ERJU SYSTEM PILLAR

# T3-OperationalProcesses

# Operational Processes Capacity Management & Capacity Production

## Task 3 CMS & TMS

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|---|---|
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# 1 History of Changes

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# 2 General

## 2.1 This Document

*Deliverable of ERJU/System Pillar/Task 3 CMS & TMS*
This document *is* a deliverable of the European Rail Joint Undertaking / System Pillar / Task 3 CMS & TMS. It is delivered in parallel with the CMS & TMS System Concept, System Definition and System Architecture and is written to be read independently. **[**SPT3TMS-10024 **]**

*Contents*
This document contains a high-level overview on, and description of, the capacity planning and capacity production processes in scope of Task 3 CMS & TMS that are to be performed by an infrastructure manager (IM) (and/or an Allocation Body (AB) in the phase of capacity planning). These processes are harmonised as to make the coordination between the IM possible. **[**SPT3TMS-10023 **]**

*Structure*
**Chapter 2** contains some key principles and choices made regarding the scope of processes and in the approach of describing operational processes. Also, some considerations about sources and developments regarding ongoing harmonisation of processes outside of the System Pillar are given. In **Chapter 3,** a short introduction and a high-level overview on capacity planning and capacity production is given. What needs to be done at an IM, what are the challenges and what approach is chosen for the near future. This is not an explanation of the processes of the future but is intended as an introduction/overview for readers new to this field. **Chapter 4** contains a more detailed description of processes for capacity planning. **Chapter 5** contains more detailed description of processes for capacity production. **Chapter 6** contains the descriptions of the processes for information exchange. Information exchange is of course an integral part of capacity planning and capacity production processes. The information exchange processes presented here as separate processes are in order to identify interfaces of the CMS & TMS domain to other domains. **Chapter 7** contains post-execution analysis processes. Performance analysis is not part of the CMS & TMS task 3, but these basic processes are included as reminder that the necessary data must be retained for analysis and improvement loops. **Chapter 8** lists the SP's Common Business Objectives for easy reference. **Chapter 9** contains some considerations about business processes, operational processes, the way of work with SEMP and what is required for Task 3 in the future. A glossary can be found in the system concept glossary. **[**SPT3TMS-10026 **]**

## 2.2 Key Principles and Decisions

*It is a description of processes of an IM*
The processes describe the work done from the viewpoint of an individual IM. The harmonisation of the processes is how coordination and cooperation on European level is to be achieved. Processes do therefore contain explicit timelines and steps for this harmonisation. **[**SPT3TMS-10025 **]**

*Business processes*
The operational processes and descriptions are based on business needs, meaning each process description depicts what an IM does for its capacity planning and capacity production. Actors are roughly considered like, RU's capacity requester, IM's capacity manager in capacity planning and RU's operator and IM's traffic manager in capacity production. The processes are listed in a standardised manner with a short description, detailed descriptions are added for enabling the foundation of a holistic operational analysis in accordance with the SEMP. More considerations about further development on business and operational processes can be found in chapter 9. **[**SPT3TMS-10020 **]**

*Scope regarding time: capacity planning starts five years before new timetable start*
The description of processes starts five years before a new yearly timetable becomes valid. This is (as will be explained later on in chapter 4) when the creation of the capacity strategy starts (at latest). The first step of what will become the capacity usage plan (with all allocated capacity in it). All processes with a time scope of more than five years ahead, e.g. long term analysis of infrastructure needs, are not in scope of Task 3 CMS & TMS. **[**SPT3TMS-10019 **]**

*Scope regarding planning objects: capacity planning includes Temporary Capacity Restrictions*
Temporary Capacity Restrictions (TCR) need to be planned, coordinated, and published. The consideration of TCR, besides the planning of train paths, as capacity-consuming planning objects is part of the capacity planning. However optimising TCR planning and execution, e.g., in combining numerous

TCR, efficient work crew or equipment schedules is not in scope. That is up to the requestors of TCR capacity. **[**SPT3TMS-10022 **]**

*Scope regarding infrastructure: network not shunting yards*
In this version, the scope covers infrastructure capacity for train runs and TCR on the general railway network. Capacity on shunting or stabling yards is important too (in some places this is becoming a restricting factor for train services) but in this version of the document out of scope. Interfaces to shunting/ stabling yards processes/system are part of later Task 3 work. **[**SPT3TMS-10021 **]**

*Scope regarding capacity production: traffic management, not traffic control (task 2 CCS)*
For capacity production, the processes regarding traffic management, disruption management and risk management are in scope. These keep the capacity plan (then transformed into operational plans) feasible and executable. While processes for setting routes in safety logic (also capacity production) are handled by Task 2 / CCS. **[**SPT3TMS-10027 **]**

*Not in scope: incident prevention and recovery management*
Handling the impacts from incidents on the train service is part of the traffic management and is therefore in scope. However, all processes that go beyond the core purpose of railway traffic management, such as preventing or recovering (e.g., coordinating repair crews, emergency services, etc.) is not in scope. This will be handled in the incident prevention and restore management. Also not in scope is the handling of crises of higher levels related to public safety, health epidemics, natural disasters, environmental et cetera. Situations, that have or are expected to have a critical effect on the supply of demand of rail transport services. Although this influences capacity planning and production these are outside the Task 3 CMS & TMS scope. **[**SPT3TMS-10031 **]**

## 2.3 Sources of & Developments in the Harmonisation of Processes

*Based on already ongoing work by cooperating IM*
The railway sector puts efforts in the harmonisation of operational processes. Through the initiative Rail Net Europe (RNE), it was agreed in 2014 to launch the so-called “Timetable and Capacity Redesign for smart capacity management”, in short TTR, which entered in its implementation phase in 2021. This entails that a common process of capacity planning in several phases was agreed, and implementation is on its way. Also, through RNE the handbook for European Traffic Management was developed and agreed upon in 2022. An international contingency handbook already existed. More info about these initiatives, including extensive process handbooks, can easily be found in the content of business areas at www.rne.eu. **[**SPT3TMS-10030 **]**

*Proposal for EU regulation on use of infrastructure capacity (published 11 July 2023)*
The above-mentioned initiatives are lacking a legal framework so far. The EC sees that focus remains too national and has made a new concept regulation. This is currently open for feedback. Basically, this regulation requires IM to cooperate in the ENIM organisation (European Network Infrastructure Managers), adopt the European Framework for capacity Management and the European Framework for Traffic-, Disruption- and Crisis management (based on the previously mentioned initiatives) and develop and coordinate all required procedures, processes, digital services, standardised interfaces and/or common tools. The ENIM is to be supported by a to be appointed organisation called the Network Coordinator. The regulation also urges the IM (mainly for digitalisation topics) to participate in the ERJU / System Pillar and take into account the work of the System Pilar. Due to this new regulation, the existing regulation 2012/34/EU (about SERA) will change and Regulation NO 913/2010 (about Rail Freight Corridors) will be repealed. The concept regulation and appendices can be found here (eur-lex) and with more background here. Since it is a proposal, changes to it and the current base for frameworks will certainly follow in the coming years. **[**SPT3TMS-10029 **]**

## 2.4 Elaboration and Presentation of Work Results

The experts working on task 3 gathered operational processes from existing knowledge, current processes running at several European IM, handbooks and input by RNE and relevant literature. As a result, four main areas of processes, called level 1 processes, were identified as depicted in Figure 1. **[**SPT3TMS-10028 **]**

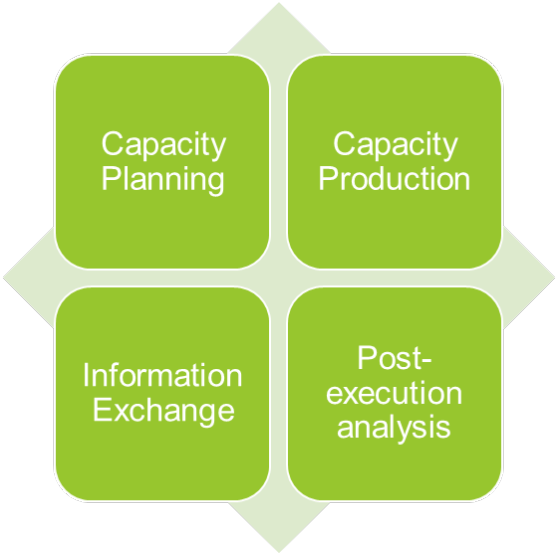



**Figure 1 Four major (level 1) operational processes of CMS/TMS**

**[**SPT3TMS-10037 **]**

The core interest lays of course in the details of capacity planning and capacity production. A first outline on these level 1 operational processes as well as their interdependencies are provided in chapter 3. The details are further depicted as level 2 processes. These are presented in chapters 4 to 7, accordingly.
**[**SPT3TMS-10036 **]**

# 3 Introduction to Capacity Planning & Capacity Production

This chapter contains a basic explanation of the work, challenges and approach in capacity planning and capacity production of an Infrastructure Manager. Actually, capacity production is not explained completely since this is also for a part, e.g. the route setting, terrain of task 2 CCS.
Paragraph 3.1 describes in general what kind of work needs to be done by an IM and why. Paragraph 3.2 lists the main issues and challenges. Paragraph 3.3. describes the principles and approach taken for capacity planning and capacity production. This follows the works done and ongoing by IM and RNE which is also the base for the European Framework for capacity management and the European Framework for traffic management, disruption management and crisis management as mentioned in the new EU regulation on Capacity Management. Links (RNE & regulation) can be found in Chapter 2.3.
**[**SPT3TMS-10039 **]**

## 3.1 What an IM does in capacity management and capacity production

The goal of this chapter is not to introduce the exact terms or the new processes but to give an overview of work that needs to be done. Intended for readers completely new to the subject. **[**SPT3TMS-10038 **]**

*Plan first, use later*
For RU to run train services and for IM to maintain the infrastructure, the use of infrastructure has to be planned beforehand. Especially when there is high demand and infrastructure capacity is scarce, infrastructure use needs to be planned precisely to maximise its utilisation and to be sure the capacity can be produced. **[**SPT3TMS-10033 **]**

*If planning is possible then allocate (after optimisation)*
RU plan their transport services and request infrastructure in the form of paths for running trains. Trains need not only to run but also space to be e.g. serviced, parked, et cetera. Capacity on stabling or service tracks / terrains is required for that. Freight trains might need to be (de)composed between the line haul and last/first mile part (where perhaps another RU or shunting service provides the traction). In short: movement / track usage - infrastructure capacity - needs to be requested and planned to know if the actual execution will be possible. And if it is, the IM/AB allocates the capacity to the RU. This is a commitment that the capacity will be available for use. **[**SPT3TMS-10032 **]**

*TCR planning first*
IM (themselves or through their contractors) plan capacity required for infrastructure projects and cyclic slots for maintenance in the form of Temporary Capacity Restrictions. The infrastructure then cannot be used for traffic or restrictions of its use must be imposed by, for example, speed restrictions. As far as possible, these TCR are therefore to be planned *before* capacity for traffic is requested, planned and allocated. When planning TCR, combinations of TCR are made or avoided and several rules are considered to minimize hindrance for RUs and travellers (e.g., always keep the diversion route open, avoid two TCR on same route if that would mean two times separate alternative transport by bus, etcetera). Of course sometimes it will be necessary to plan TCR later, e.g., for urgent repairs.
**[**SPT3TMS-10035 **]**

*Planning and allocating in different stages*
The planning of capacity goes through different stages; it starts years ahead and lasts until the day of operation. The scope in Task 3 CMS & TMS does not include the planning for building and expanding capacity which is usually performed more than 5 years before a new working timetable period becomes active. Each year a working timetable period of a year becomes active (on the 2nd Sunday of December), representing a cycle and milestone in the planning process. When creating a new working timetable, available capacity is defined and published in several stages:, capacity needs are announced, a basic pattern for the timetable is designed (very often based on last years) and simultaneous capacity planning and allocation is used to coordinate possible conflicting requests and optimize capacity. Later, after the new timetable structure is set (also if not yet active), a first come first served principle is used for allocation of requests for remaining capacity. During the working timetable period additional requests for capacity are also handled this (FCFS) way. These requests can be made by RUs (due to e.g., additional or changed services or to re-assing or re-position rolling stock) or from the IM (TCR due to unforeseeable events only, like repairs). The latter are judged on necessity / impact on traffic before being allocated (possibly already allocated paths need to be altered , compensation might be relevant). **[**SPT3TMS-10034 **]**

*During all stage IM coordinate*
During all stages, cooperation between IM is needed to create international / multi-network paths. RUs

can request a multi network path by requesting parts of the path at all involved IM separately or through a one-stop-shop of a single IM (mainly, where departing from). TCR are to be coordinated between IM as to keep e.g. international diverting routes open or work on both sides of the border on the tracks at the same time (if closed for traffic anyway). **[**SPT3TMS-10041 **]**

*The 'end product' is the base for operation*
The planning processes produce in the end a capacity usage plan. Containing the capacity used for TCR and for the timetable and all other capacity use. This plan should ideally contain no conflict. Here conflict means required use of the same infrastructure at the same time. Also operational conflicts can occur, like planned train length does not match platform length, special transport conditions etc.. The available capacity in several forms is in the capacity supply plan. (These plans will gradually come to exist, through a capacity strategy and capacity model, this will be explained in 3.3.) **[**SPT3TMS-10047 **]**

*Contingency measures are also made*
During the planning also contingency measures and plans are prepared. These handle what to do when agreed plans cannot be respected or when that can be foreseen. What if trains are delayed? Which other trains should wait for how long to keep a connecting service? Which order / sequence of trains to change? Which platform tracks? What if, due to e.g. a malfunction of the infrastructure or an incident or a defective train that blocks tracks, required capacity is not available? Where will services be cancelled, trains be short turned or diverted? What if severe weather conditions are predicted? Will, to guarantee a service, the service will be reduced? Or even completely cancelled preemptively? Contingency plans can consist of alternative plans or rules for handling events or guidelines on how to handle them (of course, not for every specific situation a contingency plan can be made). Contingency measures are prepared and executed to reach a target objective involving KPI such as the minimisation of the total delay minutes or the time to return to normal operations. If possible contingency measures are generated automatically in real-time during the operation. **[**SPT3TMS-10045 **]**

*Capacity production: create/update operational plans and execute them*
During the operation, the capacity is produced. The capacity usage plan is transformed into operational plans that can be used e.g. for route setting or information provided to ATO or to secure safe work zones. Executing the operational plans is performed via the CCS layer (System Pillar Task 2). Producing the operational plans (based on the capacity usage plan) is performed during capacity production (System Pillar Task 3). **[**SPT3TMS-10044 **]**

*It does not go as planned: traffic management and disruption management*
Very often the production does not exactly go as planned. There are small variations in driving times, there are primary delays / deviations from the plan caused by several reasons, there are incidents where for some reasons capacity is not available as planned or TCR might take longer than planned etcetera. Traffic management processes handle the delays, disruptions and other deviations from plans. Not every deviation leads to a necessary action since the plan contains buffers / margins / slack to accommodate variations and is ideally robust for smaller disturbances. But if action is required, the plan (arrival/departure times, track usage or even whole train services) is altered to deliver the capacity/services as best as is possible, to optimize remaining capacity use and to always stay in control. Although traffic management is the general term, often the traffic management process handles the smaller deviations and delays, whereas the disruption management process handles the larger disruptions. **[**SPT3TMS-10043 **]**

*Efficient traffic management: quick response, with forecast and conflict detection*
When traffic is dense, when the capacity utilisation is high, a quick response is needed when deviations occur. Ideally (but this is not the case everywhere) the IM decides then based upon agreements with RU beforehand. The contingency plans and measures made in preparation are then used. For an effective traffic management, the IM should also have a good forecast ability. However, this does not mean to predict deviations but meaning that the actual train run is projected realistically (based on run time calculations et cetera). When deviations occur, future conflicts that will or might happen can then be shown and still prevented. The forecast can also be a source for communicating / sharing information as a base for travel or transport information or arrival / handover prognosis times. **[**SPT3TMS-10054 **]**

*Relation with Incident Management*
When larger incidents happen and repair / incident management crews are involved, the traffic managements handles (only) the impact on the train services. It should be known as soon as possible which infrastructure is not available anymore so the plan can be changed quickly. The incident management handles the incident and is getting the infrastructure back to normal use. For the capacity production processes a prognosis time about the repair is needed (with several updates) to decide on exact measures and when to start with the back-to-normal / start-up actions. **[**SPT3TMS-10053 **]**

*Risk management to act preemptive*
Besides reacting to events (and preventing conflicts) external events are also monitored. Risk management is used to see if e.g. , weather forecasts, planned strikes, large public events or complex TCR demand to take action to create more stability / buffer and stay in control. **[**SPT3TMS-10051 **]**

### 3.2 Challenges & Issues

This paragraph lists the major challenges and issues which is not exhaustive nor being in order of priority / importance. Extensive lists and explanations can be found in e.g., TTR, ETMN, EU Regulation (Ex-post evaluation of Regulation No 913/2010 about Rail Freight Corridors), documents of RNE and in the ERJU CBO documentation. **[**SPT3TMS-10049 **]**

- Traffic is expected to grow substantially, and existing infrastructure is to be better utilized. The scarcer the capacity, the more detailed the planning has to be made now to get an executable plan and to ensure that allocation to RUs can be done. Detailed planning means a lot of (often manual) work and lots of rework when planning is not stable.
- Stable planning of TCR is needed. When TCR planning changes, already existing allocation for traffic needs often to be altered and services to be changed. As a consequence, the quality of service is impacted and a lot of additional work for IM and RU is incurred.
- For passenger services, capacity planning and allocation for international paths / travels must be performed at an earlier stage to allow start of ticket sales by RU (and compete with airlines).
- Capacity planning and allocation for freight should be allowed for later in time, so RUs can react on demands in the transport market. Related capacity needs are to be claimed in the yearly timetable when the need for it is not yet confirmed and the exact times are not clear. As a result, the timetable needs to be changed several times during the process, typically leading to waste of capacity and lot of rework during the year(s).
- Cross-border rail services (rail freight in particular) suffer from poor reliability, punctuality and predictability. Cross-border rail services require better coordination of planning and production across networks. This requires harmonised procedures, processes and tools for capacity planning and the allocation of TCR and paths. This also holds for contingency management, traffic management, disruption management and risk management).
- Coordination of planning and production with freight terminals is needed for alignment of capacity on the rail network and the availability of capacity at terminals. Also, alignment with capacity of yards for stabling / shunting or waiting for terminal slots is needed.
- Response times for handling capacity requests (single and multi-network) should be shortened and be facilitated by digital services with a better working one-stop shop concept enabling a transparent capacity supply.
- The replanning in case of production deviations / dispatching must be faster since the negative impact of deviation grows for as long as it remains unresolved.
- Today's planning process requires large planning departments to address peaks of workload in the process. Automation and spread of workload is needed to be able to (keep) carrying out the work which could be supported by further digitalisation.

**[**SPT3TMS-10057 **]**

### 3.3 Principles and Approach in Capacity Planning and Capacity Production

This paragraph describes the general principles and approach for a harmonised Capacity Planning and Capacity Production processes. It is mainly based on work by / through RNE on TTR, ETMN, (international) Contingency management. Also, statements / text from the proposal for an EU Regulation ‘on the use of railway infrastructure capacity in the single European railway area’ are used.
**[**SPT3TMS-10056 **]**

The key point is that national IM (and Allocation Bodies) are and remain responsible for the capacity allocation and capacity production and that mechanisms for coordination between national IM/ABs (and others involved in running cross-border train services) are in place. Hence, harmonised processes, digital services, standardised interfaces and common tools (see also 2.3). are required. This document is about the processes only. IM/ABs shall introduce flexibility in the processes. For example, IM/ABs will be able to withhold some capacity for later allocation. This will benefit rail freight services (see 3.2. Challenges and Issues). Incentives will be introduced for both IM/ABs and RU to honour capacity-related commitments and avoid changes at short notice. Cooperation and communication between IM in all planning and

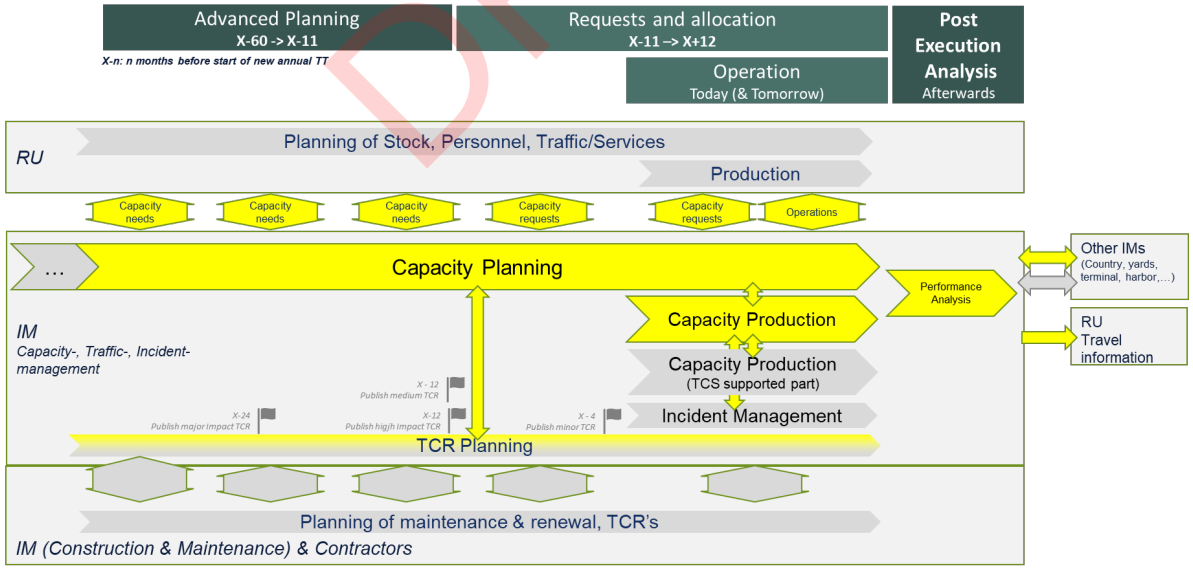
production processes is required to make services more efficient and improve their quality. [SPT3TMS-10058 ]

From the proposal for a new regulation: “the rules and procedures on the management of rail infrastructure capacity should reflect better the needs of all rail market segments. They should in particular take into account the necessity of long-term stability of available capacity for passenger services and of short-term flexibility for freight traffic to respond to market demand. Therefore, the process of managing capacity should no longer have a predominantly annual focus, but be arranged in three subsequent phases of strategic capacity planning; rail service scheduling and capacity allocation; and adaptation and rescheduling of capacity. The introduction of better defined and structured phases that provide for the possibility of long-term planning and short-term adaptation in capacity management, would particularly benefit services that are less easy to plan in advance or are more complex to arrange, such as freight trains and cross-border passenger trains.” [SPT3TMS-10064 ]

### 3.3.1 Capacity Planning and Capacity Production in Scope of Task 3

The picture below shows the processes in scope of Task 3 (marked yellow). The green blocks on top denote phases and their time spans. X is the moment of introduction of a new yearly timetable. For example, X-60 means 60 months before start of the new timetable. The Advanced (also called Strategic) Planning phase is from X-60 to X-11. Here in consecutive phases a Capacity Strategy, Capacity Model and Capacity Supply plan is developed. It becomes more and more precise what capacity the IM has to offer and when (what is reserved for what). The Requests and allocation phase is from X-11 to X+12 (also request during the timetable period therefore the +). Here, requests for new, changed (by RU) or altered (by IM) capacity are handled. In parallel to this phase during the working timetable on the day of operation, when the trains are running and TCR are executed, the operation phase (traffic-, disruption- and risk management) is going on. These concerns ‘Today’ but also one or more days in the future (since dispatching and pre-emptive measures can have impact into near future, the boundary when longer term traffic management becomes capacity management is not always the same/clear). After the Operation in the Post Execution Analysis phase analysis and evaluations are done (to report on performance and improve / feed-back loops). [SPT3TMS-10063 ]

The TCR Planning process arrow is partly yellow, depicting that the TCR planning outcome is processed in the capacity usage plan and in scope, but planning TCR (determining project and maintenance slots) and optimising them is a different process which is beyond the scope of Task 3 CMS / TMS. [SPT3TMS-10062 ]

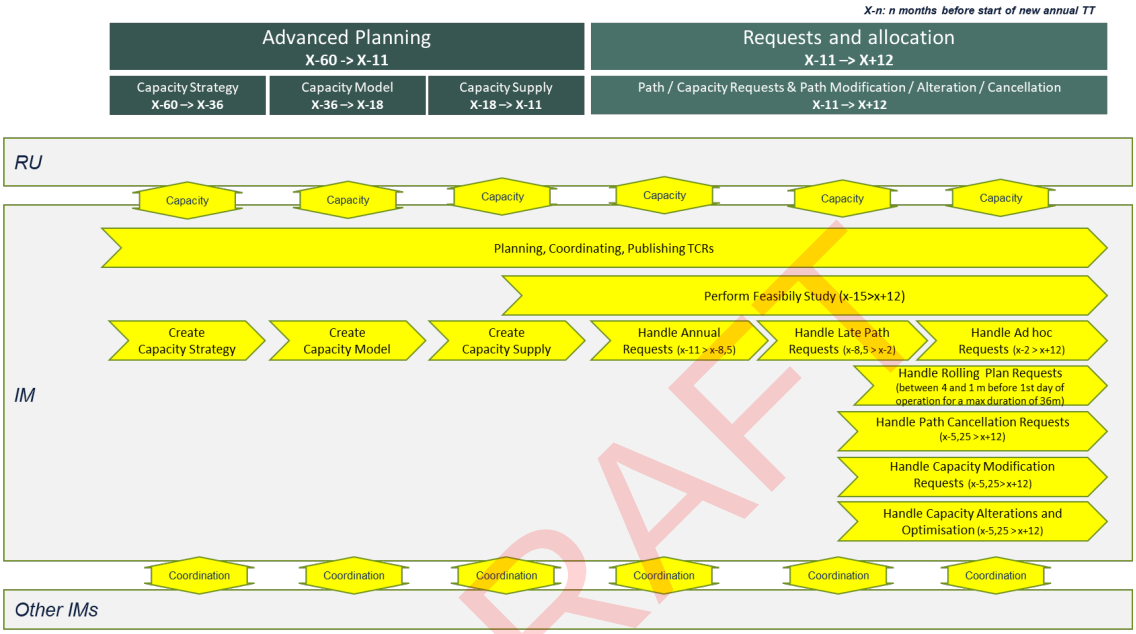



[SPT3TMS-10068 ]

**Figure 2: Scope Processes Task 3**

### 3.3.2 Capacity Planning

Within scope of task 3, capacity planning starts five years before a new working timetable becomes effective on a specific day. The processes of capacity planning are being performed in a chronological order. Following this approach, a capacity supply and later usage plan is being constructed in several consecutive processes (see Chapter 4). In each process coordination with other IM/ABs, and consultation with Applicants is performed. Until the day of operation, this plan undergoes changes by requests of Applicants, or is being altered by the IM for best capacity utilisation purposes or due to urgent TCR. The capacity usage plan is the base for the determination of train-individual operational plans. The processes follow TTR. **[**SPT3TMS-10067 **]**



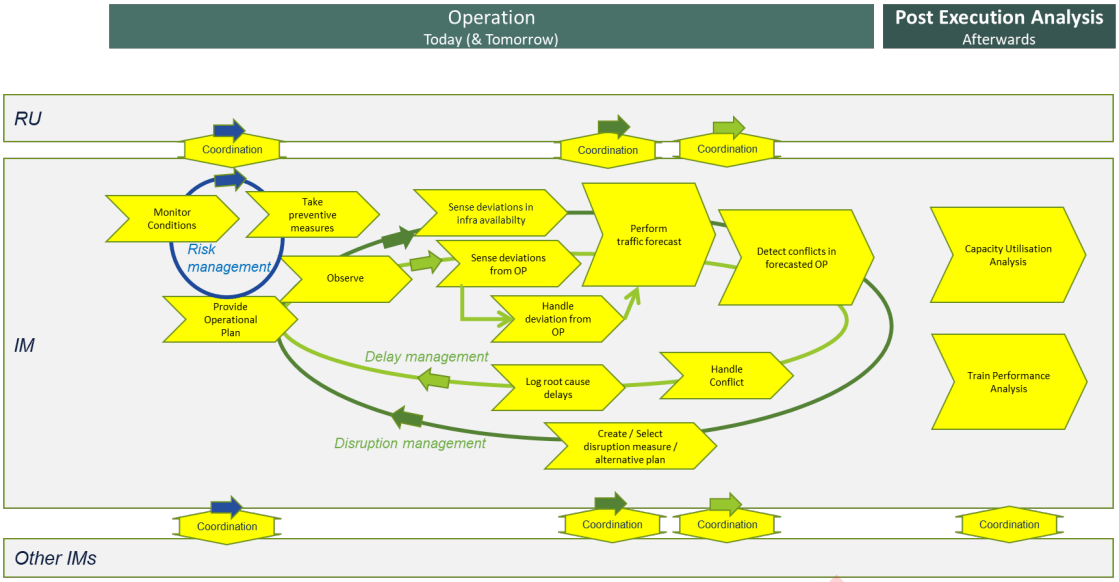

**[**SPT3TMS-10066 **]**

**Figure 3: Processes Capacity Planning**



### 3.3.3 Capacity Production

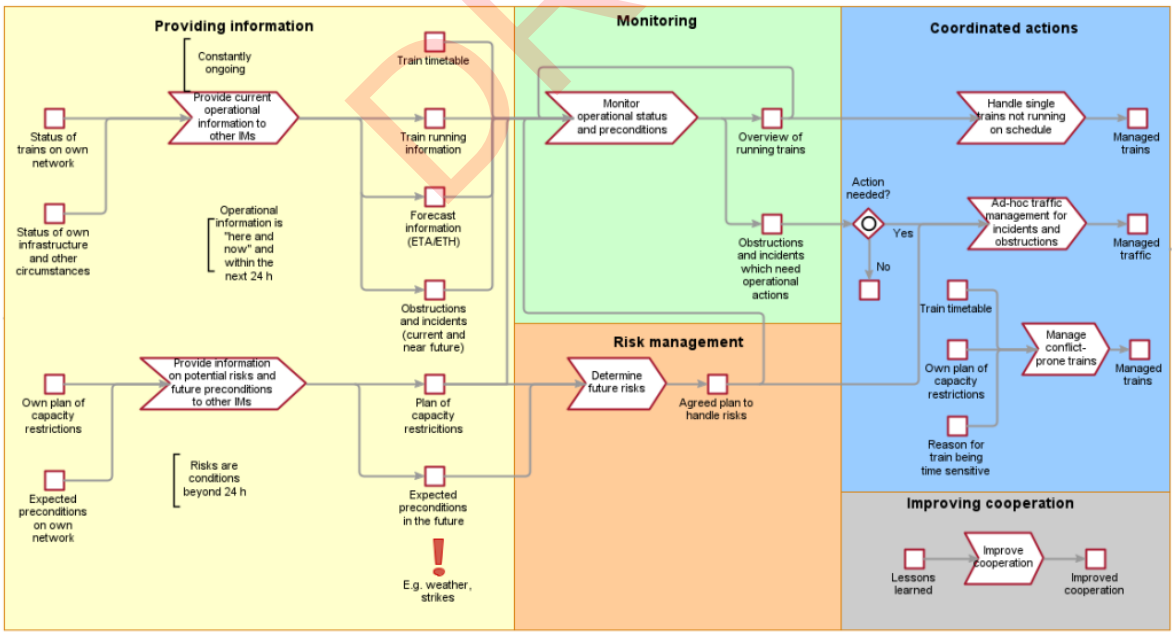
Capacity production processes are less chronologically. During the day of operation events continously happen or information comes in that needs to be handled by traffic (delay) management processes, disruptions management processes or risk management processes. These represent ‘process loops’ of which several (e.g., multiple delays, disruptions) can be active at the same time. Also, during these processes, coordination with other IM must be performed (at least when impact on multi-network, cross border is assumed and/or alignment of measures to decide upon and take is needed). **[**SPT3TMS-10069 **]**




[SPT3TMS-10042 ]

**Figure 4: Processes Capacity Production**

As said, processes are described from the viewpoint of a single IM. All IM use these harmonized processes and within these processes coordinate with each other. In the current European Traffic Management Network handbook processes are described from this viewpoint: elements/steps to be added to the IM processes for coordinating. The ETMN processes follow the common steps of Providing information, Monitoring and Risk management and then the Coordinated actions. In the process descriptions in this document, the ETMN processes will be included separatly for recognisability. The ETMN process about improving cooperation that addresses steps/measures to improve the way of work between IM, is included but is out of scope of Task 3. [SPT3TMS-10040 ]




[SPT3TMS-10048 ]

**Figure 5: ETMN Proces Map (source: RNE ETMN Handbook chapter 10 )**

# 4 Processes for Capacity Planning

The following sections describe the major processes for capacity planning. As already described before, capacity planning starts five years before a working timetable will become effective on a specific day. This day is referred to in the process description as 'X'. The level 2 processes are foreseen to be executed in a specific time span in relation to moment X. This time span is mentioned at the beginning of each section, where e.g. X-60 means 60 months before X. **[**SPT3TMS-10046 **]**

## 4.1 Create Capacity Strategy

**Create Capacity Strategy**
*Time span: X-60 - X-36*
Creation of *a strategy (document), setting down the general principles to be used further in the capacity planning and capacity allocation process. Moreover, it includes the expected available capacity and a first rough analysis of the future traffic flows. It includes a list of all planning partners per line, common overview on x-border traffic flows etcetera.* **[**SPT3TMS-9701 **]**

| Property name | Property description |
|---|---|
| Goal | Drafting the document called "Capacity Strategy" and publishing it, to inform the market about the available capacity in due time according to internationally harmonised rules, including the deadline. |
| Supporting CBO's | CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO031 (Reduce Carbon Emissions); |
| Trigger | start the Capacity Management process for a given Timetable |
| Stakeholders involved | -Infrastructure Managers<br>-Applicants (RU & Non-RU)<br>-Ministries of Transport<br>-Region, local government, transport association, industry<br>-Terminals and service facilities<br>-(if any) International Leading Entity |
| Inputs and preconditions | • Infrastructure capacity availability at X-36 (where X is the starting of the Timetable the Strategy refers to)<br>• Input from relevant stakeholders (for example, political requirements on future positive and negative changes in the available capacity, intended future development in the public service obligation (PSO) transport, market expectations, etc. …)<br>• Standardised template (National language and English) |
| Process activities | • X-60 to X-39 Input collection and creation & Harmonisation of Capacity Strategy (first version)<br>• X-39 to X-37 Input gathering and clarification on open questions regarding mature version of draft Capacity Strategy<br>• X-37 to X-36 Finalisation, validation and publication of Capacity Strategy (X-37 to X-36)<br>• Flowchart available here |
| Outputs and postconditions | Document describing the main principles of capacity management including all types of capacity needs for the assigned geographical area. In particular, the table of content will include:<br>• Geographical scope (involved IM, lines, service facilities)<br>• Expected capacity of infrastructure in a specific Timetable year (additional available capacity/reduced available capacity)<br>• Temporary Capacity Restrictions (planning principle and information on major impact TCR)<br>• Traffic planning principles and expected Traffic Flows |

| Property name | Property description |
|---|---|
| | Advantages/ added value: allows to plan/ inform about and internationally align on events with a large impact on capacity availability (such as extended track closures, intended increase of commuter services or newly opened lines, etc.). |
| Attachments | • Handbook Latest Version (Capacity Strategy Handbook_V3.0 – valid from TT 2027)<br>• Link to already published Capacity Strategies |

**[**SPT3TMS-9716 **]**

### 4.2 Create Capacity Model

**Create Capacity Model**
*Time span: X-36 - X-18*
Breakdown of total capacity into *TCR (“*negative *capacity”) and commercially usable parts (“*traffic part – 24hour overview reflecting market needs) Partitioning of capacity in capacity available for annual timetable paths, safeguarded capacity for rolling planning, TCR and unplanned reserves; capacity models must be internationally harmonised.
Based on the Capacity Strategy, Capacity Needs Announcements (CNA) and other sources of information (e.g., data about train services operated in the current or previous year, estimation and own hypothesis of future market developments, framework agreements). **[**SPT3TMS-9909 **]**

| Property name | Property description |
|---|---|
| Goal | The goal is to transparently communicate the expected traffic volumes (positive capacities and TCR/TCR window (negative capacities)) and to detect pressure points with the involved stakeholders, the Applicants, and neighbouring IM. In the case of lines with international relevance, harmonization with involved IM is obligatory. |
| Supporting CBO’s | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | Publication of Capacity Strategy |
| Stakeholders involved | • Infrastructure Managers<br>• Applicants (RU & Non-RU)<br>• Ministries of Transport<br>• Region, local government, transport association, industry<br>• Terminals and service facilities<br>• (if any) International Leading Entity |
| Inputs and preconditions | AVAILABLE DATA:<br>• Capacity Strategy: information provided by the Competent Authorities already in the Capacity Strategy phase, such as expected public service obligation (PSO), traffic flows (for the traffic part), and available funding for new capacity-related projects (for the variants for TCR periods)<br>• Multi-annual Rolling Planning requests: Rolling Planning requests placed already by Applicants in the previous or running timetable period that is supposed to have running days also in the timetable period that is subject to capacity modelling<br>• Capacity Needs Announcements (CNAs): a process for entities (also potential ones) with interests in capacity usage by which they can announce their capacity needs and participate in the process of Capacity Model and Capacity Supply design<br>• Historical data: data about train services operated in the current or previous years |

| Property name | Property description |
|---|---|
| | • IM own analyses: IM estimations and own hypothesis of future market developments<br>• Framework agreements.<br><br>IT TOOLS:<br><br>• Central IT tool - for publishing and international (cross-border) coordination<br>• National Interfaces for data flows between IM and central IT tool (TAF/TAP TSI compliant)<br><br>NATIONAL AND EUROPEAN LEGAL FRAMEWORK<br><br>• TAP/TAF TSI Sector Handbook for the Communication between RUs/IM v2.1 |
| Process activities | • X-36 Start of the Capacity Model phase.<br>• X-21 Deadline to publish draft Capacity Models. The Capacity Models are accessible for all Applicants.<br>• X-18 Deadline to publish final Capacity Models. |
| Outputs and postconditions | The Capacity Model consists of a 24-hour overview reflecting market needs (traffic part) and in case of variants for TCR periods on the capacity consumed by TCR. Furthermore, the Capacity Model contains the intended capacity usage line, which indicates the maximum number of volumes, which can be accommodated without paying special attention to capacity planning / extraordinary traffic management measures.<br>IM publish the Capacity Models covering all types of expected traffic: passenger/ freight at X-21 in a draft, and at X-18 in final form. During the definition of Capacity Models, it must be checked which sections of infrastructure have been declared congested (as defined by Article 47 of Directive 2012/34/EU). Based on the already prepared capacity enhancement plan (as defined by Article 51 of Directive 2012/34/ EU) the IM can identify those sections, where the congestion cannot be released for the TT period covered by the Capacity Model (e.g. during the preparation of Capacity Model for TT2026, in summer 2024 it shall be checked which parts of the network have been considered as congested and foreseen to be still congested in TT2026 based on the capacity enhancement plan). In these special cases, volumes should be dedicated also to ad hoc and rolling planning purposes to fully utilize the added values of strengthened long-term planning activities of IM. |
| Attachments | • Capacity Model Handbook Latest Version: Capacity Model Handbook_V3.0 – valid from TT 2025<br>• Link to ECMT description |

**[**SPT3TMS-9910 **]**

### 4.3 Create Capacity Supply / Plan Capacity

**Create capacity supply / plan capacity**
*Time span: X-18 - X-11*
Creation of an internationally harmonised capacity supply. In a 365-day overview capacity diagram, objects such as pre-planned paths and or wider bandwidths including TCR and TCR windows. Publication of available capacity to applicants. **[**SPT3TMS-9978 **]**

| Property name | Property description |
|---|---|
| Goal | To publish European-wide harmonised, pre-constructed Capacity products, with the aim of:<br><br>• accelerating and support Path Request phase<br>• providing 365-day overview of the Capacity Diagram<br>• supporting the harmonisation of the cross-border path planning |

| Property name | Property description |
|---|---|
| | • providing detailed capacity availability of TCR (Temporary Capacity Restrictions) |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services;) CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | Publication of Capacity Model |
| Stakeholders involved | • Infrastructure Managers<br>• Applicants (RU & Non-RU)<br>• Ministries of Transport<br>• Region, local government, transport association, industry<br>• Terminals and service facilities<br>• (if any) International Leading Entity |
| Inputs and preconditions | • National and European Legal Framework<br>• Central IT Tool and national interfaces (TAF/TAP TSI compliant)<br>• Capacity model<br>• Multi-annual Rolling Planning requests<br>• Historical data: data about train services operated in the current or previous years<br>• IM own analyses: IM´ estimations and own hypothesis of future market developments<br>• Framework agreements<br>• TAP/TAF TSI Sector Handbook for the Communication between RUs/IM v2.1 |
| Process activities | X-18 Final Capacity Model is published, pre-planning period of Capacity Supply starts.<br>X-18 - X-11 Preparation of the Capacity Supply for non-TCR, TCR Window and Major and High impact TCR periods.<br>X-11 Publication of the internationally harmonised Capacity Supply including non-TCR, Major and High impact TCR, and TCR window periods (those TCR which had been already included in the Capacity Model). |
| Outputs and postconditions | The Capacity Supply content consists of a 365-day time/space capacity diagram, where objects are displayed as pre-planned paths or bandwidths, which show the flexibility of a certain path, and/or empty space for tailor-made paths. |
| Attachments | • Handbook Latest Version: to be decided if to be included<br>• Capacity Supply published in Central IT Tool (Pilot): ECMT description<br>• TTR Long Process Description |

**[**SPT3TMS-9960 **]**

### 4.4 Perform Feasibility Study

**Perform feasibility study**
*Time span X-15 – X+12*
Iterative process, performed for applicants who wish a good understanding and indication of how their paths could fit in TT, based on the capacity partitioning displayed in the capacity model, before an official path request. **[**SPT3TMS-9976 **]**

| Property name | Property description |
|---|---|
| Goal | The main objective of the item is to enable the Applicants to examine the feasibility of new or amended service concepts, using an iterative process with IM and/or partner Applicants to develop them further with a view to order paths for the annual or running timetable. |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO040 (Tools Supporting New Services) |
| Trigger | Placing a feasibility study request to the Infrastructure Manager by the Applicant(s). The feasibility study can be requested due to various reasons:<br>• path study of new traffic,<br>• the published Capacity Supply does not provide enough information to the Applicant (e.g. Capacity Supply only contains TCR),<br>• Capacity Supply does not coincide with the Applicants' demand (e.g., an Applicant intends to operate a different rolling stock or apply a different stopping pattern),<br>• elaboration of path details in the case of TCR |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |
| Inputs and preconditions | • National and European Legal Framework<br>• Central IT Tool (PCS-Capacity Broker) and interfaces to National systems (TAF/TAP TSI compliant)<br>• Capacity Supply (Advanced Capacity Planning as a basis for the Annual Timetable preparation) - when it is prepared<br>• TAP/TAF TSI Sector Handbook for the Communication between RUs/IM v2.1 |
| Process activities | Feasibility Studies requests can be placed:<br>• For Annual Path request: From X-15 until X-10, IM will respond by X-9,<br>• For Late Path request: From X-10 until X-2, IM will respond within 30 calendar days, but after the Final offer deadline (X-5,5),<br>• For recurrent Ad Hoc request: From X-2, IM will provide the feedback within 30 calendar days,<br>• For Rolling Planning request: From X-5,5, IM will provide the feedback within 30 calendar days,<br>Detailed flowchart is described in the annex A of Feasibility study Handbook linked below. |
| Outputs and postconditions | IM will analyse and provide information about the feasibility of the requested Operational concept.<br>The results of the Feasibility studies should be taken into account while placing the Path request, even though it is not a commitment to Path allocation. |
| Attachments | • Feasibility Studies Handbook Latest Version: Procedures for Feasibility Studies Handbook_V1.0 – Valid from TT 2026<br>• Feasibility Studies process in PCS (IT process Feasibility Studies) |

[SPT3TMS-9959 ]

### 4.5 Coordinating and Publishing TCR

**Coordinating and publishing TCR**
*Time span: Along all planning phases in capacity planning*

Coordination of TCR planning across IM à A horizontal process which goes along all planning phases. [SPT3TMS-9974 ]

| Property name | Property description |
|---|---|
| Goal | Enhancing the unified implementation of the provisions set in Annex VII of the Directive 2012/34/EU by:<br>• Creating a clear overview on the steps to be followed during the lifecycles of TCR,<br>• Facilitating the TCR Coordination process with the commonly agreed principles and methods to be used,<br>• Contributing to the unified clustering of TCR,<br>• Contributing to the unified impact calculation of TCR,<br>• Providing an overview on the relation between the TCR and the different TTR- components,<br>• Contributing to the unified handling of Late TCR,<br>• Providing a unified method to evaluate the planned and real TCR consumption. |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | A capacity restriction on a railway line (usually construction or maintenance works) that has a negative impact on the available capacity. |
| Stakeholders involved | • Infrastructure Managers<br>• Applicants (RU & Non-RU)<br>• Ministries of Transport<br>• Terminals and service facilities<br>• (if any) International Leading Entity |
| Inputs and preconditions | • TCR and TCR window planning principles defined in the Capacity Strategy<br>• Preparation and coordination of TCR among IM<br>• National and European Legal Framework<br>• Multiannual financing<br>• Consultation channels between the IM and applicants |
| Process activities | • Defining TCR and TCR window planning principles in the Capacity Strategy<br>• Bi/Multilateral coordination among the IM with the involvement of the relevant stakeholders<br>• Consultation with Applicants and relevant stakeholders<br>• Preparation of Capacity Model TCR variants<br>• Inclusion of TCR into the Capacity Supply |
| Outputs and postconditions | • TCR publication according to deadlines defined by Annex 7<br>• Harmonised and coordinated TCR with the necessary clusterization<br>• Capacity Model TCR variant including rerouting scenarios<br>• TCR input for Capacity Supply<br>• Final offer with the inclusion of high, major, and medium-impact TCR<br>• Altered paths complying with Annex 7 |
| Attachments | • TCR Handbook Latest Version: Procedures for Temporary Capacity Restriction Handbook_V2.0 - Valid from TT 2026 |

[SPT3TMS-9962 ]

### 4.6 Handle Annual Requests

**Handle Annual Requests**
*Time span: X-11 – X-8,5*
Applicants can request pre-constructed products (paths) published by IM as part of the Capacity Supply. Unplanned capacity or bandwidth can also be applied for. In case of conflicts of requests, IM will coordinate requests to ensure best possible matching of requirements. Minor/major changes to initial requests are possible. As the last resort, after the coordination phase, European wide applicable Allocation Rules should be applied. **[**SPT3TMS-9986 **]**

| Property name | Property description |
|---|---|
| Goal | Construct a national Annual Timetable according to an internationally harmonised planning process (Annual TT Handbook) to manage the Annual path request placed on time (so called "Path request deadline"), whose main features are:<br>• European harmonisation of fragmented national processes to simplify access to capacity<br>• Overview of the Path requests and Offers on international level (Origin-Destination) in central IT system (PCS)<br>• Allowing earlier ticket sales to passengers than today by 2 months<br>• Avoiding redundant work for both, IM and Applicants<br>• Defining European-wide applicable Allocation Rules |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How) CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | Publication of the Capacity Supply |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity<br>• Regulatory Bodies |
| Inputs and preconditions | • National and European Legal Framework<br>• Central IT Tool (PCS-Capacity Broker) and interfaces to National systems (TAF/TAP TSI compliant)<br>• Capacity Supply (Advanced Capacity Planning as a basis for the Annual Timetable preparation)<br>• TAP/TAF TSI Sector Handbook for the Communication between RU/IM v2.1 |
| Process activities | **Timeline for path request placed on time**<br>X-15 to X-2: Feasibility studies<br>X-8: Path request deadline<br>X-8 to X-5: Path elaboration phase<br>X-5 to X-3.5: Consultation and post-processing phase<br>X-3.5: Final offer and acceptance<br>**Timeline for path request placed between X-8 and X-2 late path request (LPR)**<br>X-3.5: Path elaboration phase<br>X-1 (at the latest): Final offer and acceptance |
| Outputs and postconditions | Harmonised international train path |
| Attachments | • Annual TT Handbook Latest Version: Procedures for designing the annual timetable Handbook_V1.0 - Valid from TT2026<br>• Timetabling calendar: Timetabling (Capacity Requests And Allocation) Calendar |

[SPT3TMS-9961 ]

## 4.7 Handle Late Path Requests

**Handle Late Path Requests**
Requests placed until X-8,5 are treated according to annual timetable procedures, the rest (until X-2) are processed only after the final offer deadline on a first come-first served base. Products that can be applied for: preconstructed annual timetable paths or unplanned capacity or bandwidth. [SPT3TMS-9985 ]

| Property name | Property description |
|---|---|
| Goal | To manage the annual path requests placed after the path request deadline (so-called "Late Path Requests") according to an internationally harmonised planning process, whose main features are:<br>• European harmonisation of fragmented national processes to simplify access to capacity<br>• Overview of the Path requests and Offers on international level (Origin-Destination) in central IT system (PCS)<br>• Avoiding Redundant work for both, IM and Applicants<br>• Defining European-wide applicable Allocation Rules |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How);CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | After X-8.5 (deadline for placing new Path request) |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |
| Inputs and preconditions | • Central IT Tool (PCS-Capacity Broker) and interfaces to National systems (TAF/TAP TSI compliant)<br>• Capacity Supply (Advanced Capacity Planning as a basis for the Annual Timetable preparation)<br>• TAP/TAF TSI Sector Handbook for the Communication between RU/IM v2.1 |
| Process activities | The deadline for placing the Late Path request is X-2 |
| Outputs and postconditions | Harmonised international Timetable (Both Freight and Passenger traffic) |
| Attachments | • Annual TT Handbook Latest Version: Procedures for designing the annual timetable Handbook_V1.0 - Valid from TT2026<br>• Timetabling calendar: Timetabling (Capacity Requests And Allocation) Calendar<br>• Long Process Description: Long Process Description |

[SPT3TMS-9956 ]

## 4.8 Handle Rolling Plan Requests

**Handle rolling plan requests**
*Time span: M-(4-1) – X+36*
A request placed between four and one month before first day of operation for a maximum duration of 36 months. These are handled on a first come – first served base. Applicants can apply for preconstructed rolling planning capacity (slots) or bandwidth. [SPT3TMS-9983 ]

| Property name | Property description |
|---|---|
| Goal | Requests answered according to the principle of first come –first served, as long as the operation period starts between 1 and 4 months after the request. A Rolling Planning has multianual validity up to 36 months ahead of operation. |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables;) CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | A request placed at between four and one months before the first day of operation. |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |
| Inputs and preconditions | • TAP/TAF TSI Sector Handbook for the Communication between RU/IM v2.1<br>• National and European Legal Framework |
| Process activities | X-18 Rolling Planning volumes published/safe-guarded in the Capacity Model<br>X-11 Rolling Planning paths/bandwidths published in the Capacity Supply<br>X-5 The Rolling Planning capacity published at X-11 can be updated for the last time. The update shall not decrease the capacity safeguarded for Rolling Planning. The aim of the update is to narrow the bandwidths published at X11 or conversion of bandwidths to pre-constructed paths. The updated Rolling Planning capacity shall not conflict with the fixed minor TCR.<br>X-2 Conversion of unused ATT capacity to RP capacity or unplanned capacity<br>M-4 - M1 Requests answered according to the principle of first come – first served<br>M-30 days Conversion of unused RP capacity to residual capacity.<br>**Answering time from the IM:**<br>• In case of one TT period: Taking into consideration that the supply is pre-constructed, it should be as soon as possible or at the latest within two calendar days for a path for an individual train run (one running day) if only one IM is involved; as soon as possible or at the latest within seven calendar days if the path involves the networks of more than one IM<br>• In case of more TT periods: As soon as possible, but maximum in four weeks. IM will jointly forward the answer to the applicant(s) for the running timetable period and upcoming/next timetable period(s).<br><br>Applicants may make observations, within two weeks of reception of the draft offer. After the post-processing phase, IM will send the final offer (with the path details) for the running timetable period. Applicants can accept or refuse it. In case of refusal, IM will cancel the entire dossier; this includes the withdrawal of the slot from the subsequent timetable period(s). Acceptance/rejection must be communicated within five calendar days.<br>If the applicant(s) agree(s) to the final offer, path(s) will be allocated accordingly. In case of no agreement from the side of the applicant within seven calendar days, the allocation will be withdrawn by the IM and the capacity will be made available again. |
| Outputs and postconditions | A path for the running timetable period AND/OR a slot, which will be converted into a path year by year, for the subsequent timetable period(s). The size of time window for IM capacity commitment regarding subsequent timetable periods is the following:<br>» +/- 30 minutes for upcoming timetable period<br>» +/- 60 minutes for second next timetable period (timetable+2)<br>» +/- 90 minutes for third next timetable period (timetable+3) |
| Attachments | Long Process Description: Long Process Description |

[SPT3TMS-9955 ]

### 4.9 Handle Ad-hoc / Short Term Requests

**Handle ad-hoc / short term requests**
*Time span: X-2 – X+12*
A capacity request placed after X-2 until operations day within the current timetable year. Handled on a first come-first served base. Harmonised between IM. Products that can be applied for: unplanned capacity, residual pre-constructed ATT paths or rolling planning capacity, pre-constructed ad-hoc capacity (if applicable). **[**SPT3TMS-9993 **]**

| Property name | Property description |
|---|---|
| Goal | To handle international ad hoc requests, according to an internationally harmonised planning process, whose main features are:<br>• European harmonisation of fragmented national processes to simplify access to capacity<br>• Overview of the Path requests and Offers on international level (Origin-Destination) in central IT system (PCS)<br>• Avoiding Redundant work for both, IM and Applicants<br>• Defining European-wide applicable Allocation Rules |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness) CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | Need to request an individual, or recurrent path by the Applicant after the X-2 |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |
| Inputs and preconditions | • Central IT Tool (PCS-Capacity Broker) and interfaces to National systems (TAF/TAP TSI compliant)<br>• Capacity Supply (Advanced Capacity Planning as a basis for safeguarding capacity for later purposes) and its dynamic updating<br>• TAP/TAF TSI Sector Handbook for the Communication between RU/IM v2.1 |
| Process activities | This process encompasses capacity requests placed after X-2 until operations until the X+12. |
| Outputs and postconditions | • Flexibility for the market to request international paths even after the ATT phase, ensuring high quality and harmonisation of the offer from origin to destination. This is possible through the establishment of joint procedures for the ad hoc requests to treat them in a harmonised way and agree on the operational details that have to be respected in all networks (e.g. harmonised response time and acceptance timeline).<br>• Reducing the uncertainty and complexity of the process at European level |
| Attachments | • Ad-Hoc Request Management Fact Sheet: (temporary version of the Handbook to be updated with TTR elements and subject to further adjustments)<br>• Long Process Description: Ad-Hoc Request Management |

**[**SPT3TMS-9958 **]**

## 4.10 Handle Path Cancellation Requests

**Handle Path Cancellation Requests**
*Time span X-5,25 – X+12*
Applies only to complete path cancellations but overlaps content wise with “Handle capacity alterations and optimisation”. **[**SPT3TMS-9991 **]**

| Property name | Property description |
|---|---|
| Goal | In the daily business of Applicants, it may happen that an already allocated path has to be cancelled for various reasons, such as: Loss of partner RU or business by the Applicant; Volatility of the market requiring more or less frequent transport services; Unforeseen circumstances (e.g., operational problems). Applicants holding an allocated train path, in the annual or short-term allocation process, should always be able to cancel or use only some of the allocated running days. It is also possible to cancel the entire train run (all paths) or just one or more paths that are part of the international train path) |
| Supporting CBO’s | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | Need to cancel an allocated path from the side of the Applicant |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |
| Inputs and preconditions | • Path Cancellation can be based on the complete information contained in Central IT Tool (PCS-Capacity Broker) and where applicable National and European Legal Framework<br>• TAP/TAF TSI Sector Handbook for the Communication between RUs/IM v2.1 |
| Process activities | The precondition for a path cancellation request is that the initiating Applicant must cancel his entire path (from origin/handover to destination/handover point) for, at least, one operational day. Based on the cancellation request proposed by the initiating Applicant, the affected Applicant(s) may also submit a cancellation request or keep their allocated paths for other traffic needs. These options can generate two types of requests: Complete cancellation: cancellation of the same train runs by all Applicants, Partial cancellation: at least one Applicant does not cancel his path. Once the cancellation request is agreed among the applicants concerned, the cancellation request<br>can be submitted. Cancellation requests shall be processed and confirmed by the IM (preferably immediately) to release capacity for other needs. |
| Outputs and postconditions | Cancelled train path (capacity can be used for other purposes) |
| Attachments | Path Cancellation Handbook Latest version: Procedures for Cancellation of Allocated Handbook_V1.0 - Valid from TT 2026 |

**[**SPT3TMS-9957 **]**

## 4.11 Handle Capacity Modification Requests

**Handle Capacity Modification Requests**
*Time span: X-5,25 – X+12*
Change of already allocated capacity induced by RU. **[**SPT3TMS-9989 **]**

| Property name | Property description |
|---|---|
| Goal | Handle the process of a Path Modification according to an internationally harmonised process, whose main features are contained in a Handbook |

| Property name | Property description |
|---|---|
| | describing the process by which Applicants may request a modification of allocated international paths from infrastructure managers and allocation bodies. The goal is to meet the general need for modification of already allocated/pre-constructed international path from the Applicant´s perspective in line with the TAP/TAF TSI Sector Handbook for the Communication between RUs/IM v1.4 |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions); CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design); CBO042 (Viable Backward Compatibility); |
| Trigger | Need to modify an allocated path from the side of the Applicant |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |
| Inputs and preconditions | • Path Modification can be based on the complete information contained in Central IT Tool (PCS-Capacity Broker) and where applicable National and European Legal Framework<br>• TAP/TAF TSI Sector Handbook for the Communication between RUs/IM v2.1 |
| Process activities | The modification process is applicable from X-1 to X+12 |
| Outputs and postconditions | Modified international path valid for the actual/upcoming TT period |
| Attachments | • Path Modification Handbook: Procedures for Modification of Allocated Handbook_V3.0 - Valid from TT 2026 |

**[**SPT3TMS-9964 **]**

### 4.12 Handle Capacity Alterations incl. Optimisation

**Handle capacity alterations incl. optimisation**
*Time span: X-5,25 – X+12*
Change of already allocated capacity induced by IM. **[**SPT3TMS-9987 **]**

| Property name | Property description |
|---|---|
| Goal | Handle the process of a Path Alteration and/or optimization according to an internationally harmonised process, whose main features are contained in a Handbook ("Procedures for Alteration of Allocated Paths") which enables infrastructure managers and allocation bodies to alternate, adjust, replace, or withdraw already allocated paths |
| Supporting CBO's | CBO012 (Completeness of Planning and Live Update); CBO019 (Flexible use of Infrastructure Capacity); CBO021 (Increased Capacity); CBO026 (Optimise Timetables); CBO031 (Reduce Carbon Emissions) ;CBO033 (Standard Know How); CBO034 (Standardised Architecture); CBO037 (System Robustness); CBO040 (Tools Supporting New Services); CBO039 (Upgradeable System Design) CBO042 (Viable Backward Compatibility); |
| Trigger | • Need to alter an allocated path from the side of the IM |
| Stakeholders involved | • Infrastructure Managers and Allocation Bodies<br>• Applicants (RU & Non-RU)<br>• (if any) International Leading Entity |

| Property name | Property description |
|---|---|
| Inputs and preconditions | • RNE Process Handbook for International Path Allocation<br>• Handling Temporary Capacity Restrictions in Timetabling<br>• TAP/TAF TSI Sector Handbook for the Communication between RU/IM v2.1 |
| Process activities | The process of path alteration should follow the below mentioned timelines:<br>Timeline for alteration of passenger trains<br>Deadline / Action<br>T-135 days: The last day for IMs to trigger the path alteration in relation to the upcoming TCR<br>T-120 days: IMs provide internationally harmonised alternative offers<br>T-113 days: The last day for applicants to accept/reject offers or ask for adaptation[15]<br>T-106 days: The last day for IMs to allocate accepted offers or provide harmonised second offers<br>Timeline for alteration of freight trains<br>Deadline / Action<br>T-45 days: The last day for IMs to trigger the path alteration in relation to the upcoming TCR<br>T-30 days: IMs provide internationally harmonised alternative offers<br>T-23 days: The last day for applicants to accept/reject offers or ask for adaptation[16]<br>T-16 days: The last day for IMs to allocate accepted offers or provide harmonised second offers<br>Where "T- #": a deadline referring to the first day of the capacity restriction (T) and the number of days (#) in advance of this deadline |
| Outputs and postconditions | • Newly allocated path by IM |
| Attachments | • Path Alteration and optimization Handbook Latest version: Procedures for Alteration of Allocated Paths Handbook_V3.0 - Valid from TT 2026<br>• TCR Handbook Latest Version: Procedures for Temporary Capacity Restriction Handbook_V2.0 - Valid from TT 2026 |

[SPT3TMS-9972 ]

### 4.13 Check Route Compatibility

**Check route compatibility**
Checks an operational plan against the intended train unit (and the intended cargo). [SPT3TMS-9998 ]

| Property name | Property description |
|---|---|
| Goal | The route of every operational plan must be checked against the train unit (and the cargo) that is intended to be assigned for the operational plan's execution during capacity production. |
| Supporting CBO's | CBO003, CBO007 |
| Trigger | Within capacity planning, when the train unit is being assigned to the operational plan. |
| Stakeholders involved | RU, IM |
| Inputs and preconditions | Detailed route and its technical characteristics, intended cargo, all intended vehicle(s) of the train unit |
| Process activities | The process checks the compatibility between the characteristics of the network (in the broadest sense, i.e., the fixed parts of all the subsystems concerned) and those of the vehicles that are part of the train unit envisaged to operate on the given route. Articles 21 and 23 of Directive (EU) 2016/797 on Interoperability introduce the process for obtaining authorisation of a vehicle for an area of use and the route compatibility checks that must be done to ensure route compatibility before the authorised vehicle(s) can be used. For the contents of the route compatibility checks please refer to The Technical Specifications for Interoperability on Operations (OPE TSI), section 4.2.2.5 and the therein mentioned Appendix D1. |
| Outputs and postconditions | A test result determining whether the intended vehicle(s) of the train unit are compatible with the intended route or not. In the latter case, the route and/or the |

| Property name | Property description |
| --- | --- |
| | train unit must be modified to get a positive test result. |

[SPT3TMS-9970 ]

# 5 Processes for Capacity Production

The following sections describe the major processes for capacity production. The level 2 processes of this section are foreseen to be applied to missions currently in execution.

## 5.1 Manage Risks

**Manage risks**
Consider external events such as strikes, bad weather conditions etc. in capacity production.
**[**SPT3TMS-10006 **]**

| Property name | Property description |
|---|---|
| Goal | To take pre-emptive measures when the estimated risk of possible events becomes high enough. This also includes sharing this risk / coordinate measures with other IM. |
| Supporting CBO's | CBO019 (Comprehensive Incident management); CBO014 (Continuous Supervision); CBO027 (Rapid Deviation Information / Solution) |
| Trigger | Information received or requested, usually not sooner than days before the actual day of operation. |
| Stakeholders involved | • IM: Traffic Manager (and depending on scale of possible impact of measure many more communications, crisis management etc.)<br>• Applicants (RU & Non-RU) |
| Inputs and preconditions | • Information / Risk assessments: e.g., weather, strikes, staff health / availability, special events/trains, large/complex TCR, …<br>• Scheduled TCR on own network and on neighbouring IM network that affect international trains (awareness that TCR and redirecting trains are already in operation, higher risk if additional issues arise.) |
| Process activities | • Receive / request assessment information<br>• Determine if risk profiles exceed agreed threshold<br>• Determine if risk needs to be shared with other IM<br>• Determine if measure(s) must be coordinated with other IM<br>• Take preventive measures(e.g.,reduce train service due to storm)<br>• Follow/exchange progress.<br>• Coordinate 'back to normal' |
| Outputs and postconditions | • Risk assessments and decisions to (not) act.<br>• And optionally a changed capacity usage plan / operational plan |
| Attachments | • RNE Handbook ETMN: https://rne.eu/wp-content/uploads/2023/01/Handbook-for-European-Traffic-Management-Network.pdf |

**[**SPT3TMS-9968 **]**

In the ETMN handbook the process risk management is also described, see 5.1.1..

### 5.1.1 Risk Management (ETMN)

| Property name | Property Description |
|---|---|
| Goal | Determine whether risks from inside "my" network affect surrounding IM or risks from outside influence "my" traffic and which coordination steps are needed. |
| | CBO001 (Analytical Information for Passenger Flow/Incidents), CBO008 (Comprehensive Incident Management), CBO009 (Continuous Supervision), |

| | |
|---|---|
| Supporting CBO's | CBO018 (Rapid Deviation Information/Solution) |
| Trigger | International trains are affected |
| Stakeholders involved | -Infrastructure Managers<br>-Railway Undertakings |
| Inputs and preconditions | Input to the risk management process is:<br>o Scheduled capacity restrictions on own network and on neighbouring IM network that will affect international trains<br>o Expected conditions on own and on neighbouring IM network that will affect international trains (e.g., inclement weather conditions, expected strikes). |
| Support for communication | Potential circumstances that may develop into risks or actual risks are preferably shared via personal contact (e.g., phone call, chat, chat with translation function). Further IT support may be agreed between IM. Future developments of international supporting tools may support this communication in a more coordinated way. |
| Process activities | 1. Each IM should analyse the received information and estimate the impact.<br>2. Each IM is recommended to assess whether the expected conditions need coordination with other IM.<br>3. If international coordination is needed either of these options shall be used to plan the coordinated actions<br>a. At a regular or already scheduled meeting if there is enough time<br>b. Plan a meeting if needed<br>4. If a common plan is made, make this available for concerned dispatchers. |
| Outputs and postconditions | Coordination of risks is mainly done at already planned or ad-hoc conference calls as described in the process.<br>TCR and other risks should be documented and sent to TIS according to the requirements in the process step "*Providing information on expected conditions: Risks and future preconditions to other IM*" (see 6.1.2) |
| Source | https://rne.eu/wp-content/uploads/2023/01/Handbook-for-European-Traffic-Management-Network.pdf |

**[**SPT3TMS-9966 **]**



### 5.2 Provide Operational Plan

**Provide operational plan**
Provide current version of Operational Plan to trackside, to ATO, and to CDAS
Can be split in "Provide operational plan set of movements", "Provide operational plan set of restrictions", "Provide operational plan warning measures". **[**SPT3TMS-10005 **]**

| Property name | Property description |
|---|---|
| Goal | Starting from the agreed plan received by capacity planning, create Operational plans necessary for the execution and provide it to the Traffic Control and Supervision System |
| Supporting CBO's | CBO003 (Automatic Train Operation); CBO007 (Automation of Systems); CBO012 (Completeness of Planning and Live Update); CBO016 (Efficient Energy Use); CBO019 (Flexible use of Infrastructure Capacity); CBO026 (Optimise Timetables); |
| Trigger | Upon reception of a new plan or an existing plan update, or by a real time adjustment from dispatching. |

| Property name | Property description |
|---|---|
| Stakeholders involved | • Infrastructure Managers: Traffic managers, Signal Operators (working on TCS)<br>• Applicants (RU & Non-RU) |
| Inputs and preconditions | • CMS and TMS share the same (a coherent) topology.<br>• The train paths and all restrictions with the suitable level of precision are shared, in terms of elementary resources and estimated running time for each of them.<br>• For every train, the associated composition is available, with at least length, maximum speed, acceleration and deceleration.<br>• The operating state of the whole controlled area is up to date and known to the system.<br>• The necessary infrastructure resources are known and will be available at the required time.<br>• All planned or unplanned restrictions are available (possessions, TSR, etc), along with the resources they impact on. |
| Process activities | • The agreed plan is received from capacity planning, according to a predefined and agreed topological representation of the controlled area.<br>• The received plan is complemented with possible additional information if missing or additionally available.<br>• The operational plan is provided to consuming systems in a convenient advance with respect the beginning of its validity.<br>• This operational plan is ready to be processed by TMS (unplanned restrictions are integrated / conflicts are solved). |
| Outputs and postconditions | • The Operational Plan is sent to TCS. This may happen in a convenient advance with respect when it is planned to be executed.<br>• Every time an update is elaborated, this is sent to TMS, which replaces the older one. |

**[**SPT3TMS-9980 **]**

### 5.3 Observe Railway Network Occupation (Real-time Monitoring)

**Observe railway network occupation**
Observe movements of controllable and observable objects:

- Movable rail-bound objects currently on the tracks
- Movable non-rail-bound objects currently on or near the tracks

**[**SPT3TMS-10008 **]**

| Property name | Property description |
|---|---|
| Goal | To have information of and a view on the situation / state of the train traffic. To detect possible risks and to create situational awareness. |
| Supporting CBO's | CBO007 (Automation of Systems); CBO014 (Continuous Supervision); |
| Trigger | Continuous |
| Stakeholders involved | IM: Traffic manager |
| Inputs and preconditions | Operational state, occupation of infrastructure (received through TCS) |
| Process activities | Monitor<br>Evaluate deviations, mark for direct follow up. |
| Outputs and postconditions | Actual view / knowledge of operational state.<br>Events / situation that trigger safety procedures. |

[SPT3TMS-9979 ]

## 5.4 Sense Deviations from the Operational Plan

**Sense deviations from the operational plan**
Identify trains running late (or faster/earlier ); TCR not started or released as planned and react to it. [SPT3TMS-10007 ]

| Property name | Property description |
|---|---|
| Goal | Determine if the execution is different from the current operational plans (e.g. trains are slower/faster, TCR not started/finished). When deviations are detected (in other processes) they are evaluated if measure should be taken, and if so, operational plans are adapted. |
| Supporting CBO's | CBO003 (Automatic Train Operation); CBO007 (Automation of Systems); CBO006 (Availability, Robustness, Reliability); CBO012 (Completeness of Planning and Live Update); CBO016 (Efficient Energy Use); CBO026 (Optimise Timetables); CBO027 (Rapid Deviation Information/Solution ); CBO032 (Smart/Assisted incident Handling). |
| Trigger | Continuous incoming information about the execution, operational state.<br><br>Old text (kept, for check of intention/use other process)<br>Upon reception of status changes of trackside objects, restrictions updates, information coming from interfaces at the boundary of the controlled area |
| Stakeholders involved | • Infrastructure Managers<br>• Applicants (RU & Non-RU)<br>• Dispatchers<br>• Signal Operators (working on TCS) |
| Inputs and preconditions | • Trains positions are provided by TCS<br>• The status of the trackside objects is available and updated in real time<br>• AND the status of restrictions and resources availability is known and real-time updated as well |
| Process activities | • Information from monitoring is compared to operation plans to detect. E.g., deviations. For each train, the displacement between its current position and the planned one is verified. For each restriction, the displacement between its current state and the planned one is verified. |
| Outputs and postconditions | Deviations are found, to be evaluated if action is required (this is input for process 5.6.) |

[SPT3TMS-9977 ]

## 5.5 Sense Deviations in Infrastructure Availability

**Sense deviations in infrastructure availability**
Identify faulty field elements, occupied sections with defective trains, and TCR induced by Incident Management and identify possible conflicts with train runs. [SPT3TMS-10002 ]

| Property name | Property description |
|---|---|
| Goal | Identify all unplanned infrastructural unavailability |
| Supporting CBO's | CBO007 (Automation of Systems); CBO012 (Completeness of Planning and Live Update); CBO026 (Optimise Timetables); CBO027 (Rapid Deviation Information/ Solution); |
| Trigger | Numerous messages coming from connected systems, such as:<br><br>• Messages from the safety logic regarding defective field elements<br>• Messages from the safety logic on track occupations<br>• TCR newly induced by the planning system or by the |

| Property name | Property description |
|---|---|
| | • incident management system |
| Stakeholders involved | IM, safety logic, incident management |
| Inputs and preconditions | Numerous upstream message types of the interface SCI-OP as part of the operating state as well as dedicated message types of the interface with the incident management system (t.d.b.). |
| Process activities | The process consumes the messages coming from connected system and evaluates them. It is checked whether the information received conflicts with planned train paths and/or train paths currently being executed. Possible conflicts (location and time) are identified. |
| Outputs and postconditions | Potential occupation conflicts that must be solved. |

**[**SPT3TMS-9975 **]**

### 5.6 Handle Deviation From the Operational Plan

**Handle deviation from the operational plan**
Apply operational measures to minimize deviations from the current operational plan: e.g., change order of trains, platforms, crossings or by cancelling, short turning, skipping stops etcetera. **[**SPT3TMS-10001 **]**

| Property name | Property description |
|---|---|
| Goal | Deviations from the operational plan (usually early arrivals and delays) will be dealt with in a targeted manner to get back on schedule. The deviations do not necessarily have to have led to occupation conflicts. The process, however, reduces the risk of new occupation conflicts. |
| Supporting CBO's | CBO007 (Automation of Systems); CBO012 (Completeness of Planning and Live Update); CBO0021 (Increase Capacity); CBO026 (Optimise Timetables); CBO027 (Rapid Deviation Information/Solution ); |
| Trigger | Detected deviation based on train position reports as part of the operating state coming via the interface SCI-OP (actually this is output of process 5.4). |
| Stakeholders involved | IM, RU, safety logic, ATO |
| Inputs and preconditions | Train is in execution and provides train position reports leading to a deviation. |
| Process activities | The operational plan of an affected train will be modified so that the intended level of service can be reached again. This can be done, for example, by updating driving instructions to ATO/CDAS or by updating planned dwell times. |
| Outputs and postconditions | Updated operational plan |

**[**SPT3TMS-9982 **]**

### 5.7 Perform Traffic Forecast

**Perform traffic forecast**
Determine the future timing points of an operational plan. **[**SPT3TMS-10004 **]**

| Property name | Property description |
|---|---|
| Goal | Forecast information is key to an efficient traffic management. The forecast displays the future state of traffic. The forecast information can then be used to identify conflicts and solve them by changing the operational plans of trains involved. Also, the forecast is the base of informing downstream traffic cells of estimated handover times. |
| Supporting CBO's | CBO007 (Automation of Systems); CBO012 (Completeness of Planning and Live Update); CBO026 (Optimise Timetables); CBO027 (Rapid Deviation Information/ Solution ); |
| Trigger | Continuously |

| Property name | Property description |
|---|---|
| Stakeholders involved | IM, Traffic managers<br>Other IM |
| Inputs and preconditions | Operational plan, current operational state (infra & trains) and run time calculations. |
| Process activities | Perform a traffic forecast (this is an automated function / calculation). |
| Outputs and postconditions | The future state of traffic, forecasted operation plans with estimated handover or arrival times. |

**[**SPT3TMS-9981 **]**

### 5.8 Sense Operational Conflict Between Operational Plans

**Sense operational conflict between operational plans**
Identify a (potential) conflict (using traffic forecast). **[**SPT3TMS-10003 **]**

| Property name | Property description |
|---|---|
| Goal | From the current Operation Plan under execution, updated in real-time with the current status of the trackside objects and with the movements forecast and restrictions status updated, evaluate those situations where trains or trains and restrictions interfere one another. |
| Supporting CBO's | CBO003 (Automatic Train Operation); CBO014 (Continuous Supervision); CBO026 (Optimise Timetables); CBO027 (Rapid Deviation Information/Solution), CBO032 (Smart/Assisted incident Handling). |
| Trigger | Upon the re-evaluation of trains forecast and restriction status. |
| Stakeholders involved | • Infrastructure Managers<br>• Applicants (RU & Non-RU)<br>• Dispatchers |
| Inputs and preconditions | • The future movements of running trains have been recalculated based on the updated status of the controlled area: this is done considering also the planned and unplanned restrictions.<br>• Users performed their own traffic choices (if any) prior to the elaboration of the movement forecast performed by the TMS. In case a new change is done, the movement forecast may be not run again prior the search of operational conflicts. |
| Process activities | • An algorithm is applied to detect any interference among trains and trains and restrictions.<br>• The detected conflicts are shown onto specific synoptics and tabular views; every conflict is highlighted by a specific symbol.<br>• Conflict details are available to be shown to the user, for example acting on the conflict identifier.<br>• New events potentially generating new conflicts or updating existing ones occurring while no solution is yet provided shall lead to further updates. |
| Outputs and postconditions | • Conflicts and interferences are available for further elaboration<br>• The user can act on conflicts characteristics to perform changes or set solutions if the solution mode is set to manual.<br>• TMS shall apply the solution algorithm to the set of detected conflicts if the solution mode is set to semi-automatic (see the System Concept document).<br>• TMS shall apply the solution algorithm to the set of detected conflicts and shall apply the solution if the solution mode is set to automatic (see the System Concept document). |

**[**SPT3TMS-9984 **]**

## 5.9 Handle Operational Conflicts

**Handle operational conflicts**

- Apply operational measures to solve an operational conflict: e.g. change order of trains, platforms, crossings or by cancelling, short turning, skipping stops etc.
- For non-operationally solvable conflicts see interface with incident management.
- (Consider functionalities dealing with cases where conflict resolution fails)

**[**SPT3TMS-10009 **]**

| Property name | Property description |
|---|---|
| Goal | The goal is to minimise the overall impact on traffic by handling conflicts. The detection triggers a solution process (manual or automatic).<br>“Solving” a conflict is to define a single measure (dispatching action) or a set of measures applying to single train or various trains. Evaluation algorithms are computing real time KPI impacts (e. g. delay at destination), to support the dispatcher´s decision.<br>Conflicts may be solved manually from the operator or with the help of automatic tools providing different solutions to solve the detected conflict.<br>The selected solution will result in a new operational plan based on the measures taken. The new operational plan immediately leads to a new forecast and will be broadcasted to the different information consumers. |
| Supporting CBO’s | CBO007 (Automation of Systems); CBO012 (Completeness of Planning and Live Update); CBO026 (Optimise Timetables); CBO027 (Rapid Deviation Information/ Solution ); |
| Trigger | Conflict detection. |
| Stakeholders involved | IM<br>RU |
| Inputs and preconditions | • Operational plans<br>• Conflicts<br>• Agreement IM/RU about Traffic Management Decisions<br>• Measures (predefined) or objective/goal to achieve |
| Process activities | • Determine if conflicts require measures<br>• Determine the measure to take (manually or automatically)<br>• Determine if RU needs to be involved / exceed arrangements IM/RU<br>• Determine to execute measure<br>• Execute measure<br><br>Note: in the contingency planning, agreements were made between IM and RU about how to handle conflicts and to what range/impact the IM / Traffic Management can decide. Speed of action is of importance, therefor no time should be lost in IM/RU coordination. |
| Outputs and postconditions | • (Changed) Operational plans |

**[**SPT3TMS-9994 **]**

In the ETMN handbook, for 3 types of coordinated actions (1. handle single trains not running on schedule, 2 ad-hoc traffic management for incidents and obstructions, 3. Manage conflict prone trains) the steps are described further.

### 5.9.1 Coordinated Actions Between Infrastructure Managers (ETMN)

| Property name | Property Description |
|---|---|
| Overall | Coordinated actions are all actions that actually *are* traffic management. Depending on the traffic situation, IM may implement the actions within |

| | |
|---|---|
| | their own organisation as long as they lead to a common concerted procedure with affected IM. Implementation could be coordinated along an RFC.<br>Situations can be differentiated concerning<br>- regular and irregular traffic and<br>- single trains versus multiple trains affected on the route<br>- and combinations of the above.<br>There are different types of actions that can be triggered depending on the circumstances. This will also depend on the case and if e.g., other incidents influence the situation.<br>The following actions are not exclusive; they are options to ensure better border-oriented traffic management. |
| **Coordinated action 1** | **Handle single trains not running on schedule** |
| Aim of the sub-process | Improved handover of a single train at borders by early coordination |
| Glossary | Sending IM: The IM that sends an international train towards a border outside its traffic cell.<br>Receiving IM: The IM that takes over a train from another IM.<br>Third IM: the IM after the receiving IM (“over the cell”) |
| Stakeholders involved | • Infrastructure Managers<br>• Railway Undertakings |
| Inputs and preconditions | • Overview of running trains, specifically Estimated Time of Handover (ETH).<br>• Active dissemination of ETH from sending IM |
| Applicability | The process is activated if the sending IM sends an altered ETH.<br>The receiving IM decides if the process will continue due to the receiving IM not being able to accept the new ETH. |
| Process activities | 1. Receiving IM: Checks ETH for incoming trains at the border.<br>2. Receiving IM: If ETH for a single train is not suitable, i.e., the train cannot be handled smoothly without any significant problems, continue to step 3. If ETH is accepted, no further action is needed, and the process is terminated.<br>3. Receiving IM: Determine the suitable time of handover (specific time or preferably interval). Request this time/interval for handover from sending IM by *the common communication platform*.<br>4. Sending IM: Check if the request from receiving IM can be fulfilled.<br>a. If yes, go to step 5.<br>b. If no, go to step 6.<br>5. Send new ETH to receiving IM. Then go to step 7.<br>6. Notify receiving IM that the request cannot be fulfilled. This may depend on e.g., lack of parking options or other capacity-related or train running reasons.<br>7. Sending IM: Make the best effort to keep the indicated ETH (original or new). Update ETH if needed.<br>Receiving IM: Plan for taking over the train at ETH (original or new).<br>8. The process is terminated after this. It may be restarted if sending IM updates ETH without a request from receiving IM. |
| Communication | |

| | |
|---|---|
| | IM exchange on the actual trains and agree if a new ETH can be agreed on or has to be denied. After a transition period, this should be done in a harmonised way via the *common communication platform*. |
| **Coordinated action 2** | **Ad-hoc traffic management for incidents and obstructions** |
| Aim of sub-process | Improved international coordination of incidents with consequences below ICM case and ICM cases. |
| Applicability | The process is recommended if one IM is affected by an incident or obstruction - call for action. |
| Inputs and preconditions | From process “Monitor operational status and preconditions”: Obstructions and incidents which need operational action. This means that someone has discovered a condition that needs to be handled internationally between IM and that concerned IM should be informed about the situation, forwarding this information to concerned IM.<br><br>From process “Determine future risks”: Agreed plan to handle risks. If IM have agreed on actions for risk management prior to the operational day, this also needs to be considered at the operational stage. |
| Process activities | 1. Determine impact from deviation from plan. Each IM investigates the foreseen impacts from the deviation.<br>2. Continued actions depend on the type of deviation<br>a. ICM case<br>i. Incidents/ obstruction affects traffic cells on other IM’s networks<br>ii. Expected that it will last at least 3 days<br>iii. At least 50% of international freight trains are affected<br>b. Disruption that needs to be managed together between IM, but not ICM case.<br>i. If one IM requests coordination (because of a direct incident or cascading impact)<br>ii. Incidents/ obstruction affects traffic cells on other IM’s networks<br>iii. Expected that it will last at least 6 hours<br>iv. At least 10 international trains are affected<br>c. One IM has limitations in receiving trains due to temporary limited capacity on its network. |
| Coordination in case of ICM case (case 2a) | Act according to the ICM handbook. This is not further described here. Please see the handbook*: RNE European Rail Infrastructure Managers Handbook for International Contingency Management* |

| | |
|---|---|
| Coordination in case of disruption but not ICM case (Case 2b) | In case of any type of disruption but not ICM case:<br>1. *Any concerned* IM should initiate coordination. In most cases, this will be done by inviting other affected IM to a conference call or the common communication platform in the English language or using available language tools.<br>2. Coordinate actions:<br>a. Instigating IM provides information in a structured way in IMT+ on e.g., the general implication of disturbance, impacted capacity/ reduced number of trains (link to agenda template).<br>b. Leading IM provides proposals for overall handling of the incident (e.g., priorities of trains, parking of trains, re-routing).<br>c. The affected IM evaluate the impact on neighbouring IM and coordinate themselves further if needed<br>3. Coordination between IM requires coordination by individual IM on a national level with RUs. After that, it may require repetitive meetings or other means of coordination with affected IM.<br>4. Each IM manages trains on their own network according to the agreed and coordinated plan<br>5. The process is repeated when one IM sees the need for it, e.g., when conditions change.<br>When the disruption is solved, each IM goes back to normal operations. |
| Automated coordination in case of limitations in receiving trains (Case 2c) | In the case of a specific disruption (but not ICM case) such as when an IM experiences limitations in receiving trains<br>1. IM with temporarily reduced capacity, “receiving IM”, records the incident in IMT+.<br>2. The receiving IM chooses if they would like to specify the ability to receive trains “train by train” or indicate the capacity in “trains per hour”.<br>*Train by train*<br>3. TIS IMT presents affected trains. The receiving IM decides which of these trains need to be parked on the sending IM’s network and records this in TIS IMT. This information is distributed through TIS to the sending IM. Then go to step vii.<br>*Trains per hour*<br>4. The receiving IM must indicate the number of trains they can receive per hour. The indication can be divided into train types, e.g., X freight trains and Y commuter trains.<br>5. The receiving IM must indicate the timeframe in which the limitation in step iv is valid.<br>6. The receiving IM may indicate a different capacity to receive trains in different timeframes. If so, steps iv and v are repeated. |
| Handling after coordination: Common process continued | 1. If the sending IM can fulfil the requested train handling according to one of the procedures mentioned above, no further action than managing trains according to the request is needed.<br>2. If the sending IM cannot fulfil the request from the receiving IM, they |

| | |
|---|---|
| | should make personal contact with the receiving IM and agree on the best mutual train management. |
| **Coordinated action 3** | **Manage conflict-prone trains** |
| Aim of sub-process | Keep international trains running fluently approaching a TCR/bottleneck. |
| Applicability | The process is recommended if one IM sees the need for it. This is the case if either train with TT close to the time of a track closure/TCR or trains with real running time close to the time of track closure/TCR. Then a foresighted coordination shall be initiated. |
| Input | • IM's own plan of TCR, Train Timetable<br>• Train run Information and ETH. |
| Process activities | In case of planned TCR/track closure, the receiving IM checks internally in advance if it has trains that need to enter its network strictly on time to pass the location of TCR before the TCR/track closure starts.<br>The receiving IM sends information to IM upstream in the train run with reference to the international train number/TrainID and date(s).<br>The reason for sending the information "upstream" in the train run is that trains may require special attention to be kept on schedule or managed in a way on several IM networks passing the TCR before it starts.<br>IM upstream shall do their best to keep these conflict-prone trains on schedule.<br><br>If conflict-prone trains have become delayed, these measures should be taken:<br>• Information should be sent to IM downstream along the train run<br>• IM between the current location of the train and the receiving IM should make an effort to let the trains catch up, if possible.<br>• The receiving IM prepares for other measures regarding affected trains, e.g., parking or re-routing. |

**[**SPT3TMS-9992 **]**



### 5.10 Log Cause of Deviations and Delays

**Log cause of deviations and delays**
Associate a deviation reason for post-execution analysis. **[**SPT3TMS-10013 **]**

| Property name | Property description |
|---|---|
| Goal | When deviations occur, the (root) cause must be registered. This is for later reporting, accountability, performance analysis and billing. |
| Supporting CBO's | CBO001 (Analytical information); CBO007 (Automation of Systems); |
| Trigger | A deviation from operational plan (above a certain threshold) |
| Stakeholders involved | IM / Traffic manager |
| Inputs and preconditions | • Operational plans<br>• Deviation above agreed threshold (eg 3 min).<br>• Predefined list of causes / categories |
| Process activities | Enter a cause for each deviation (select out of predefined causes/ category). If possible, an automatic assignment of cause for the secondary delays, caused by root cause. Or even automatic assignment of root cause. |
| Outputs and postconditions | Completed deviation registration. |

[SPT3TMS-9990 ]

# 6 Operational Processes for Information Exchange

Information exchange is already part of capacity planning and capacity production processes but this chapter emphasises this aspect by describing several processes dealing with exchanging information between IM or with domains outside the Capacity Planning and Capacity Production. The description of the input, activities and output follows therefore the structure of: 'new or changed information?' (input), share it (activity), information is shared (output). Acting upon shared information is part of described capacity planning and capacity production processes here above.

In the ETMN handbook several processes are describing what elements are to be added for the coordination aspects, like what information should be exchanged and how and with what system. There is a close but not an excact one on one match with the operational processes described here and the ETMN processes. Therefore, and for recognisability of ETMN parts, the ETMN processes are taken over and placed as a sub-process with the most matching operational process. An improvement to this chapter could be made by subdividing into capacity planning and capacity production processes. Then completeness should be checked, now e.g., 'Exchange of TCR information' and 'Data exchange for feeding passenger information services' is missing. ETMN processes, should be then distributed over information exchange- and capacity production processes. This improvement however should go along with a next version of the system concept/definition. To get a consistent and coherent view on processes and IT systems architecture (and on automated and digital information exchange).

## 6.1 Exchange Operational Plan with other IM

**Exchange operational plan with other IM**
Get/provide current operational plan data from/to other IM in other Area of Control (this concerns timetables, TCR states, Estimated Time of Handover (ETH), etcetera).
**[**SPT3TMS-10012 **]**

| Property name | Property description |
|---|---|
| Goal | The goal is to share all relevant operational plan information. So that (cross border) conflicts can be detected and/or measures can be taken. This can be done by contacting an IM or system exchange with other IM or using a centralised place/tool to share information. |
| Supporting CBO's | CBO007 (Automation of Systems); |
| Trigger | New operational plan or changes in operation plans |
| Stakeholders involved | • Infrastructure Managers<br>• Railway Undertakings |
| Inputs and preconditions | A new/change in Operational plan (all kinds) is made |
| Process activities | Sharing information |
| Outputs and postconditions | A new or a modified Operational plan is exchanges. |

**[**SPT3TMS-9988 **]**

In the ETMN Handbook Chapter 10 this is described in several processes which are included here below. Also from 6.2 and 6.3, which handle exchange of information with other TMS or centralised IT systems, a reference to these processes will be made.

### 6.1.1 Providing Current Operational Information to Other IM (ETMN)

| Property name | Property Description |
|---|---|
| Goal | To increase transparency about the current train runs and status of the single networks inside the whole virtual network to be able to take coordinated actions. |
| Supporting CBO's | CBO001 (Analytical Information for Passenger Flow/Incidents), CBO007 (Completeness of Planning and Live Update), CBO008 (Comprehensive Incident |

| | |
|---|---|
| | Management), CBO009 (Continuous Supervision), CBO018 (Rapid Deviation Information/Solution), CBO026 (Standardised Architecture) |
| Trigger | No trigger, constant information flow and exchange between IM |
| Stakeholders involved | • Infrastructure Managers<br>• Railway Undertakings |
| Inputs and preconditions | Each IM oversees providing operational information in an automated and standardised way according to TAF/TAP TSI and valid RNE TM – related guidelines. Operational information is made available to all IM either via RNE's IT application TIS or via standardised interfaces between IM. |
| Source of information | The information that is exchanged is based on input from IM domestic systems and facilitates the connected stakeholders to obtain the required train-related information and to gain an initial understanding of situations that deviate from the plan. Each IM must use its information on:<br>• Train related information on own network<br>• Status of infrastructure including remaining capacity and other circumstances on own network<br>It must be ensured that the information is as real-time/timely and reliable as possible. |
| Process activities | Providing Information<br>• Each IM should automatically transfer TAF/TAP TSI compliant (or TIS accepted) format train timetable information and train running information for all agreed trains to TIS and where applicable to agreed IT application of neighbouring IM<br>• IM provide train forecast information to the neighbours and to TIS (at least ETH for all borders). Other train running forecast information are recommended to be exchanged.<br>• Additionally, to automated data transfer, it is considered most beneficial to implement a process of regular exchange between dispatchers digitally or verbally to exercise regular personal contact. The content of the exchange is described in the Improved cooperation process.<br>• Each IM is recommended to implement a procedure to secure that all internationally relevant information about the network status in terms of duration, location and impact of obstructions, incidents and ongoing TCR. It is made available via an additional functionality of TIS [named IMT+]. This information can be sent in XML "TAF/TAP similar" format or entered manually in TIS.<br>• Incidents / obstructions that meet the following criteria should be provided to IMT+ which triggers an automatic notification to concerned IM<br>◦ Incidents/obstructions affecting traffic cells on other IM's networks<br>◦ Expected that it will last at least 6 hours<br>◦ At least 10 international trains are affected<br>◦ As soon as you have to apply restrictions on received trains<br>IM may agree that this information should be shared also for incidents and obstructions with lower thresholds. |
| Outputs and postconditions | Advantages/added value: allows to inform and be informed about being internationally aligned on the cross-border traffic management (notified of such as TCR, expected obstructions, etc.). |
| Attachments | ETMN Handbook RNE |

**[**SPT3TMS-9999 **]**

### 6.1.2 Providing Information on Expected Conditions: Risks and Future Preconditions to Other IM (ETMN)

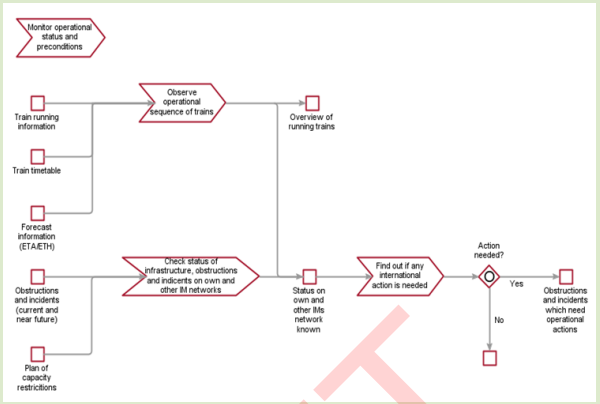
| Property name | Property Description |
|---|---|
| Goal | To ensure internationally foresighted traffic management by being aware of risks and future conditions and regularly updating each other on these topics and potentially upcoming developments that might influence cross-border traffic. |
| Supporting CBO's | CBO001 (Analytical Information for Passenger Flow/Incidents), CBO008 (Comprehensive Incident Management), CBO009 (Continuous Supervision), CBO018 (Rapid Deviation Information/Solution) |
| Trigger | Upon receiving information of a possible future obstruction or any other sort of pre-condition |
| Stakeholders involved | -Infrastructure Managers<br>-Railway Undertakings |
| Inputs and preconditions | Each IM is highly recommended to provide information on upcoming conditions that may restrict capacity for international trains or affect international train runs (e.g., inclement weather conditions, expected strikes) to their neighbouring IM and virtual network |
| Source of information | Each IM takes into account:<br>• their plan of TCR on their network (to the degree the TM wishes)<br>• the TCR tool indicating internationally coordinated TCR and information on TCR provided internally<br>• an estimate of upcoming risks that may affect cross-border traffic e.g., due to weather conditions or strikes |
| Process activities | **Information about TCR**<br>Each IM should actively share details about the TCR affecting international trains via *IMT+* based on the following requirements:<br>• Information about TCR that may evolve as a risk if trains are likely to deviate from their timetable, expected to cause train delays exceeding a certain time (commonly agreed with a neighbouring IM, delay time for each shared track line may vary depending on the congestion of a particular line). This applies both to early planned TCR (e.g., reduction to single track, close of important track of stations), where the timetable has been adapted and later TCR.<br>• TCR that have not been processed into a new timetable.<br>• All changes of TCR affecting capacity including duration.<br>Additionally, information about TCR status can be a frequent topic in regular meetings between TCC/IM at least once a week. The actual procedure should be agreed upon in bilateral agreements.<br>**Information about events potentially affecting train operations**<br>TCCs are recommended to actively inform their neighbours and European network about other events or circumstances *potentially* affecting train operations in the upcoming days or weeks (e.g., weather effects, strikes). An indication of such an event is that one expects:<br>• to apply restrictions on the handover of inbound and outbound trains<br>• effects on the international train run on its own and networks outside the national one<br>• if that event occurs – the consequences |

| | |
|---|---|
| | ▪ Affect network outside the national one and traffic cells on a directly neighbouring IM's network<br>▪ Affect traffic cells further than the directly neighbouring network<br>▪ lasts at least 6 hours<br>▪ more than 10 cross-order trains are affected<br>• The actual effects of an event are handled by sharing information in the process step above (providing current operational information to other IMs)<br>This information can be sent in XML format or entered manually in TIS. |
| Outputs and postconditions | Advantages/added value: allows to inform and be informed about being internationally aligned on cross-border traffic management (notified of such as TCR, expected obstructions, etc.). |
| Attachments | ETMN Handbook |

[SPT3TMS-9997 ]

### 6.1.3 Monitoring of International Train Runs (ETMN)

| Property name | Property Description |
|---|---|
| Goal | • Create awareness of conditions on other IM networks that will affect "my" networ<br>• Understand situations that require coordinated actions with other IM and thus trigger the sub-process "Ad-hoc traffic management for incidents and obstruction<br>• Get an overview of running trains coming from other IM networks and potentially trigger the sub-process "Handle single trains not running on schedule" |
| Supporting CBO's | CBO001 (Analytical Information for Passenger Flow/Incidents), CBO008 (Comprehensive Incident Management), CBO009 (Continuous Supervision), CBO018 (Rapid Deviation Information/Solution) |
| Trigger | - |
| Stakeholders involved | -Infrastructure Managers<br>-Railway Undertakings |
| Inputs and preconditions | The input to the process comes from the previous process steps where IM provide both current operational information to other IM. The information consists of these main parts:<br>- Train timetables<br>- Train running information<br>- Forecast information (ETA/ETH)<br>- Current and upcoming obstructions and incidents (within 24 hours)<br>- Planned TCR<br>- Capacity status on other IM networks |
| Process activities | Dispatchers in each IM are recommended to perform the following actions regarding trains from other IM and their networks. Focus should be on neighbouring IM but, depending on the network, traffic and geography, a further outlook may be needed.<br>1. Observe operational sequence of trains. This process step enables dispatchers to see both single delayed trains and larger irregularities in the incoming traffic. This may lead to adaptations in the IM own plan to manage trains coming from other IM as well as create a first alert about larger problems. |

| | |
|---|---|
| | 2. Check current status of the infrastructure regarding current unplanned obstructions and incidents as well as planned TCR. This enables both a better understanding of the current traffic situation and the effect it will have on the own network and serve as an input to determine if any further actions are needed.<br>3. Find out if any international actions are needed. Each IM affected by disruption with international impact must consider if any internationally coordinated action is needed. If so, it will trigger the process of an “Ad-hoc traffic management for incidents and obstructions”. |
| Process Map |  |
| Attachments | ETMN Handbook |

[SPT3TMS-9996 ]

## 6.2 Exchange (near) Real-time Data With Other TMS

**Exchange (near) real-time data with other TMS**
Get/provide current, train running information, forecast information, incidents, etcetera. [SPT3TMS-10011 ]

| Property name | Property description |
|---|---|
| Goal | The goal here is to share more information than the operational plan and more specific than described in 6.1. The exchange is from one national Traffic Management System (TMS) to another. And it not only concerns current operational plans but also messages (TSI TAF/TAP) about train running information (TRI), Train running forecast (TRF), Train Running Interruption message (TRIM), … |
| Supporting CBO’s | CBO007 (Automation of Systems); |
| Trigger | New/ changes in operational plan or in forecast |
| Stakeholders involved | |
| Inputs and preconditions | New / change in operational plan or in forecast |
| Process activities | Send / Publish change using TSI TAF/TAP message |
| Outputs and postconditions | Message is sent and received |

[SPT3TMS-9995 ]

Note that this is also covered in the ETMN 6.1.1, 6.1.2, 6.1.3 processes.

## 6.3 Exchange (near) Real-time Data With a Centralised System on European level

**Exchange (near) real-time data with a centralised system on european level**
This process contributes to the overall picture of the European network status about the general impact of the national infrastructure on international train runs.
[SPT3TMS-10010 ]

| Property name | Property description |
|---|---|
| Goal | The goal is constantly updating the expected forecast for an international train run. Primarily to exchange information about handover points based on planning and operations. And to use common IT tool as a primary option in cross border traffic management for information exchange and communication purposes. (In addition to the information displayed in the IM's traffic management tools and obtained through TAF/TAP obligatory data exchange) |
| Supporting CBO's | CBO007 (Automation of Systems); |
| Trigger | Continuously (when changes in plan or forecast or passing reference points) |
| Stakeholders involved | IM: Traffic manager |
| Inputs and preconditions | Changes in the national network status<br>Reference points<br>Use of TSI TAF/TAP messages |
| Process activities | Share changes through TSI TAF/TAP messages (fully automated from National IT tools)<br>Use common tool for information for handovers. |
| Outputs and postconditions | Shared information and thereby an overall picture on the European network status. |

**[**SPT3TMS-10000 **]**

Note that this is also covered in the ETMN 6.1.1, 6.1.2, 6.1.3 processes.

### 6.4 Exchange Information Between National Traffic Control Centres

**Exchange information betwen national traffic control centres**
Definition of a common cooperation and communication platform for national TCCs. This exchange process is included to feed this platform, however the function of this platform should become more specific to place the use of it in the IM operational processes. **[**SPT3TMS-10017 **]**

| Property name | Property description |
|---|---|
| Goal | NTCCs communicate about risks, disruptions, traffic and operational state and act. Common procedures and a common language are required (and/or translation tools). This differs from the information exchange between national TMS or Centralised tools for specific purposes (like capacity strategies or models or TCR).<br><br>The goal is to offer an easily accessible communication platform for IM to make the cooperation more effective (by also sharing learning, cooperating on developments) and to integrate dispatchers into a common network.<br><br>These goals should be split for process description. A tool is not a goal. |
| Supporting CBO's | CBO007 (Automation of Systems); |
| Trigger | New information |
| Stakeholders involved | IM |
| Inputs and preconditions | New information |
| Process activities | Share it |
| Outputs and postconditions | Information shared |

The 'Improving cooperation' process (ETMN) placed in 6.4.1. also provides reasons for a common platform.
**[**SPT3TMS-9965 **]**

#### 6.4.1 Improving Cooperation (ETMN)

| Property name | Property Description |
|---|---|
| Goal | Improve cooperation between TCC to ensure an uninterrupted flow of information in regular as well as disrupted traffic situations. |
| Prerequisites | • Active participation of all involved subjects<br>• Mutual understanding of language and content of the communication<br>• Cooperating parties must be involved in permanent information exchange triggered by relevant events<br>• Regular socialisation – team-building activities<br>• Availability of permanent and irregular data, information and knowledge exchange<br>• All data and information must be coherent, complete, and relevant<br>• Established a technical platform for communication and cooperation<br>• Two main process flows of information exchange are applied to improve cooperation<br>◦ Data exchange<br>◦ Verbal exchange<br>• Data and communication channels are created between the subjects for<br>◦ Data exchange – TIS using XML message exchange (TAF/TAP TSI and agreed formats)<br>◦ Verbal or written exchange – new common conference platform (e.g., MS Teams) |
| Process activities | Better cooperation is achieved primarily through the improved possibilities of a direct exchange within the virtual network.<br>TCCs exchange information verbally on the processes they are responsible for<br>a. On a regular basis - more often than once a week preferably with neighbouring NTCCs to exchange on topics like current traffic situation and possible risks.<br><br>b. Irregularly with over-neighbouring NTCCs to<br>i. Get more detailed information about the partner network status<br>ii. Ask to park/cancel/send trains differently from the timetable<br>iii. Coordinate contingencies<br><br>c. Heads of NTCCs meet twice a year in group meetings organised by RNE:<br>i. To inform each other about the structure, working procedures, strategies and goals<br>ii. To coordinate mutually on the European level<br>iii. To discuss the expected European network status<br>iv. To evaluate the agreed performance figures of the European network<br>v. To define and test new procedures for improving European network efficiency<br>vi. Harmonise TCC procedures on a European level<br>vii. Create and maintain necessary guidelines<br>viii. Prepare TCC teambuilding |
| Communication | To establish and maintain cooperation, infrastructure managers are encouraged to ensure not only digital communication e.g., via the communication platform, but arrange meetings in person to reduce barriers of communication. |

[SPT3TMS-9963 ]

### 6.5 Receive Operating State from Safety Logic

**Receive operating state from safety logic**
Get all information regarding field elements, track occupations, TCR, etc. form underlying safety logic systems. **[**SPT3TMS-10016 **]**

| Property name | Property description |
|---|---|
| Goal | Via the envisaged interface SCI-OP, TMS shall be provided with details on infrastructure operating state. This entails regular updates of track occupations, but also information about field element states including any deviations from the planned characteristics and failures. |
| Supporting CBO's | CBO007 (Automation of Systems); CBO021, CBO012, CBO013, CBO014 |
| Trigger | Numerous upstream message types of the interface SCI-OP as part of the operating state |
| Stakeholders involved | Safety logic, IM |
| Inputs and preconditions | Each single upstream message |
| Process activities | The process ensures the proper information flow via the interface. |
| Outputs and postconditions | Acknowledgements of message reception where required. Otherwise, none. |

**[**SPT3TMS-9973 **]**

### 6.6 Receive Operating State from RU and ATO

**Receive operating state from RU and ATO**
Get all dynamic train run information from RU systems and/or ATO. **[**SPT3TMS-10015 **]**

| Property name | Property description |
|---|---|
| Goal | Via the envisaged interface SCI-OP, TMS shall be provided with details on the progress of the train run. This entails regular updates of the train position (from ETCS through SCI-OP), but also information about train characteristics including any deviations from the planned characteristics. |
| Supporting CBO's | CBO003, CBO007 (Automation of Systems); CBO021, CBO012, CBO014 |
| Trigger | Numerous upstream message types of the interface SCI-OP as part of the operating state |
| Stakeholders involved | RU, IM, ATO |
| Inputs and preconditions | Each single upstream message |
| Process activities | The process ensures the proper information flow via the interface. |
| Outputs and postconditions | Acknowledgements of message reception where required. Otherwise, none. |

**[**SPT3TMS-9971 **]**

### 6.7 Exchange Information with Crowd Management

**Exchange information with crowd management**
Get updates on passenger exchange times on platforms to adapt Operational Plans. **[**SPT3TMS-10014 **]**

| Property name | Property description |
|---|---|
| Goal | For planning and for dispatch measures (and to keep connecting services), information about passenger exchange time is needed.<br><br>Also (real-time) platform occupation information can be relevant input for capacity production / traffic management decision (to crowded and therefor too dangerous to disembark or skip stops). |
| Supporting CBO's | CBO007 (Automation of Systems); |
| Trigger | Changes in passenger exchange time, platform occupation information |
| Stakeholders involved | • IM: traffic manager<br>• RU: Operations |
| Inputs and preconditions | Changes in passenger exchange time, platform occupation information |
| Process activities | • Determine if received information requires changes to capacity or operational plans |
| Outputs and postconditions | Changed capacity plans or operational plans. |

**[**SPT3TMS-9969 **]**

### 6.8 Exchange Information with Incident Management

**Exchange information with incident management**

- Receive duration forecasts of incidents (via respective TCR)
- Handover of trains to/from TMS à incident management
- Support processes that incident management can initiate in TMS

**[**SPT3TMS-10018 **]**

| Property name | Property description |
|---|---|
| Goal | The traffic management / disruption management handles the incident impact management. Being the impact on the train services. Therefor information about infrastructure-availability (current status and forecast) is needed. |
| Supporting CBO's | CBO007 (Automation of Systems); |
| Trigger | The infrastructure availability (for whatever reason) changes and/or a new prognosis about it is available. |
| Stakeholders involved | • IM: Traffic Manager<br>• IM: Incident Management |
| Inputs and preconditions | • Message which Infrastructure has become (unplanned) unavailable for traffic use.<br>• A prognosis about duration / time of return to available for traffic |
| Process activities | • When infrastructure becomes unplanned unavailable an impact estimation to the train services has to be made. This is part of the disruption management process.<br>• When a prognosis of duration / time to return is received, measures are continued, or start-up plan are prepared for execution. This is also part of the disruption management process. |
| Outputs and postconditions | • Information about infrastructure availability is shared.<br>• Information about prognosis / return is shared. |

[SPT3TMS-9967 ]

# 7 Operational Processes for Post Execution Analysis

## 7.1 Capacity Utilisation Analysis

Calculation of specific KPI determining the capacity utilisation on the network. **[**SPT3TMS-10059 **]**

## 7.2 Train Performance Analysis

The performance analysis is out of scope task 3, but the data needs to be collected. **[**SPT3TMS-10065 **]**

# 8 Common Business Objectives

The Business Objectives are derived from the identified impacts of the EU-Rail Master Plan and are based on the importance of delivering an overall system view. Business objectives in this document were copied from the original document, sorted in alphabetical order and coded with CBO(xxx) to ease referring to them in other chapters and documents and link them to the achieved Common Business Objectives (CBOs). The original CBOs are here: T1_Common_Business_Objectives **[**SPT3TMS-10060 **]**

The relevant CBOs are:

analytical information for passenger flow/incidents(1) -> CBO001

analytical information for passenger flow/incidents(2) -> CBO002

ATO(1) -> CBO003

ATO(2), automated shunting -> CBO004

attractive labour -> CBO005

availability, robustness, reliability -> CBO006

automate operators knowledge management -> CBO007

changeability -> CBO008

changeability and upgradeability(1) -> CBO009

changeability and upgradeability(2) -> CBO010

changeability and upgradeability(3), simplified integration -> CBO011

completeness of planning and live update -> CBO012

comprehensive incident management -> CBO013

continuous supervision -> CBO014

deep/optimized plan -> CBO015

efficient energy use(1) -> CBO016

efficient energy use(2) -> CBO017

efficient migration based on adaptable systems -> CBO018

flexible use of infrastructure capacity -> CBO019

implement a full system optIMation approach for better capacity -> CBO020

increase capacity -> CBO021

multi-modal mobility(1) -> CBO022

multi-modal connections(2) -> CBO023

new technologies, harmonized processes -> CBO024

noninvasive/noticeable cyber security -> CBO025

optimize timetables -> CBO026

rapid deviation information/solution -> CBO027

rapid response to capacity request -> CBO028

rapid return of experience -> CBO029

reduce human elements and factors -> CBO030

reduce noise, reduce vibration, reduce carbon emissions -> CBO031

smart/assisted incidence handling -> CBO032

standard know how -> CBO033

standardized architecture(1) -> CBO034

standardized architecture(2) -> CBO035

suitable cyber-security levels -> CBO036

system robustness and robustness against weather -> CBO037

systems: extensible capacity, scalability(1) -> CBO038

systems: extensible capacity, scalability(2) -> CBO039

tools support new services -> CBO040

validated system performance, robust PRAMSS framework -> CBO041

viable forward/backward compatibility -> CBO042

viable migration path -> CBO043

# 9 Outlook on further Work on Operational Processes

This document focusses on the identification and description of operational processes for the CMS and TMS domain of individual IM/ABs in a European/international context. This embraces the elaboration of the bare business objectives, definitions of stakeholders (human actors, system actors), and the identification and description of stakeholder needs. As a result, the operational processes for the domain have been harmonised. **[**SPT3TMS-10055 **]**

The work done, however, does not comprise a holistic operational analysis. This next level of detailed work is to be elaborated as the next step (see Deliverable D2.4 for SC5 Task 2 (Harmonisation of Operational Processes (HOP)) of the S2R.18.OP.02). The division into recent and future tasks is described in detail in the following overview:

| **Operational analysis is contemplated in 3 sub-groups** | |
|---|---|
| **2023** | Concept/preparatory: SPPR-3581 - Derive Stakeholder needs and problems<br><br>The purpose of this sub-group is to reach quickly and reliably a consent about the processes to be specified, incl. automation, if necessary, by System Pillar. |
| **2024 (subject to remit details)** | Detailed/Modelling work: SPPR-3582 - Operational Design<br><br>This process group consists in the detailed work of System Pillar's operational analysis: precise, modelled, qualified definition of harmonized processes. |
| | Post-processing: SPPR-3585 - Publish, migrate, and implement operational processes<br><br>This sub-group of processes support public releasing of operational analysis deliveries. |

Source: SEMP V2 document section 5.2.2 Perform Operational Analysis **[**SPT3TMS-10052 **]**

In a possible later operational analysis (depending on further remits and necessity for the Task 3 work), the works will be carried out furthermore according to the SEMP, as it is defined for the holistically for the System Pillar. **[**SPT3TMS-10050 **]**

Besides the detailing of the already identified operational processes, the future work will also contain the extension on and analysis of additional processes and their details. In particular, the following tasks are envisaged:

- Further detailing of existing process descriptions and/or split into subprocesses, where necessary
- Integration of processes for planning in yards and terminals (currently outside CMS & TMS scope)
- Analysis of impacts induced by the further work on the European framework for capacity management and traffic management by ENIM and/or RNE (and/or the to be appointed Network Coordinator) and their impacts on the operational processes.
- Further detailing of the cross-IM processes to further accelerate the planning and execution of cross-border rail transports.

**[**SPT3TMS-10061 **]**