serves as explanation examples, which functions can be covered in the Functional Clusters. It is illustrative and leaves it open for related projects/activities to cover these functions.

In Scope:

Functional Cluster	Functionality example
Path request (annual and late/ad hoc) incl. timetable modifications	-Path pre-planning, path request, changes of path requests (before offer), reaction on path offers, confirmation; -Re-planning before operations due to RU, -Re-planning before operations due to IM
train harmonization, harmonization of capacity needs	-Creation of path related train service idea (passenger service/transport load); -harmonization of path related train service with partner RUs, - changes of path related data due to RU, changes due to IM; -Modification of service
TCR handling (characteristic of TCR)	evaluation of TCR characteristic proposed by IM; alignment (check) of TCRs proposed by different IMs; alignment of RU responses to TCR concepts to IMs; replanning of trains according to TCR planning (as in timetable modifications - path related); TCR re-scheduling; KPIs (e.g. on TCR planning stability); TCR consultation history (in course of the process of TCR consultation)
Capacity Needs Announcements	Capacity Needs Announcements incl. reply from IM
Route compatibility	Calculate the weight/size of wagons in relation to line;
Master data	link of different business processes to use same data source/format for similar use; have ONE standard per business end

Out of Scope:

Functional Cluster	Functionality example
Production planning	Engine planning, vehicle planning (wagon rotation planning, harmonization), staff planning
Operations	Train running information, Train preparation; Train ready (TRM) + train composition (TCM) Wagon messages (WSM by RU) / processes; Service disruption and train delay Re-planning/re-routing during operations Wagon status Running km
Route compatibility (safety related)	Bridge compatibility Signalling compatibility Vehicle homologation