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, a current 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 was approved by the Plenary Assembly as the initial FTE IT Strategy and updated by the WG IT during Q3/2023-Q1/2024.

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 Strategy

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.

An update of the IT Strategy has been foreseen for 2023. Therefore, the need for an update of the IT Strategy was discussed with the WG IT. Minor changes have been suggested and incorporated. The WG IT agreed to the update in its meeting on 12 February 2024.

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 RUs requirements and incorporate to standards TAF/TAP TSI is seen as the backbone.
3	Temporary Capacity Restrictions (TCR) handling - characteristic of TCR	The tool lead remains with RNE. FTE shall be used to align and steer the RUs needs. (Data integration and User Interface).
4	Capacity Needs Announcements	The tool lead remains with RNE. FTE shall be used to align and steer the RUs needs (Data integration and User Interface).
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.

FTE aims to ensure as a minimum the following requirements for the systems it uses and develop them in accordance with FTEs and its Members evolving needs.

The following generic IT security requirements shall be reflected (partially based on the Rail Freight Forward initiative) 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. The WG IT mainly takes on an auditor role and promotes that the methodology and the IT standards are fulfilled and respected. The WG IT also supports and advises FTE's operative groups regarding recommended standards.

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

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. This is the version including the latest updates as approved by the WG IT on [*add date here*]

A complete revision of the FTE IT Strategy should be envisaged after 5 years, i.e. by the end of 2025.

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.

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

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

7.2. Current portfolio of activities and projects under the FTE IT Strategy

To implement the FTE IT Strategy, initially a mix of ongoing or new activities and new projects are identified.

Activities

Activities shall be executed in existing working bodies, e.g. WG IT, WG Freight, WG Passenger. These are ongoing tasks.

Special focus on DCM (Digital Capacity Management), the integral part of the TTR IT Landscape. The DCM was foreseen to be the micro-service architecture-based set of various modules that fulfil the requirements of the business expressed in TTR. The strategic approach of FTE IT regarding DCM shall always focus on protecting the main requirements and interests of RU community which were expressed during the TTR initial analysis done by FTE and its RU community in the starting phase of TTR programme:

- Capacity overview
    - RUs shall get the clear overview how the IMs planned the capacity model
        - For this requirement, the DCM has foreseen the tool ECMT
    - RUs shall get the possibility to influence the planning of capacity supply according to their needs
        - For this requirement, the DCM has foreseen the module for Capacity Needs Announcements (CNA) within ECMT
    - The FTE participants of TTR project required from the beginning the clear overview of the Temporary Capacity Restrictions (TCRs) and ensuring that the planning of these restrictions was coordinated and harmonised.
        - For this requirement, the DCM has foreseen the TCR tool. However, the overview of the planned TCRs shall also be available through the tool ECMT for better understanding of the capacity model. The visibility of TCRs is still not fully available on European level.
        - The RUs required an API-based access to read the TCRs from the corresponding tools, in order to integrate the information about TCRs into their domestic tools. Such an API is still not productive
    - Protect the capacity which is reserved for traffic from non-announced (or not coordinated with RUs) capacity restrictions
        - In TTR programme there shall be the methodology of capacity safeguarding implemented. The FTE WG IT shall monitor if the tools developed in DCM do support the capacity safeguarding
- New philosophy of Path Request Management

- The aim of RUs is to use the tool which works according to the harmonized timetabling rules and is able to provide reliable offers based on the available capacity, by taking into account the capacity restrictions.
  - For this purpose, the DCM has foreseen the upgrade of the current PCS EC to the system called PCS Capacity Broker (CB)
  - RUs interest is to clearly have the “brokerage” of capacity which can be securely allocated by IMs. The capacity in the central tool must be ensured that it is manageable by IMs. The tool shall prevent, as far as possible, the request of the capacity, which is occupied or restricted, without knowledge of RUs.
  - The tool must be user-friendly and practical for the end-user, at least, on the level of the current PCS EC. The possible downgrade of the usefulness through the development of the new tool PCS CB shall be objected through the reactions of FTEs representatives and RU community in the PCS CB development governance.

7.2.1. ECMT

The ECMT development shall be observed by FTE IT by having the active FTE representative in the ECMT governance. The above-mentioned requirements must be put in focus by FTE representatives

7.2.1.1. Capacity Needs Announcements (CNA)

Within the overall TTR Program the element of mid and long-term capacity needs to be announced by RUs (and others) is subject to data delivery.
The CNA functionality is currently implemented as a module of ECMT and shall be carefully tracked and evaluated by FTE IT by reporting about the CNA functionality and results in FTE WG IT meetings.

7.2.2. Temporary Capacity Restrictions (TCR)

Currently RNE organizes a tool for information and consultation of TCRs between IMs and RUs.
FTE shall keep the track on the development of TCR tools by having the business side observer from FTE who participates in review of business process specifications for IT development and results of the tool development.
FTE WG IT shall be informed by the FTE business representative about the TCR tool progress.
The requirements given above shall be in focus of FTE representatives.

7.2.3. PCS RU Requirements

7.2.3.1. PCS EC

Within a cooperation of FTE and RNE, FTE can order adaptation in PCS if needed by RUs. The already established work on collecting RUs requirements, evaluate offer and test implementations for PCS shall continue in the FTE RU PCS Group.

7.2.3.2. PCS CB

PCS Envelope Concept will be migrated to the PCS Capacity Broker (PCS CB). Development shall start in the second half of 2023 and the go-to-production is scheduled for September 2024. This migration process requires feedback and inputs from RUs. The aim of FTE is - in agreement with JO RNE as system provider - to provide a framework where the power users can express their opinions on the presented solutions to the project management. In addition, FTE is working to ensure that RUs are strongly involved in the crucial phase of User Acceptance Test.

FTE representatives in the PCS CB development shall report on each FTE WG IT meeting about the progress and potential issues. FTE WG IT shall support FTE representatives and RU community members by giving the qualified evaluation and recommendations from IT perspective.

7.2.4. Masterdata

Master data requires initial work to identify optimal sources (as blueprint) per subject and then ongoing work to identify any initiatives that needs to be directed towards common use of optimal master data. As this is an ongoing task it shall be done in the regular WG IT.
To reach that point master data shall be a standard point on the Agenda of Working Group IT. Any member of Working Group Freight, Passenger and IT shall notify about any new or unclear initiatives that should be influenced regarding the master data used.
The members of FTE WG IT who participate in the TEG Reference Files shall report about the topics of interest about master data on FTE WG IT meetings.
The topics of interest are:

- Clean location coding of primary and subsidiary locations in CRD and RINF
- Data consistency of location and line data in RINF and their relation to CRD
- Data consistency and awareness of the common code lists

7.2.5. TAF/TAP TSI activities

In TAF/TAP TSI the FTE shall be represented in:

- Joint Sector Group (JSG)
- Sector Management Office (SMO)
- Telematic Expert Groups (TEGs):
    - Planning (for everything related to Path Request and object identifiers)

- Reference files (regarding master data topic)
- Operations (only on demand of the members)

It is necessary that FTE WG IT members are informed about:

- TAF/TAP meeting schedule
- TEG conclusions which are topics of interest of FTE members (such as the topics related to Path Request and master data)
- the governance activities of SMO and JSG with the focus on topics of interest for RUs