ERJU SYSTEM PILLAR

ETCS L2 Rulebook

ETCS L2 Rulebook

Author(s)	Renato Rodrigues , IOVINO, Salvatore , Pérez Gómez-Tostón, Lidia , Schouwerwou, Piet , Stefan Christian Rosengren , Werner Ried , Jens Leuteritz , LITZEN Bjorn , BAGLIVO Stefano , SCHULER Karin-Monika , Bartholomeus, M.G.P. (Maarten) , Martens, E. (Emile) , Álvarez Sánchez, Virginia , Sebastian Post , Fabio Fabrizi , Grob Roger (I-NAT-GST-CCS-EXT - Extern)

Abstract	This document outlines the ETCS L2 Rulebook with a specific focus on translating the operational requirements into concrete operational processes.

Config Item	Harmonised Operational Concept
Document ID	ORS Traffic CS and OD overall/ETCS L2 Rulebook#725941 ETCS L2 Rulebook
Classification	Public
Status	In Review by System Pillar
Version	0.3
Revision	725941
Last Change Date	05.10.2025

Copyright	Brussels: Europe’s Rail Joint Undertaking, 2025

© Europe’s Rail Joint Undertaking, 2025

This document is drafted by and belongs to EU Rail.

EU Rail encourages the distribution and re-use of this document, the technical specifications and the information it contains. EU Rail holds several intellectual property rights, such as copyright and trade mark rights, which need to be considered when this document is used.

EU Rail authorises you to re-publish, re-use, copy and store this document without changing it, provided that you indicate its source and include the following: EU Rail trade mark, title of the document, year of publication, version of document.

EU Rail makes no representation or warranty as to the accuracy or completeness of the information contained within these documents. EU Rail shall have no liability to any party as a result of the use of the information contained herein. EU Rail will have no liability whatsoever for any indirect or consequential loss or damage, and any such liability is expressly excluded.

You may study, research, implement, adapt, improve and otherwise use the information, the content and the models in the this document for your own purposes. If you decide to publish or disclose any adapted, modified or improved version of this document, any amended implementation or derivative work, then you must indicate that you have modified this document, with a reference to the document name and the terms of use of this document. You may not use EU Rail’s trade marks or name in any way that may state or suggest, directly or indirectly, that EU Rail is the author of your adaptations.

EU Rail cannot be held responsible for your product, even if you have used this document and its content. It is your responsibility to verify the quality, completeness and the accuracy of the information you use, for your own purposes.

This work is currently a work in progress. The content presented is subject to change as it undergoes further review, refinement, and development. Please do not consider this version as final or authoritative.

DRAFT

INFO: History table is not displayed, because this document is in status **doc_contentApproval**.
RULE: History table is not displayed, in statuses: { draft doc_open doc_inprogress doc_contentApproval doc_contentDecision }
CONTACT: For more information contact Administrator

Approval by reviewers
(captured at end of 'In Review by System Pillar')

Type of Approval	Document Review

Approval by approvers
(captured at end of 'In Approval by System Pillar')

Type of Approval	Document Approval

DRAFT

1 Preamble 8
1.1 Purpose 8
1.2 Intended Audience 8
1.3 Document Context 8
1.4 Glossary 10
1.4.1 Terms 10
1.4.2 Abbreviations 15
2 Baseline Planning and Design Constraints 17
2.1 Baseline Planing 17
2.2 Design Contraints 18
3 Referenced content of TSI OPE 20
3.1 TSI OPE - Appendix A 20
3.2 TSI OPE - Appendix B 21
3.2.1 Fundamental operational principles 21
3.2.2 Common Operational rules 21
3.3 TSI OPE - Appendixes C-J 21
4 Design Principles for Operational Harmonisation 23
4.1 List of SP Operational Design principles 24
4.1.1 Principle 1: Railway operation is planned 24
4.1.2 Principle 2: infrastructure is prepared for use 24
4.1.3 Principle 3: The user receives clear authorisation for use 26
4.1.4 Principle 4: Infrastructure is properly used as planned 27
4.1.5 Principle 5: The signaller decides on operational use in an area 29
4.1.6 Principle 6: System-user interaction is standardised 29
4.1.7 Principle 7: Procedures are fit for use 30
4.1.8 Principle 8: Technical systems perform safety relevant actions 32
4.1.9 Principle 9: Operational staff receives relevant information 33
4.1.10 Principle 10: New technology supports existing operation 34
5 Technical configurations (Feature set) 35
6 Operational actors (and skills), and entities 36
6.1 Actors 36
6.2 Entities 36
7 Operational Vision Breakdown Alignment 37
8 Subtopics addressed 38
9 Operational Processes 40
9.1 Next operational step unknown 40
9.1.1 Operational Activities involved in Operational Process 42
9.1.2 Operational Requirements implemented by Operational Process 42
9.2 Observation while driving 42
9.2.1 Operational Activities involved in Operational Process 44
9.2.2 Operational Requirements implemented by Operational Process 44
9.3 Resume driving after stopping short of scheduled stopping location 44
9.3.1 Operational Activities involved in Operational Process: 45

DRAFT

9.3.2 Operational Requirements implemented by Operational Process 46
9.4 Train departure / SoM departure 46
9.4.1 Train departure / SoM general overview (train preparation) 46
9.4.1.1 Operational Activities involved in Operational Process: 47
9.4.1.2 Operational Requirements implemented by Operational Process 48
9.4.2 Train departure / SoM with manual operation 48
9.4.2.1 Operational Activities involved in Operational Process: 48
9.4.2.2 Operational Requirements implemented by Operational Process 49
9.4.3 Train departure / SoM after pressing start, with text messages 49
9.4.3.1 Operational Activities involved in Operational Process: 50
9.4.3.2 Operational Requirements implemented by Operational Process 52
9.4.4 Train departure with not valid and ambiguous position 52
9.4.4.1 Operational Activities involved in Operational Process: 52
9.4.4.2 Operational Requirements implemented by Operational Process 53
9.4.5 Train departure with valid and unambiguous position 53
9.4.5.1 Operational Activities involved in Operational Process: 54
9.4.5.2 Operational Requirements implemented by Operational Process 55
9.5 Revoke Movement Permission 55
9.5.1 Operational Activities involved in Operational Process: 56
9.5.2 Operational Requirements implemented by Operational Process 57
9.6 Activate Temporary Speed Restriction 57
9.6.1 Activate Temporary Speed Restriction without Signaller Confirmation 57
9.6.1.1 Operational Activities involved in Operational Process: 58
9.6.1.2 Operational Requirements implemented by Operational Process 59
9.6.2 Activate Temporary Speed Restriction with Signaller Confirmation 60
9.6.2.1 Operational Activities involved in Operational Process: 60
9.6.2.2 Operational Requirements implemented by Operational Process 61
9.7 Deactivate Temporary Speed Restriction 62
9.7.1 TSR deactivation without Signaller Confirmation 62
9.7.1.1 Operational Activities involved in Operational Process: 63
9.7.1.2 Operational Requirements implemented by Operational Process 63
9.7.2 TSR deactivation with Signaller Confirmation 64
9.7.2.1 Operational Activities involved in Operational Process: 65
9.7.2.2 Operational Requirements implemented by Operational Process 66
9.8 Handling an unplanned speed restriction 66
9.8.1 Operational Activities involved in Operational Process: 67
9.8.2 Operational Requirements implemented by Operational Process 68
9.9 End of misison 69
9.9.1 Train arrival (ending journey): Functional number de-registered from voice communication mobile (BL4) 69
9.9.1.1 Operational Activities involved in Operational Process: 70
9.9.1.2 Operational Requirements implemented by Operational Process 70

DRAFT

9.9.2 Shutdown (CR1350 'always connected always reporting' not implemented) (BL3) 71
9.9.2.1 Operational Activities involved in Operational Process: 72
9.9.2.2 Operational Requirements implemented by Operational Process 73
9.9.3 Shutdown (with CR1350 'always connected always reporting' implemented) BL4 73
9.9.3.1 Operational Activities involved in Operational Process: 74
9.9.3.2 Operational Requirements implemented by Operational Process 74
9.10 Arrival at scheduled stop 74
9.10.1 Arrival at scheduled stop - GoA1 74
9.10.1.1 Operational Activities involved in Operational Process: 75
9.10.1.2 Operational Requirements implemented by Operational Process 76
9.10.2 Arrival at scheduled stop - GoA2 76
9.10.2.1 Operational Activities involved in Operational Process: 77
9.10.2.2 Operational Requirements implemented by Operational Process 78
9.11 Platform start (without optimizations) 78
9.11.1 Operational Activities involved in Operational Process: 79
9.11.2 Operational Requirements implemented by Operational Process 80
9.12 Reducing Movement Permission by Signaller action for a specific location in case of imminent danger 80
9.12.1 Operational Activities involved in Operational Process: 82
9.12.2 Operational Requirements implemented by Operational Process 82
9.13 Reducing Movement Permission by signaller action for an area in case of imminent danger 82
9.13.1 Operational Activities involved in Operational Process: 84
9.13.2 Operational Requirements implemented by Operational Process 85
9.14 Regular execution of planned train movement 86
9.14.1 Operational Activities involved in Operational Process: 87
9.14.2 Operational Requirements implemented by Operational Process 88
9.15 Building blocks 89
9.15.1 Train doors opening - GoA1 89
9.15.1.1 Operational Activities involved in Operational Process: 89
9.15.1.2 Operational Requirements implemented by Operational Process 89
9.15.2 Train doors opening - GoA2 90
9.15.2.1 Operational Activities involved in Operational Process: 91
9.15.2.2 Operational Requirements implemented by Operational Process 91
9.15.3 Train doors closing - GoA2 91
9.15.3.1 Operational Activities involved in Operational Process: 92
9.15.3.2 Operational Requirements implemented by Operational Process 93
10 Derived operational needs 94
10.1 Next operational step unknown 94
10.2 Observations while driving 95
10.3 Resume driving after stopping short of scheduled stopping location 96

DRAFT

10.4 Train departure / SoM departure 98
10.4.1 Train departure / SoM general overview (train preparation) 98
10.4.2 Train departure / SoM with manual operation 99
10.4.3 Train departure / SoM after pressing start, with text messages 99
10.4.4 Train departure with not valid and ambiguous position 102
10.4.5 Train departure with valid and ambiguous position 103
10.5 Revoke Movement Permission 104
10.6 Activate Temporary Speed Restriction 105
10.6.1 Activate Temporary Speed Restriction without Signaller Confirmation 105
10.6.2 Activate Temporary Speed Restriction with Signaller Confirmation 106
10.7 Deactivate Temporary Speed Restriction 108
10.7.1 TSR deactivation without Signaller Confirmation 108
10.7.2 TSR deactivation with Signaller Confirmation 109
10.8 Handling an unplanned speed restriction 110
10.9 End of Mission 112
10.9.1 Train arrival (ending journey): Functional number de-registered from voice communication mobile (BL4) 112
10.9.2 Shutdown (CR1350 'always connected always reporting' not implemented) (BL3) 113
10.9.3 Shutdown (with CR1350 'always connected always reporting' implemented) BL4 114
10.10 Arrival at scheduled stop 115
10.11 Platform start (without optimizations) 116
10.12 Reducing Movement Permission by signaller action for a specific location in case of imminent danger 118
10.13 Reducing Movement Permission by signaller action for an area in case of imminent danger 119
10.14 Regular execution of planned train movement 121
11 Appendix 124
11.1 References 124
11.2 Open points 125

DRAFT

1 Preamble

1.1 Purpose

This document presents the harmonized operational design for the SPMS-2098 - CCS System (system under consideration). Its primary objective is to translate the operational vision outlined in SPP-19402 - Operational Vision (Nov. 2022) into clearly defined and harmonized operational processes. The document provides guidance for human actors, serves as input for the Traffic CS System Specification and for Rulebook products, and forms a foundation for potential TSI OPE amendments.

In line with [SPP-8684 - System Pillar Common Business Objectives (Sept. 2022)], the Operational Design builds upon ETCS Level 2 and initially support ATO up to GoA 2.

The activities of the OD and Traffic CS domains are structured according to the subtopics listed in SPP-28769 - Subtopics OD and Traffic CS: Traceability Report.

The scope of this release is limited to the subtopics described in section SPP-30557 - Subtopics addressed. For the Design Constraints please refer to SPP-18091 - Baseline Planning and Design Constraints.

1.2 Intended Audience

This document is primarily intended for domain experts with in-depth knowledge of the system under consideration, particularly regarding the System Specification, which may be used for product development and pilot implementations.

1.3 Document Context

As shown in the illustration below (SPP-30551 - Dependencies between Configuration Items), the ETCS L2 Rulebook of the SPMS-2098 - CCS System is derived from the following key inputs:

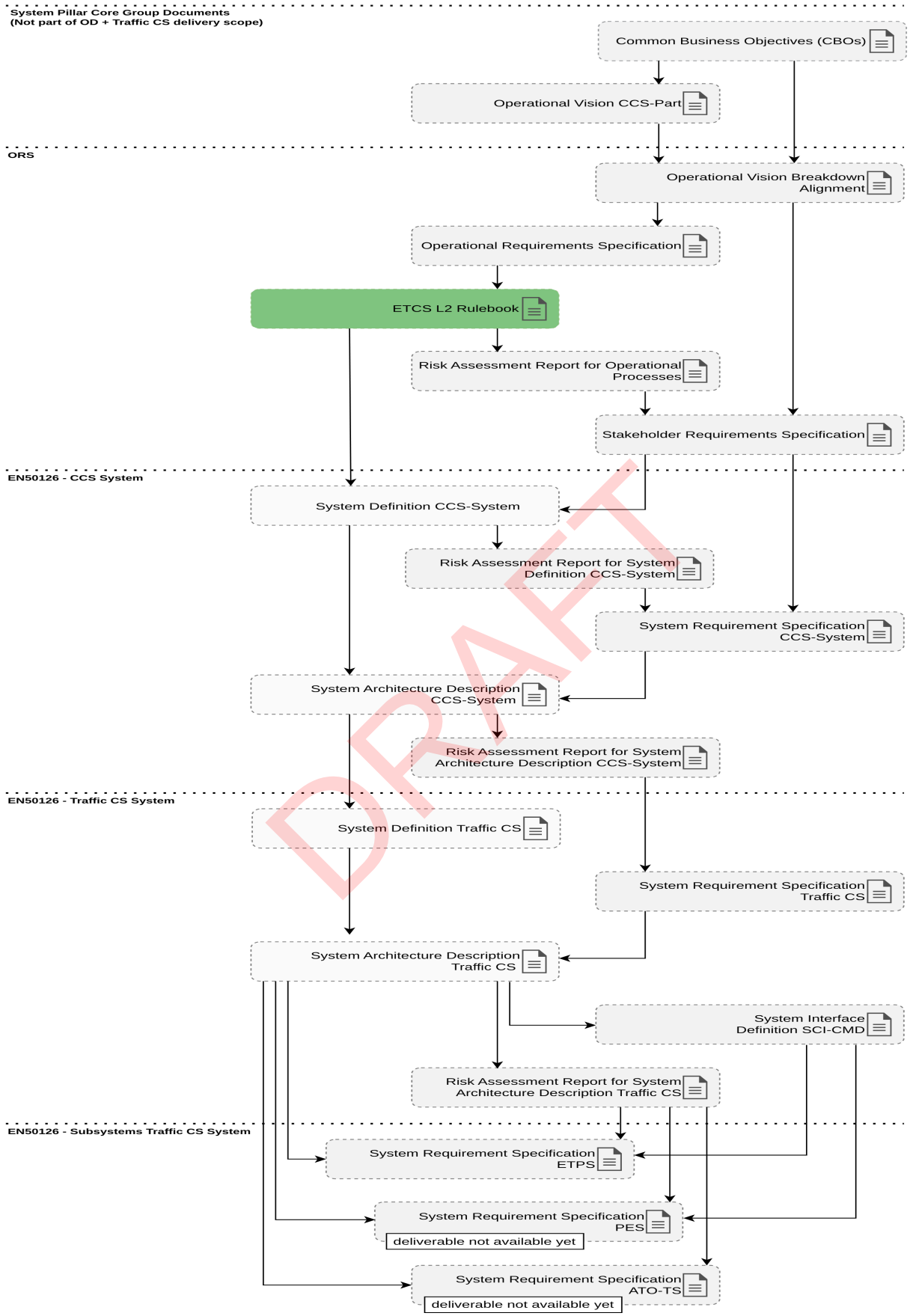
- [SPP-19164 - OD_Operational Requirements Specification CCS System_V0.2]: Defines the operational requirements foreseen for the future SERA
- [SPP-19162 - OD_Operational Vision Breakdown Alignment CCS System_V0.3]: Establishes the linkage between the Operational Requirement Specification and the Operational Vision (SPP-19402 - Operational Vision (Nov. 2022)) ensuring consistency and traceability.

Through these inputs the SPMS-2098 - CCS System is aligned with the Common Business Objectives of the System Pillar (SPP-8684 - System Pillar Common Business Objectives (May 2022)).

The Rulebook ETCS L2 itself serves as input document for the subsequent deliverables, including the System Definition CCS-System and the Stakeholder Requirement Specification of the SPMS-2098 - CCS System.

Further details regarding document independencies are described in SPP-18362 - Requirements Management Plan v2.0]. The positioning of the ETCS L2 Rulebook within the document framework is shown in SPP-30551 - Dependencies between Configuration Items.

DRAFT



DRAFT

[SPP-30551]

1.4 Glossary

1.4.1 Terms

Term	Definition
ATO Available	When it is in AV State, the ATO-OB is ready for operation and it is waiting for the ATO Engagement Conditions to be fulfilled.
ATO Engaged	When it is in EG State, the ATO-OB is responsible for driving the train controlling brake and traction according to the computed ATO Operational Speed Profile.
BALISE TRANSMISSION MODULE	A module inside the ERTMS/ETCS on-board equipment for intermittent transmission between track and train, which processes Up-link signals and retrieves application data telegrams from a balise.
BRAKING CURVE	Prediction of the train speed decrease versus distance by the ERTMS/ETCS on-board equipment, from a mathematical model of the train braking dynamics and of the track characteristics ahead.
CCS System	The control command and signalling (CCS) system covers signalling, train control, positioning equipment and telecommunications.
Class A / B system	ERMTS is considered being a class A system whereas national legacy non-ERTMS systems are known as class B systems. In the frame of the migration to the future, harmonised CCS architecture based on harmonised operating rules, ERTMS systems based on earlier baselines are also treated as a kind of Class B system.
Co-operative Shortening of MA	Co-operative Shortening of MA is a special procedure between Traffic CS and Train CS to shorten a given Movement Authority.
De-registration	Termination of the temporary relationship between the telephone number and the train running number. This action can be initiated by the user of a GSM-R radio, by automatic systems or by the network authority. The de-registration allows the de-registered train running number to be re-used.
Driver Machine Interface (DMI)	Train device to enable communication between the ETCS on-board and the driver.
Dwell time	Waiting time between the arrival and estimated departure time of a train at stop.
ERTMS/ATO Trackside	ERTMS/ATO Trackside (ATO-TS) is the ERTMS/ATO trackside subsystem. ERTMS/ATO provides a set of non-safety functions related to speed control, accurate stopping, door opening and closing, and other functions traditionally assigned to a driver, while the safety of operation is still ensured by ETCS with regards to the speed and distance limits and also by other safe systems.
EUROPEAN TRAIN CONTROL SYSTEM	The Control Command part of ERTMS.
Emergency stop order	ETCS order braking a train with the maximum brake force until the train is at a standstill.
End Of Authority	Location up to which a train or a shunting composition is authorised to proceed.
European Instruction	

DRAFT

Term	Definition
	A European Instruction is an instruction issued by the Signaller to the Driver to ensure safe operation when this cannot be provided by the signalling system. A European Instruction will state for example: - which train it is issued to - the time and date it was issued - location of train (if relevant) - location of issuer - a clear, precise, unambiguous instruction - a Unique Identification. The EI precises speed, special conditions for train movement and other requests for safe operations.
European Instruction 7	Authorisation to start after preparing a movement.
Functional number (GSM-R)	Full number used within the functional addressing scheme to identify an end user or a system by function or role rather than by a specific item of radio equipment or user subscription. The functional number can be divided into two parts: — functional addressing (process of addressing a call using a specific number, representing the function a user is performing, rather than a number identifying the GSM-R on-board), — location dependent addressing (process of addressing a particular function – typically a signaller – based on the current location of the user – typically a train).
Grade of Automation	GoA - Grade of Automation
Human Machine Interface	Human Machine Interface is mainly the space and environment in which interactions between humans and machines occur, through complex relations between input and output exchanged among several sub-systems and/or peripheral devices and presented by means of the display of graphical elements and data, from where Operators can issue commands and supervise the sub-systems behaviour.
JURIDICAL DATA	Data to record all actions and exchanges relating to the movement of trains sufficient for off line analysis of all events leading to an incident.
Journey Profile	JP - Journey Profile
MOVEMENT AUTHORITY	Permission for a train to run to a specific location within the constraints of the infrastructure.
Manual Route Setting	Manual route setting refers to the historical process of manually configuring and establishing train routes within the railway network. This involves selecting and activating specific track paths that trains will follow during their journey. Manual route setting is typically carried out by railway operators or dispatchers in the event that automatic route setting fails. This concept will be replaced in the target system of SERA by Movement Permission, see here: SPT2TRAFFIC-7866 - Movement Permission
Movement Authority (MA)	Permission for a train (shunting composition) to move to a specific location with supervision of speed.
Movement Permission	A Movement Permission is a discrete domain object within the ETPS that defines and secures the operational path of a train.

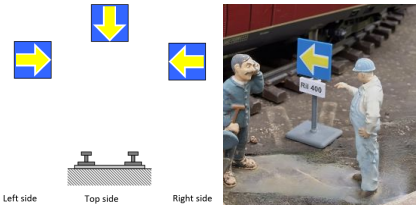
DRAFT

Term	Definition
	It replaces the traditional split between route setting, signalling, and train control by integrating them into one unified concept. Key characteristics: · **Geometric Extent**: The MP specifies a linear, contiguous section of track (running path) that a train is permitted to occupy, including mandatory safety margins (Risk Buffers, Risk Paths) to prevent collisions. · **Basis for Movement Authority**: An MP provides the trackside foundation from which an ETCS Movement Authority (MA) is derived and transmitted to the train. · **Dynamic & Risk-Based**: Unlike fixed interlocking routes, an MP can start and end at any topological point and is defined according to operational needs and real-time safety checks rather than static rules. · **Lifecycle**: MPs are created upon request, checked against topology and safety conditions, granted, supervised, and continuously updated (extended, shortened, upgraded, or removed). · **Integration**: By merging route protection and movement granting, the MP enables efficient infrastructure use, reduces unnecessary locking of track elements, and supports flexible, automated operations. Movement Permission is not just an “allowance to proceed” but **a dynamic, safety-checked allocation of infrastructure to a specific train movement**, forming the essential prerequisite for issuing a Movement Authority in ETCS.
NO POWER MODE	ERTMS/ETCS on-board equipment mode in which the on-board equipment is not powered and the emergency brake is commanded.
Operational Plan	The Operational Plan is the result of the planning process performed by TMS. An Operational Plan will be issued by the TMS for any operationally relevant activity. This comprises all movements of Physical Train Units incl. shunting operations (Operational Movement), restrictions due to e.g., infrastructure maintenance and construction works, and warning measures during restrictions.
PERMITTED SPEED	The speed limit at which a train is allowed to proceed without ERTMS/ETCS warning and / or intervention.
Passenger transfer	Passenger transfer is the process where a passenger enters, leaves or switches from one train to another.
Platform	Means the area at a station to alight from/board trains
Position Report	

DRAFT

Term	Definition
	The "Position Report" (PR) is a structured message sent from the train's On-board (OBU) to the trackside CCS such as the RBC). This report communicates the current position of the train, including its precise location, direction, speed, and other relevant status information. The Position Report allows the trackside system to continuously track the train's progress, ensure safety, and allocate new movement authorities accordingly. Position Reports are fundamental to ETCS because they enable accurate, real-time management of train movements without relying on trackside detection equipment.
RADIO BLOCK CENTRE	A centralised safety unit that receives train position information via radio and sends movement authorities via radio to trains.
ROUTE RELEASE	The release of route locking.
Radio communication	Exchange of information between the ETCS on-board and the RBC/radio infill unit.
Route Book	Description of the lines and the associated line-side equipment for the lines over which the driver will operate and relevant to the driving task.
STAFF RESPONSIBLE MODE	ERTMS/ETCS on-board equipment mode that allows a driver to take full responsibility for the movement of a train in an equipped area. The ERTMS/ETCS on-board equipment will impose a speed limit in this mode.
STANDSTILL, ETCS	A state which is entered when the ERTMS/ETCS on-board equipment determines that the train is not moving, and which is left when the ERTMS/ETCS on-board equipment determines that the train is moving. Important note: The criteria for determining standstill are not harmonised. An ERTMS/ETCS on-board reporting "standstill" does not guarantee that there is no train movement at all.
STATIC SPEED PROFILE	The description of the fixed speed restrictions of a given line. The speed restrictions can be related to such items as maximum line speed, curves, points, tunnel profiles, bridges.
SUPERVISED MANOEUVRE MODE	ERTMS/ETCS on-board equipment operating mode which allows a shunting consist to be supervised with a Movement Authority, while the engine and its active cab can be located anywhere in the consist.
Safe Train Extent	The Safe Train Extent represents the extent of the track that may be occupied by a connected train. It is calculated from train-side information (Confirmed Rear End and Max Safe Front End derived from the ETCS Position Report) and track-side information (track vacancy proving sections like track circuits or axle counters), taking into account the most recent information available from these train- and track-side information sources. Remarks: • The Safe Train Extent for a train will be updated when new information becomes available.

DRAFT

Term	Definition
	• For a moving train, it is likely that the train will move outside the Safe Train Extent between update
Scheduled stop	Planned stop for commercial or operational reasons.
Standstill	Standstill is when the train's speed is detected as 0 km/h by the onboard system, within the accuracy and limits of the system's detection capabilities. In context of door closing procedure there is also the limit at or below 3 km/h and no un-commanded propulsion is available. This harmonises the intent of both TSIs: it acknowledges the LOC&PAS practical threshold (due to system tolerances) but defaults to the CCS zero-movement criterion when safety functions are involved.
Stop Marker Board	A Harmonised trackside ETCS marker board defined in EN 16494/2015 is a fixed, clearly recognisable trackside sign that indicates the location where a driver has to stop the train, if running without an MA. Further purpose defined by ERTMS Users Group: 1. To be used to unambiguously identify an EOA which must not be overpassed without authorisation by the signaller and which may protect one or a group of safety-critical points such as a point switch, a conflicting route, an entrance of a station, junctions, etc. 2. To be used to identify specific location on the track the train shall not overpass when an MA is not available, unless the driver has received a specific authorisation by the signaller. 3. To be used to mark the location up to which the driver needs to confirm that the line is clear (e.g. for TAF function). To be used to mark the location up to which the driver has to drive under his/her responsibility before a possible MA in FS/OS is received. 
Stopping point	A location identified in the schedule of a train where the train is planned to stop, usually to carry out a specific activity such as allowing passengers to join and leave the train.
Switched Off	Switched Off is one of the possible states of logical and physical Output Channels and logical and physical Input Channels with the interpretation, that in this state, no voltage is given resp. no current flows.
TEMPORARY SPEED RESTRICTION	

DRAFT

Term	Definition
	A planned speed restriction imposed for temporary conditions such as track maintenance.
TRAIN DATA	Defined set of data which gives information about the train. Data that characterises a train and which is acquired by ERTMS/ETCS in order to perform a mission.
TRIP MODE	ERTMS/ETCSERTMS/ETCS on-board equipment mode (e.g. entered when passing an EOA), resulting in an application of the emergency brake that can only be revoked at standstill and with additional precautions.
Text message	Information in writing displayed on the Driver Machine Interface.
Timetable	Document or system that gives details of a train(s) schedule over a particular route.
Trackside Train Detection	Trackside Train Detection is a system which determines the occupancy status of TTD sections. TTD section may be a Track Circuit or an Axle Counting system section. EULYNX synonym for TTD section: Track Vacancy Proving Section (TVPS)
Train	A train is defined as (a) traction unit(s) with or without coupled railway vehicles with train data available operating between two or more defined points.
Train Running Number	A number under which the train is operated.
Unplanned speed restriction	An unplanned speed restriction refers to a temporary reduction in the maximum allowable speed for movements on a specific section of railway track that is not part of the regular operational plan. This restriction may be implemented due to unforeseen circumstances.
Unsupervised movement	The unsupervised movement is not under the supervision of the CCS system. So, there is no Movement Authority like OS or FS. During this type of movement the Signaller and Driver have the responsibility for ensuring the safety and control of the train in the absence of the supervision by the CCS system.

DRAFT

1.4.2 Abbreviations

Abbreviation	Definition
AD	Automatic Driving mode
ATO	Automatic Train Operation
ATO-OB	Automatic Train Operation - Onboard (unit)
ATO-TS	ERTMS/ATO Trackside
AV	ATO Available
BTM	BALISE TRANSMISSION MODULE
COSMA	Co-operative Shortening of MA
EG	ATO Engaged
EI	European Instruction
EI#7	European Instruction 7
EOA	End Of Authority
ETCS	EUROPEAN TRAIN CONTROL SYSTEM
ETCS	European Train Control System
FS	Full Supervision mode
GoA	Grade of Automation

Abbreviation	Definition
HMI	Human Machine Interface
JP	Journey Profile
MA	MOVEMENT AUTHORITY
MP	Movement Permission
NP	NO POWER MODE
OS	On Sight mode
PR	Position Report
RBC	RADIO BLOCK CENTRE
RU	Railway Undertaking
SB	Service Brake or in the context of modes, Stand By mode
SM	SUPERVISED MANOEUVRE MODE
SMB	Stop Marker Board
SR	STAFF RESPONSIBLE MODE
SSP	STATIC SPEED PROFILE
STE	Safe Train Extent
SoM	Start of Mission
TR	TRIP MODE
TRN	Train Running Number
TSR	TEMPORARY SPEED RESTRICTION
TTD	Trackside Train Detection

DRAFT

2 Baseline Planning and Design Constraints

2.1 Baseline Planing

The work of the OD and Traffic CS domain is organized along a consolidated list of operational scenarios captured in subtopics (SPP-28769 - Subtopics OD and Traffic CS: Traceability Report)

The prioritization of topics is guided by the introduction of baselines, each representing an incremental expansion of functional scope. Every baseline ensures that System Pillar outputs can already be applied to defined use cases, while progressively enabling broader applications over time. Currently, three baselines have been defined as listed below.

All subtopics addressed by this release and listed in SPP-30557 - Subtopics addressed are part of the Baseline 0 (SPP-30522 - Baseline 0 (MVP - Minimum Viable Product)).

Target application	Simple lines
Included	• normal and degraded situations for usual operation on simpler lines • trackside/on-board train detection • centralised configuration • working area handling (simple)
Excluded	• Transitions • change of train composition • pushed movement • level crossings • Enhancements requiring TSI changes
Purpose	Enable potential pilot line to show feasibility of harmonised SERA application with certain key new features and have return of experience

Target application	Large share of railway lines, without big nodes
Included in addition	• level crossings • handover inside SERA • transition in and out SERA • splitting and joining of train sets • enter occupied tracks with system support
Excluded	• change of train composition (except splitting/joining of train sets) • pushed movement • Enhancements requiring TSI changes
Purpose	Provide functionality for wide-spread application

DRAFT

Target application	Big nodes with complex operations
Included in addition	• shunting including pushed movements • train composition changes • working area handling (complex) • Enhancements requiring TSI changes
Excluded	• features beyond the current scope (e.g. GoA 3/4 or driving in relative braking distance)
Purpose	Provide functionality for network-wide application

2.2 Design Contraints

The design constraints define the boundaries for the development of Operational Design and Traffic CS. They will be updated in case of scope changes, for example when including work on higher grade of automation (GoA 3/4), or if new ETCS baselines are introduced.

They are derived from the System Pillar Common Business Objectives and from stakeholder requirements as captured in the Traffic CS System Concept (SPP-28757 - Traffic CS - System Concept V1.5)

Derived from SPT2TRAFFIC-4817 - Traffic CS shall support trains equipped with ETCS Baseline 3 and above

Background:
The sector faces the situation that updates of ETCS on-boards are currently done in rather long cycles like 10-15 years. Since current projects still equip trains with ETCS Baseline 3, there will likely be a large number of trains in operation with Baseline 3 when Traffic CS systems will be deployed. This lead to the requirement to design Traffic CS with ETCS System Version 2 for the trackside which will support operation with B3MR1, B3R2 and B4 trains. The main new features of B4 (ATO, Supervised Manoeuvres and FRMCS) can also be used with System Version 2 tracksides.

Consequences for system design:
All on-board versions that can operate on a SV 2 trackside need to be considered. For many situations, there won't be a relevant difference in behaviour. If there are differences, distinctions need to be made in the design of operational processes and system requirements.

Derived from SPT2TRAFFIC-4481 - ATO GoA1 and SPT2TRAFFIC-4480 - ATO GoA2

Background:
The TSI CCS 2023 introduced ATO over ETCS as part of the ERTMS specifications. It is optional to deploy ATO trackside systems on ETCS trackside installations and it is also optional to equip ETCS trains with ATO on-board systems. If the ATO is available, it can operate in Grade of Automation 1 (manual driving) and give driving advise or in Grade of Automation 2 (automatic driving). In both cases, the driver is still responsible for the train operation.

Consequences for system design:
Operational processes and system requirements need to consider all possible situations covered by TSI CCS 2023: Only ETCS, ATO in GoA 1, ATO in GoA 2.

DRAFT

Derived from SPT2TRAFFIC-4478 - Operation of mixed fleets and SPT2TRAFFIC-4476 - Aggregation of several train localisation sources

Background:
One objective for System Pillar is to enable the reduction of trackside installations. This can be achieved by using on-board Train Integrity Monitoring with ETCS to calculate the safe rear end of a train. The design goal for Traffic CS is to support any combination of on-board and trackside localisation. All input is combined in Traffic CS into one safe representation of the train position.

Consequences for system design:
Operational processes and system requirements need to consider that localisation information can come from on-board, from trackside or from both sources.

Derived from SPT2TRAFFIC-4454 - Harmonised SERA operational rules and SPT2TRAFFIC-4817 - Traffic CS shall support trains equipped with ETCS Baseline 3 and above

Background:
The System Pillar received input for operational processes from many different railways which is used to define harmonised operational processes. In addition, there are also proposals for further operational improvements. Some of these improvements will be achievable with the current TSI CCS, other improvements will need TSI changes. Any TSI change needs to be agreed in the sector and then implemented in products and installed in trains which all takes considerable time. Nonetheless, there are cases were TSI changes are proposed to improve operational processes. In conclusion: For some operational scenarios, multiple process versions will be needed to cover differences in ETCS versions and potential improvements. It is always necessary to have at minimum an operational process for the current TSI.

Consequences for system design:
Design at least one operational process for the current TSI. If needed, also design a process to support trains with Baseline 3 MR1 or R2. Only if beneficial and broadly agreed, also a process resulting in TSI changes can be designed.
Operational improvements which are possible without TSI changes (only affecting trackside) shall be incorporated in the design, as far as they can be supported by Traffic CS.

DRAFT

3 Referenced content of TSI OPE

Notes:

- The TSI OPE, and in particular Appendix A, contains Principles and Rules that apply in ETCS L2 lines. In principle these rules also apply to SP lines, so the work in the System Pillar might lead to change requests of the TSI OPE, in particular in case of Appendix A rules.
- Table of contents for each Appendix and content examples can be found - SPP-19363 - Overview of TSI OPE content

3.1 TSI OPE - Appendix A

TSI OPE Appendix A chapters - version 6
Chapters:

- (left blank)
- (left blank)
- Appendix A Ch. 3. Introduction
- Appendix A Ch. 4. References, terms and abbreviations
- Appendix A Ch. 5. Principles - SPT2OD-9248 - Table of contents for Appendix A 5. Principles for ETCS
- Appendix A Ch. 6. ETCS Operational Rules - Table of contents - ETCS Operational rules
- Appendix A Ch. 7. GSM-R Voice Radio Operational Rules - Table of contents - GSM-R operational rules

Overview of different chapters of TSI OPE appendix A and how content will be referenced

Ch. 4 References, terms and abbreviations

The factory process that includes OD and Traffic CS has an own glossary. Glossary terms are referenced in each document. When there is an overlapping term from TSI OPE or TSI CCS, a choice has to be made between using a TSI OPE or a TSI CCS term. It is also possible that the new Trackside CCS system being developed requires using other terms, not sourced from TSI OPE or TSI CCS.

Ch. 5 Principles for ETCS

Set of rules for ETCS operations for key operational situations. The rules might be restrictive in a few cases, e.g., mandating the use of a European Instruction, where technical means can be considered. Final designs and possible derived change requests are to be assessed once the factory reaches the relevant topics (scenarios).

Ch. 6 ETCS Operational Rules

Contains the instructions for DMI usage, which are the basis for the ERTMS Driver's handbook. Significant amount of content that will be reused in the ETCS L2 Rulebook for detailed train driver DMI instructions.

Ch. 7 GSM-R Voice Radio Operational Rules

Contains the instructions for using the voice communication system, currently based on GSM-R. Although not the main focus of the SP Operational Design, voice communication is part of the operational processes that are being developed and may lead to requests for change. Also, as the SP products will cover FRMCS as underlying technology as well, some GSM-R rules may no longer apply.

DRAFT

3.2 TSI OPE - Appendix B

Note: Appendix B contains rules and principles for ETCS and class B.

3.2.1 Fundamental operational principles

Note: included in SPP-19363 - Overview of TSI OPE content

The Fundamental Operational Principles have been incorporated in the Operational Design Principles further described in Chapter 4: SPP-14922 - Design Principles for Operational Harmonisation .

3.2.2 Common Operational rules

SPT2OD-9045 - Table of contents - Common Operational Rules

Use of Common Operational Rules (COR) in the ETCS L2 Rulebook

Referenced in the operational processes when relevant. Development of SP Operational Design processes might lead to change requests to the Common Operational Rules; for instance regarding rules for passing an EOA while not reaching the danger point as they might allow another reaction than the current one.

3.3 TSI OPE - Appendixes C-J

Note: Appendix C-J contain rules and principles for ETCS and class B.

Appendixes C to J

Safety related communications methodology	Appendix C
Oral communication	Appendix C1
European Instructions	Appendix C2
Route compatibility and Route Book	Appendix D
Parameters for the vehicle and train compatibility over the route intended for operation	Appendix D1
Elements the infrastructure manager has to provide to the railway undertaking for the Route Book	Appendix D2
ERTMS trackside engineering information relevant to operation	Appendix D3
Language and communication level	Appendix E
Elements relevant to professional qualification for the tasks associated with ‘accompanying trains’	Appendix F
Elements relevant to professional qualification for the task of preparing trains	Appendix G
European Vehicle Number and linked alphabetical marking on the bodywork	

DRAFT

	Appendix H
List of areas for which national rules may continue to apply according to Article 8 of Directive (EU) 2016/798	Appendix I
Glossary (extended by SP glossary, based on TCCS SD1)	Appendix J

How TSI OPE appendixes will be referenced in the ETCS L2 Rulebook

C1 - good practices for oral communication -> to influence process design and be referenced
C2 - European Instructions -> to be constructed as individual processes and reused in the operational processes as needed
D-I -> to be checked in detail. Mostly out of scope, with the exception of Appendix D3 as it specifies which kind of ETCS related information should be available to RU's and (indirectly) to train drivers.

DRAFT

4 Design Principles for Operational Harmonisation

Operational design principles have been introduced. These principles intend to lead to consistent design decisions within Operational Design that contribute to a proper working and workable railway system.

When making design decisions within operational design, these design principles are adhered to as far as this is reasonably practicable. They should not be considered as hard requirements but should rather be *perceived as the ambition* for operational design. Using relevant operational design principles on any design decision basically comes down to 'comply or explain'.

The Operational Design principles are listed in the sections below.

They are categorised in main and derived principles. Main principles are on a somewhat higher level of abstraction. All principles are formulated in a technology independent way. This way, they properly reflect the principles that are the basis of both legacy, current ETCS and future railway operation.

The Operational Design principles should help to make design decisions that result in an operational process design that is workable for the involved human actors - primarily signallers and train drivers. This is essential for a successful introduction of new, digital railway technology. When introducing such digital technology, new technical systems will replace older systems to support these operational processes. Human actors involved will typically not be replaced by new operational staff, however. Because of this, it is very relevant that the new technology is still usable by the operational staff that is used to operate older technology. By sticking to existing, technology independent operational principles, dealing with new technology should be easier as it still acts in a way that is perceived as 'logical' by the involved users.

The first 4 main principles that are listed deal with the basic flow of railway operation:

- any operational use of railway infrastructure should first be planned,
- the intended infrastructure must then be prepared,
- the human actors need to be authorised to perform the planned use, and!
- they need to make proper use of the infrastructure.

Main principle 5 covers the role of the signaller, who is basically responsible for train traffic in a certain area.

Main principles 6, 7, 8 and 9 deal with the role of human actors as part of railway operation, indicating that their interfaces should be standardised, procedures must be fit for use, safety critical actions should be performed, or at least supervised, by safety systems and relevant information should be provided to users.

The final main principle deals with the concept that new technology should support the key existing operational needs.

DRAFT

4.1 List of SP Operational Design principles

4.1.1 Principle 1: Railway operation is planned

Main Operational Design Principle 1: Railway operation is planned.
Operational use of railway infrastructure is planned prior to execution.
[SPP-17626 **]**

This main principle deals with the concept that railway operation is not execute...
This main principle deals with the concept that railway operation is not executed spontaneously, but is planned beforehand. Planning of use prior to execution - also known as timetabling - allows making efficient use of the infrastructure and allows provision of transportation in a predictable way. Railway operation includes all activity on the rail infrastructure: driving trains, but also assembling or stabling trains and execution of maintenance works. The plan also takes into account the planned restrictions for use.

Operational design principle 1.1: The plan is executable.
Planned use of the infrastructure is operationally possible, safe and efficient and non conflicting.
[SPP-17975 **]**

Planned use must take into account the properties of infrastructure and rolling...
Planned use must take into account the properties of infrastructure and rolling stock in order to provide a plan that can be executed. It also implies that the rolling stock that is planned to be used has to be compatible with the planned infrastructure.

Operational design principle 1.2: If necessary, the plan is adapted.
When the planned operation cannot be executed as planned, the principle is to adapt to a new plan. **[**SPP-17628 **]**

This makes it possible to keep operation predictable and it allows automation of...
This makes it possible to keep operation predictable and it allows automation of operational activities.
Related to the premise: SPP-16083 - 1. SP-OD wants to maximise standardised and automated solutions for railway oper...

Operational design principle 1.3: Planned use is either dynamic (train paths) or static (slots).
Planned use of the infrastructure exists in the form of dynamic use (train paths) and static use of infrastructure (slots).
[SPP-17772 **]**

Typically, use of infrastructure mainly consists of planned movements along the...
Typically, use of infrastructure mainly consists of planned movements along the infrastructure i.e. train paths, where the allocated infrastructure is released whenever the train has left that part of the infrastructure. For other types of use like stabling trains or performing maintenance activities on the railway infrastructure, a certain part of the infrastructure has to be provided to a user for a longer, planned amount of time. Such 'static' allocation of an area of infrastructure is referred to as 'slots'.

Operational design principle 1.4: The plan is communicated.
The plan for operation, including any updates, is communicated to all stakeholders.
[SPP-17774 **]**

This makes it possible to provide predictable transportation services, and is re...
This makes it possible to provide predictable transportation services, and is required to allow execution of the plan as planned.

4.1.2 Principle 2: infrastructure is prepared for use

Main Operational Design Principle 2: Infrastructure is prepared for use.
Operational use of the railway infrastructure is made possible by operationally allocating infrastructure, in

DRAFT

such a way that conflicting use is prevented.
[SPP-17776 **]**

This main principle deals with the notion that infrastructure has to be brought...
This main principle deals with the notion that infrastructure has to be brought in the proper condition before any operation can take place. Based on the plan, the infrastructure manager will check if the actual rolling stock that is involved in the planned use is available at the intended location and will then create the actual conditions for the planned use of the infrastructure which include actions to prevent conflicting use by any other user.

Related to safety principle SPP-15486 - Safety Principle 1: Safe Conditions for track and vehicle

Operational design principle 2.1: A safe train path is created.
In case of a train path, a safe trajectory along the infrastructure is provided in which trackside elements are locked in place in the correct position and conflicting movements by any other train are prevented until the train has passed.
[SPP-17777 **]**

A train can only safely run on infrastructure if there are no conflicting train...
A train can only safely run on infrastructure if there are no conflicting train movements and trackside elements remain locked in the appropriate condition until the train has passed.

Related to TSI OPE Appendix B, Fundamental Operational Principle 1: 1. The method of authorising a train movement shall maintain a safe interval between trains.
Related to TSI OPE Appendix B, Fundamental Operational Principle 3: 3. Before a train begins or continues its journey, it shall be ensured that passengers, staff and goods are carried safely.

Related to: SPP-15486 - Safety Principle 1: Safe Conditions for track and vehicle
Related to: SPP-15489 - Safety Principle 3: Ensure the correct status of movable elements
Related to: SPP-15490 - Safety Principle 4: Prevent conflicting movements

Operational design principle 2.2: For static use, a part of the infrastructure is exclusively allocated.
In case of static use, this is performed by providing a distinct part of the infrastructure to the intended user(s) for which no other user can get authorisation. **[**SPP-17778 **]**

When providing a static part of the infrastructure to a user, it is relevant tha...
When providing a static part of the infrastructure to a user, it is relevant that no other users can obtain authorisation to enter this infrastructure. Keeping infrastructure elements locked in a certain position inside the allocated infrastructure will typically not be necessary.

Operational design principle 2.3: Infrastructure is allocated efficiently.
For any planned use, only the infrastructure that is necessary for the planned use will be reserved.
[SPP-17779 **]**

This means that infrastructure is only reserved for particular planned use as lo...
This means that infrastructure is only reserved for particular planned use as long as and as far as this is necessary. This keeps a maximum amount of infrastructure available for other use. It also means that it is prevented that trains need to slow down when this is not planned.

Related to: SPP-16086 - 4. SP-OD is aware of the need of punctuality and of an efficient use of tracks a...

DRAFT

4.1.3 Principle 3: The user receives clear authorisation for use

Main Operational Design Principle 3: The user receives clear authorisation for use.
The user receives unambiguous authorisation for safe use of the infrastructure, that is based on the infrastructure that is operationally allocated for this user and the properties of and conditions on that infrastructure.
[SPP-17780 **]**

This main principle deals with the authorisation for use that needs to be commun...
This main principle deals with the authorisation for use that needs to be communicated to the intended user. As infrastructure has been operationally allocated for a specific user, the infrastructure manager will provide authorisation for the use of this infrastructure that allows full use of the allocated infrastructure as far as this is possible for safe operation. Track defects or incidents on the infrastructure can require temporary restriction of the authorisation to be provided.

Related to TSI OPE Appendix B, Fundamental Operational Principle 2: 2. A train shall only operate over a portion of line if the train composition is compatible with the infrastructure.
Related to TSI OPE Appendix B, Fundamental Operational Principle 2: 4. Before a train is allowed to start or continue its movement, it shall have an authority to move and all necessary information to define the conditions of that authority.

Operational design principle 3.1: Authorisation is communicated by the signalling system.
Authorisation for use will be provided via the signalling system as much as possible and by operational instruction from the signaller if necessary. **[**SPP-17785 **]**

The signalling system is the preferred way of issuing authorisation to users, al...
The signalling system is the preferred way of issuing authorisation to users, allowing quick, standardised communication of the authorisation for use, allowing the intended movement without additional instruction. Avoiding operational instructions if possible should be a high priority. If authorisation cannot be communicated via the signalling system however, procedural authorisation will be used. Any train that has traction power should be able to receive authorisation to move, even if no safety system functionality is available.

Related to: SPP-16083 - 1. SP-OD wants to maximise standardised and automated solutions for railway oper...
Related to: SPP-16084 - 2. SP-OD aims to reduce inter-human communication need for operations. It means...

Operational design principle 3.2: The signalling system provides authorisation that matches the allocated infrastructure.
Authorisation for use provided via the signalling system can be more restrictive than necessary, in particular in degraded situations, but may not be too permissive. **[**SPP-17786 **]**

The authorisation provided by the signalling system has to be reliable and must...
The authorisation provided by the signalling system has to be reliable and must be safely usable by the intended user at any time. This means that the authorisation should contain allowed distance and allowed speed information to match the allocated infrastructure and infrastructure condition and information to supervise these speeds (limits) (i.e. gradients). In degraded modes, it is possible that the authorisation provided by the signalling system can be more restrictive than necessary as safety systems are designed to fail in a safe way. In that case, an operational instruction can be provided to allow a movement that the signalling system does not allow. Also, existing authorisation should not be changed very often, implying that it can be a valid choice not to process a less restrictive authorisation.

Operational design principle 3.3: Operational use within the limits of the authorisation is not hindered.

DRAFT

Any authorisation that has been provided can be followed without any additional restriction, except in case of imminent and unforeseen danger. **[**SPP-17787 **]**

Infrastructure users must be able to rely on the validity of the issued authoris...
Infrastructure users must be able to rely on the validity of the issued authorisation for use without causing any intervention by the safety system. At the same time, this principle does allow to update the authorisation to a more restricted one if this does not lead to any intervention.

Operational design principle 3.4: Authorisation is revoked in case of imminent danger.
In case of imminent danger, the authorisation for use is updated i.e. made more restrictive as fast as possible. **[**SPP-17788 **]**

If the previously provided authorisation is no longer safe to use, this has to b...
If the previously provided authorisation is no longer safe to use, this has to be reflected by shortening, reducing or completely removing the authorisation in order to lower the risk involved.

Related to TSI OPE Appendix B, Fundamental Operational Principle 5: 5. A train shall be prevented from proceeding onto a portion of line if it is known or suspected that it would not be safe for the train to pass until measures have been taken to allow the train to continue safely.

Related to: SPP-15487 - Safety Principle 6: Protect people and goods

Operational design principle 3.5: Authorisation is communicated via a single signalling system.
Authorisation is communicated via a single signalling system at any location and at any moment. **[**SPP-17789 **]**

Different signalling systems may still be used for a long time, in particular on...
Different signalling systems may still be used for a long time, in particular on class B infrastructure. It should always be clear which signalling system provides authorisation. This means that there must be a clear location up to or from which another signalling system needs to be observed.

Operational design principle 3.6: Authorisation for train movement takes into account locations that are not suitable for stopping.
Authorisation for train movement takes into account locations that are not suitable for stopping. **[**SPP-17790 **]**

Some locations may be passed but are not suitable for stopping, such as voltage...
Some locations may be passed but are not suitable for stopping, such as voltage changeovers, steep slopes and level crossings. Any authorisation for train movement should avoid forcing a train to a stop at such a location.

DRAFT

4.1.4 Principle 4: Infrastructure is properly used as planned

Main Operational Design Principle 4: Infrastructure is properly used as planned.
Any infrastructure user makes proper use of the infrastructure, staying within the limits of the provided authorisation but also by executing the intended activity as planned. **[**SPP-17791 **]**

This main principle deals with the actual use of infrastructure by any user. Mak...
This main principle deals with the actual use of infrastructure by any user. Making proper use will allow other users to also operate as planned and reduces the number of cases in which the plan will need to be adapted. Staying within the limits of the provided authorisation includes prevention of overspeeding and prevention of moving in the wrong direction.

Related to: SPP-15486 - Safety Principle 1: Safe Conditions for track and vehicle
Related to: SPP-15491 - Safety Principle 5: Prevent Overspeeding and unintended vehicle movements
Related to: SPP-15487 - Safety Principle 6: Protect people and goods

Related to TSI OPE Appendix B, Fundamental Operational Principle 2: 2. A train shall only operate over a portion of line if the train composition is compatible with the infrastructure.

Operational design principle 4.1: A train only departs in safe condition.
A train may only depart and keep driving if it is in a safe condition to transport passengers and/or goods. **[**SPP-17792 **]**

Proper use also includes making safe use of the infrastructure; the condition of...
Proper use also includes making safe use of the infrastructure; the condition of any train has to be checked on this aspect prior to any departure.

Related to TSI OPE Appendix B, Fundamental Operational Principle 3: 3. Before a train begins or continues its journey, it shall be ensured that passengers, staff and goods are carried safely.
Related to TSI OPE Appendix B, Fundamental Operational Principle 6: 6. A train shall not continue to operate after it has been found to be unsafe in any respect, until measures have been taken to allow the train to continue safely.

Related to: SPP-15486 - Safety Principle 1: Safe Conditions for track and vehicle

Operational design principle 4.2: A train only departs if it has clear authorisation.
Before a train is allowed to start or continue moving, it must have an authority to move that clearly indicates the limits of that authorisation. **[**SPP-17793 **]**

Respecting the provided authorisation i.e. staying within its limits requires a...
Respecting the provided authorisation i.e. staying within its limits requires a clear indication of what the authority actually is.

Related to TSI OPE Appendix B, Fundamental Operational Principle 4: 4. Before a train is allowed to start or continue its movement, it shall have an authority to move and all necessary information to define the conditions of that authority.

Related to: SPP-15491 - Safety Principle 5: Prevent Overspeeding and unintended vehicle movements

Related to SPP-15095 - Danish fundamental principles 2. Before a train is allowed to start or continue moving, it must have an authority to move that clearly indicates the limits of that authority.

Operational design principle 4.3: A train is compatible with the infrastructure.
Before a train starts using any part of the infrastructure, it is checked whether the rolling stock is compatible with the allocated infrastructure and the driver is properly qualified for driving on that infrastructure. **[**SPP-17794 **]**

Not all infrastructure is compatible with all types of rolling stock and not all...
Not all infrastructure is compatible with all types of rolling stock and not all drivers can drive everywhere. Although this is part of the planning process, it is also checked during operation.

Related to: SPP-15488 - Safety Principle 2: Compatibility of track and vehicle

Operational design principle 4.4: Infrastructure is released as planned.
Proper use of infrastructure also includes leaving the allocated infrastructure at the planned time, in order to make the infrastructure available for other users. **[**SPP-17795 **]**

To allow the planned operation of all users, users also need to make sure they h...
To allow the planned operation of all users, users also need to make sure they have moved away from the allocated infrastructure at the planned time.

Operational design principle 4.5: The user informs the signaller of any deviation of planned use.
If a user is not able to make proper use of infrastructure and cannot leave the allocated infrastructure at the planned time, the user informs the signaller as soon as possible. **[**SPP-17796 **]**

In some cases, operation cannot be executed as planned. This needs to be communi...
In some cases, operation cannot be executed as planned. This needs to be communicated to the signaller, in order to allow adapting the plan. As an OD principle, this refers to any deviation to the

DRAFT

plan that occurs and is reported real-time. For everything that relates to the actual real-time operation on the infrastructure the signaller is intended as the single point of contact to the Infrastructure Manager for the driver. Deviations that can be foreseen are outside the scope of Operational Design and are part of Traffic Management. There will also be Infrastructure Manager contacts in Traffic Management processes. These roles will be described separately from the role of the signaller, although some Infrastructure Managers could combine these two roles in one function.

4.1.5 Principle 5: The signaller decides on operational use in an area

Main Operational Design Principle 5: The signaller decides on operational use in a certain area.
The signaller is responsible, within a certain part of the infrastructure, for operationally allocating infrastructure to users according to the plan, for providing proper authorisation to these users and for monitoring proper use of the infrastructure. **[**SPP-17798 **]**

This main principle deals with the responsibility and role of the signaller. Alt...
This main principle deals with the responsibility and role of the signaller. Although both allocating infrastructure and authorising users may be performed by technical systems, the operational responsibility for these activities need to be with a person: the signaller. If system functionality does not lead to the intended result, the signaller will take action. In other words: The signaller supervises that the plan is correctly executed by the signalling system and intervenes in case this is not so.

Operational design principle 5.1: If infrastructure used for maintenance works, responsibility is transferred.
If a certain part of the infrastructure is used exclusively for maintenance works, control of this infrastructure is transferred for a certain amount of time to the person responsible for safe maintenance work. **[**SPP-17799 **]**

In case of maintenance works that cannot be combined with train traffic, the per...
In case of maintenance works that cannot be combined with train traffic, the person responsible for safe maintenance works needs to be responsible for all (remaining) train movements and operation of infrastructure elements. The principle does not imply that all maintenance work can only be performed on tracks that are exclusively designated for maintenance activities; if the safety risks are acceptable, some maintenance activities (like inspection) could be performed on tracks that are also used for train traffic.

Operational design principle 5.2: The signaller will manually allocate infrastructure, if necessary.
If trackside systems do not provide the intended allocation of infrastructure, the signaller intervenes and allocates the intended infrastructure by taking manual action, if necessary. **[**SPP-17800 **]**

While allocation of infrastructure should typically be performed by automated sy...
While allocation of infrastructure should typically be performed by automated systems, the signaller will take action if necessary and create a train path by manual operation of infrastructure elements if necessary.

4.1.6 Principle 6: System-user interaction is standardised

Main Operational design Principle 6: System-user interaction is standardised.
System-user interaction, including operation of systems and receiving information from systems is performed via standardised interfaces.
[SPP-17801 **]**

This main principle defines the how technical systems are operated. The use of s...
This main principle defines the how technical systems are operated. The use of standardised interfaces for operational staff allows easier training and promotes proper and efficient use.

DRAFT

Related to: SPP-16083 - 1. SP-OD wants to maximise standardised and automated solutions for railway oper...

Related to: SPP-16085 - 3. SP-OD has the objective to apply as most as possible digital solutions for op...

Operational design principle 6.1: There is a single system-user interface with the signalling system for the driver.
All interaction between train driver and the on-board CCS system is performed via a single standardised interface. **[**SPP-17802 **]**

Train drivers may encounter multiple types of rolling stock and drive on network...
Train drivers may encounter multiple types of rolling stock and drive on networks of different Member States. To provide a standardised interface, all rolling stock should use the same standardised ETCS DMI for provision of signalling information and interacting with the on-board CCS system.

Operational design principle 6.2: There is a single system-user interface with the driver for procedural authorisation.
Procedural authorisation is provided to the train driver via the same system interface as is used for the signalling system. **[**SPP-17803 **]**

Train drivers may encounter multiple types of rolling stock and drive on network...
Train drivers may encounter multiple types of rolling stock and drive on networks of different Member States. To provide a standardised interface, all rolling stock should use the same standardised DMI for provision of procedural authorisation i.e. digitalised operational instructions.

Operational design principle 6.3: Signallers use a single system-user interface for operational allocation of infrastructure.
Within any Infrastructure Manager, signallers use a single standardised user interface for interacting with the trackside CCS system. The information that is exchanged with the trackside system is standardised within the Single European Railway Area. **[**SPP-24461 **]**

Infrastructure Manager staff including signallers will not move around through m...
Infrastructure Manager staff including signallers will not move around through multiple networks and typically work within the network of the Infrastructure Manager. While the actions that signallers perform in creating train paths and providing authorisation to trains need to be functionally identical and need to be formatted identically on the interface to the train driver, operation of the trackside infrastructure systems may be performed via a different interface between Infrastructure Managers for a substantial amount of time. Information that is exchanged with the SERA trackside CCS system is standardised however. Development of a full single system-user interface for signallers in the Single European Railway Area is only expected as a long term development.

DRAFT

4.1.7 Principle 7: Procedures are fit for use

Main Operational Design Principle 7: Procedures are fit for use.
Procedures to be executed by operational staff are limited in number, easy to understand and execute, unambiguous, and uniform across the Single European Railway Area and lead to the intended operational result. **[**SPP-17805 **]**

This main principle focuses on the railway operation actions performed by operat...
This main principle focuses on the railway operation actions performed by operational staff. Human actors are flexible and are able to determine whether operation is still performed as intended. Human actors are also subject to human error, however. To reduce the chance of human error, it helps if procedures are limited in number, easy to understand and execute, unambiguous, and uniform.

Operational design principle 7.1: Uniformity of procedures across Europe is most important for train drivers.
Uniformity of procedures across the Single European Railway Area is most relevant for train drivers and other operational Railway Undertaking staff, but still relevant for Infrastructure Manager staff including signallers. **[**SPP-24468 **]**

Infrastructure Manager staff will not move around through multiple Member States...
Infrastructure Manager staff will not move around through multiple Member States and will experience less benefits when procedures are the same as in another Member State. Also, it is likely that the Infrastructure Managers will still have dedicated interfaces for operating their own infrastructure and dedicated traffic management processes for a long time.

Operational design principle 7.2: Routine activities are automated.
Operational activities, especially those that are part of the planned and intended railway operation, are automated i.e. performed by technical systems. **[**SPP-17820 **]**

To increase reliability, capacity and overall performance, and to reduce costs,...
To increase reliability, capacity and overall performance, and to reduce costs, planned operation – mainly consisting of routine activities – should be automated as much as possible. Human actors are primarily intended to monitor the process and take action in case of unexpected events. Also non-routine activities can sometimes be automated, this principle should not be regarded as a limitation.

There can still be reasons however to have certain actions performed by human actors. One of the reasons is that human actors typically perform best at moderate workload. This may be a good reason to not automate certain actions that do not occur very often. Also, it it often useful to have some actions performed manually in order to keep up training for any event in which the automated system fails. Furthermore, some actions require human interpretation and cannot be automated properly.

Related to: SPP-16083 - 1. SP-OD wants to maximise standardised and automated solutions for railway oper...

Operational design principle 7.3: Operational staff is free of unacceptable risk in case of failure.
The quality level at which users must be able to execute a procedure is based on the frequency that the procedure needs to be executed and the consequences in case of failure - both in terms of safety and of reliability of train service. **[**SPP-17821 **]**

Human actors can typically work skill based, rule based or knowledge based (Kirw...
Human actors can typically work skill based, rule based or knowledge based (Kirwan Human Factor approach). Any failure that can impact railway safety should typically lead to a requirement that the related procedure is executed skill-base or rule-based. If a failure will have no impact on safety and the need for this procedure will occur only at rare occasions then knowledge based execution is typically good enough.

Operational design principle 7.4: All operational situations can be handled.
Operational Procedures are complete, meaning there is a defined way of handling any operational situation that can occur. **[**SPP-18052 **]**

Procedures that are fit for use should also be sufficient to deal with any situa...
Procedures that are fit for use should also be sufficient to deal with any situation of or on the infrastructure. A situation in which no one knows how to handle is to be avoided. This can be realised by handling a multitude of situations using a limited set of procedures, which is possible as many different causes lead to the same limitations for use.

Operational design principle 7.5: Each operational situation can be handled by a single operational procedure.
For each uniquely identifiable operational problem, there is a single, clearly defined operational procedure to address it. **[**SPP-20635 **]**

If there are more procedures to cope with a specific problem (say a defective le...
If there are more procedures to cope with a specific problem (say a defective level-crossing) the likelihood of selecting the wrong procedure increases.

DRAFT

4.1.8 Principle 8: Technical systems perform safety relevant actions

Main Operational Design Principle 8: Technical systems perform safety relevant actions.
For safety relevant actions, priority is given to technical solutions. If this is not possible, safety relevant actions are performed by trained and authorised operational staff. **[**SPP-17818 **]**

This main principle defines the approach to safety relevant actions. Railway saf...
This main principle defines the approach to safety relevant actions. Railway safety incidents can have very serious consequences. Human actors are subject to human error and will make occasional mistakes. To prevent that these actions lead to actual danger, any action that can impact railway safety should preferably be performed by safety systems i.e. systems that are designed to be fail-safe and have a Safety Integrity Level certification, which proves that they have a lower failure rate than trained human actors. This is especially relevant for safety relevant actions that are time critical, i.e. need to be executed very quickly.

Operational design principle 8.1: Safety critical actions by operational staff are supervised by safety systems.
Safety critical actions that are executed by operational staff are supervised by safety systems in order to prevent unacceptable safety risks. **[**SPP-17806 **]**

Whenever operational staff executes actions that can lead to unsafe consequences...
Whenever operational staff executes actions that can lead to unsafe consequences, these actions should be supervised by safety systems as much as possible as these actions are subject to human error.

Operational design principle 8.2: Operational staff takes into account safety principles for safety relevant actions.
When executing safety critical actions, operational staff will take into account the safety principles applicable to railway operation. **[**SPP-17959 **]**

Taking into account the safety principles for railway operation reduces the chan...
Taking into account the safety principles for railway operation reduces the chance of making safety critical errors.

Related to: SPP-15486 - Safety Principle 1: Safe Conditions for track and vehicle
Related to: SPP-15488 - Safety Principle 2: Compatibility of track and vehicle
Related to: SPP-15489 - Safety Principle 3: Ensure the correct status of movable elements
Related to: SPP-15490 - Safety Principle 4: Prevent conflicting movements
Related to: SPP-15491 - Safety Principle 5: Prevent Overspeeding and unintended vehicle movements
Related to: SPP-15487 - Safety Principle 6: Protect people and goods

Operational design principle 8.3: Procedural authorisation is no routine activity.
Provision of procedural authorisation is standardised and is not part of normal, planned operation and is only used in case of technical failure. **[**SPP-17807 **]**

Procedural authorisation for train movements presents risks due to the possibili...
Procedural authorisation for train movements presents risks due to the possibility of human error. This risk is only acceptable if this is necessary to limit the effects of technical failure and should not be part of the planned regular operation. To limit the risk of human error, the way in which procedural authorisation is provided is standardised (as formalised operational instructions).

Related to: SPP-16083 - 1. SP-OD wants to maximise standardised and automated solutions for railway oper...

Operational design principle 8.4: Planning and planned operational allocation of infrastructure is not safety relevant.

DRAFT

Planning and allocating operational use of the infrastructure as part of the normal, planned operation is not safety relevant. **[**SPP-17808 **]**

As long as all safety related actions in normal operation are executed by or con...
As long as all safety related actions in normal operation are executed by or controlled by safety systems, adapting planning and providing route setting commands cannot have safety relevant consequences in case of failure. Procedures and systems for these activities do not need to be fail-safe. One important condition for this is that there is system support that ensures compatibility between track and rolling stock, at least to prevent unsafe consequences.

Operational design principle 8.5: Railway safety risks are ALARP.
Railway safety risks are managed by a safety management system aimed at making these risks As Low As Reasonably Practicable.

Disclaimer: This is a first draft from System Pillar Operational Design side. It may be reworked based on PRAMS input once that input is available. **[**SPP-17809 **]**

Safety is an important quality aspect of railway operation, but not the only one...
Safety is an important quality aspect of railway operation, but not the only one. It should be avoided to require safety measures that limit other quality aspects such as reliability and capacity only to have a theoretical safety improvement. This means placing additional rules and restrictions on human actions for safety reasons - like acknowledgement of safety critical activities - is only necessary if the related risks are higher than the accepted residual safety risks of SIL-4 systems. As new technology also brings better opportunities to limit the possibility of safety critical failures, the ALARP principle will also imply that the safety level will not be reduced by the introduction of new technology.

Other Safety principles are regarded as a less optimal choice, from Operational Design point of view. GAME/GAMAB may not be good enough when migrating from some older legacy systems, ALARA may lead to small and insignificant safety gains at substantial additional costs, and MEM may lead to leaving out small but still relevant safety gains that are easy to realise.

DRAFT

4.1.9 Principle 9: Operational staff receives relevant information

Main Operational Design Principle 9: Operational staff receives relevant information.
Operational staff is provided with any information that is relevant to allow proper use of the infrastructure. **[**SPP-17810 **]**

This main principle deals with the provision of relevant information to operatio...
This main principle deals with the provision of relevant information to operational staff. Operational staff will typically need to be provided with accurate and relevant information to be able to properly execute their task.

Operational design principle 9.1: Relevant information is provided by technical systems.
Relevant information, including communication between users, is communicated and provided to users via technical systems as much as possible. **[**SPP-17811 **]**

System based communication or ‘silent’ communication allows for more efficient a...
System based communication or ‘silent’ communication allows for more efficient and effective communication. Also, direct voice communication between operational staff is typically limited to one-on-one communication, in which case the operational staff member is not reachable for other voice calls. System based communication eliminates this restriction. On the other hand, human actors are more flexible in handling unexpected circumstances. Direct voice communication between human actors is still useful in these situations. Also, this allows non-verbal communication like emotional state that can sometimes be relevant, depending on the nature of the incident.

Related to: SPP-16084 - 2. SP-OD aims to reduce inter-human communication need for operations. It means...

Operational design principle 9.2: Operational staff shares relevant information.
Operational staff will share any relevant information with other operational staff for whom this information is relevant, if this information cannot be communicated via technical systems. **[**SPP-17812 **]**

Not all types of information can efficiently be communicated between operational...
Not all types of information can efficiently be communicated between operational staff. Especially information on unexpected events or information requiring consultation between staff is best communicated directly via voice communication.

Operational design principle 9.3: The signaller has access to train status information.
Additional to the trackside information that is available, any information on actual train status that is available in the trackside system is presented to the signaller if requested. **[**SPP-17813 **]**

To properly interact with train drivers, any information on the actual train sta...
To properly interact with train drivers, any information on the actual train status – such as speed, location, mode and level – can be relevant to the signaller, apart from information on the infrastructure status that is also required.

Operational design principle 9.4: Relevant information is presented, while other information is available on request.
Information that is relevant for normal and maintenance operation is presented to the user, as well as information that is relevant for any action that is very time critical. Other information that can be relevant depending on the operational conditions is presented to the user on request. **[**SPP-21566 **]**

If all information that can be relevant in any operational condition is always p...
If all information that can be relevant in any operational condition is always presented to the user, there is a significant risk of 'flooding' the user with information that is not relevant most of the time. Information that is relevant for regular, planned operation is the proper kind of information to present to a user as fixed information on the user interface. Any other information that is available should be presented on request of the user.

DRAFT

4.1.10 Principle 10: New technology supports existing operation

Main Operational Design Principle 10: New technology supports existing operation.
Any new technology to be used in railway operation supports, as a minimum, the current existing operational use of the infrastructure. **[**SPP-17814 **]**

This main principle stipulates that the introduction if new technology should no...
This main principle stipulates that the introduction if new technology should not make existing operation impossible. New technology will become available to allow more and higher quality railway operation. In principle, any new technology must still support the existing operational needs for railway operation, such as departure, combining, changing direction etc. While the same operational use must be supported, the process in which this is performed and the procedures that have to be followed can vary significantly from those performed in legacy systems. Support of existing operational use should only be left out if the need for such operational activity ceases to exist.

Operational design principle 10.1: New trackside technology supports existing rolling stock.
New trackside technology may offer additional functionality for newer rolling stock, but also supports the use of existing rolling stock. **[**SPP-19224 **]**

Rolling stock that complies to the TSI's should be able to run anywhere in the S...
Rolling stock that complies to the TSI's should be able to run anywhere in the Single European Railway Area and should be able to keep using any infrastructure that it is already using. ETCS offers version management and backwards compatibility to allow this, although this principle is not absolute: in well defined circumstances as laid down in the TSI, an update of rolling stock (i.e. to a higher System Version) could be required.

5 Technical configurations (Feature set)

Operational processes within this operational design are differentiated according to two categories of features, as defined by the Architecture and Release Coordination Domain:

Grade_Of_Automation

GoA0

GoA1

GoA2

OnBoard features

SV2.1

SV2.2

SV3.0

SV_SP

Each operational process is designed with regard to its dependency on the features liste above. When differences exist, the process is explicitly linked to the corresponding feature.

- **Grade of Automation differentiation**
  - If an operational process is specific to GoA 1, it is linked to the GoA 1 feature
  - If an operational process is specific to GoA 2, it is linked to the GoA 2 feature
  - If an operational process is valid for both GoA 1 and GoA 2 without distinction, no GoA-specific feature is linked.
- **Onboard features differentiation**
  - If an operational process differs depending on the onboard features, the process is linked to the corresponding SV feature work item (SV2.1, SV2.2, or SV3.0)
  - If an operational process is identical across System Versions, no System Version-specific work item is linked

This feature-based differentiation ensures:

- Clear traceability of operational processes to the relevant functional scope
- Explicit identification of GoA- and SV-specific behavior
- Simplified maintenance of the operational design when new System Versions or GoA levels are introduced

DRAFT

6 Operational actors (and skills), and entities

This section outlines the operational actors and entities involved in the defined operational processes. The list is subject to updates whenever a subtopic introduces a new actor or requires the refinement or subdivision of existing actors.

6.1 Actors

Signaller
Staff in charge of authorising trains/shunting movements and of issuing instructions to train drivers to ensure safe train operation. **[**SPP-10101 **]**

Train Driver
Train Driver means a person capable and authorised to drive trains, including locomotives, shunting locomotives, work trains, maintenance railway vehicles or trains for the carriage of passengers or goods by rail in autonomous, responsible and safe manner. (Reference: Article 3 of Directive 2007/59/EC)
This includes different roles related to train responsibility, especially the train guard, the shunting assistent (e.g. located in the train front end), fall-back responsibilities in case of ATO failure and other train driver assistants. **[**SPP-10100 **]**

Field Force
The field force is the single point of contact when maintenance activity or construction work is carried out in the field, e.g. this actor is responsible for the safety of the staff in the field. In addition, the field force visualises and interprets diagnostics and monitoring data from the CCS system to support maintenance and resolution of technical issues. **[**SPP-10697 **]**

6.2 Entities

Trackside CCS
All the trackside equipment required to ensure safety and to command and control movements of trains authorised to travel on the network. (Reference: TSI CCS 2023/1695) **[**SPP-10102 **]**

On-board CCS
All the on-board equipment required to ensure safety and to command and control movements of trains authorised to travel on the network. (Reference TSI CCS 2023/1695) **[**SPP-10103 **]**

DRAFT

7 Operational Vision Breakdown Alignment

The Operational Vision Breakdown Alignment (SPP-19162 - OD_Operational Vision Breakdown Alignment CCS System_V0.3 provides a top-down breakdown of:

- Operational requirements
- Stakeholder requirements, and
- Application conditions

These are derived from the Operational Vision for CCS (see SPP-19136 - Document Context). For the system pillar traceability concept see SPP-18362 - EET_Requirements Management Plan Version_1.0.

The System Pillar received input on operational processes from multiple railways. These inputs were consolidated to define additional operational requirements which are formalized for each subtopic in the Operational Requirement Specification (SPP-28675 - OD_Operational Requirements Specification CCS System Release 4). The operational requirements represent what the operational design must fulfil.

Chapter SPP-14937 - Operational Processes provides the mapping between operational requirements and the specific operational processes that implement them.

DRAFT

8 Subtopics addressed

The work of the OD and Traffic CS domain is organized along a consolidated list of operational scenarios captured in subtopics (SPP-28769 - Subtopics OD and Traffic CS: Traceability Report). All subtopics addressed are listed below:

ID	Subtopic	Change (new| modified| unchanged)	Purpose / Scope of subtopic
t02	SPP-11764 - 102B - t02 - Next operational step unknown	new	Update the production plan to resume or end the train mission.
t03	SPP-11766 - 102C - t03 - Observations while driving	modified	Ensure observations of infrastructure or train conditions are reported.
t04	SPP-11767 - 102D - t04 - Resume driving after stopping short of scheduled stopping location	new	To enable the train driver to move the train from the actual stopping location to the scheduled stopping location.
t05	SPP-11768 - 101B - t05 - Train departure	new	Start a planned movement by using Start and receiving FS or OS MA.
t06	SPP-11769 - 108A - t06 - Revoke Movement Permission	modified	Shorten the MA for operational purposes.
t07	SPP-11770 - 403A_on - t07 - Activate planned temporary speed restriction	new	To activate a previously planned temporary speed restriction and ensure all supervised trains comply. **Out of Scope:** Planning and introducing the speed restriction in the system. Method or actors that trigger the activation of the Temporary Speed Restriction.
t08	SPP-11771 - 403A_off - t08 - Deactivate temporary speed restriction	new	To deactivate the temporary speed restriction and ensure the Signaller log is updated. **Out of Scope:** Method or actors that trigger the deactivation of the Temporary Speed Restriction.
t11	SPP-11776 - 403C - t11 - Handling an unplanned speed restriction	new	Ensuring that the unplanned speed restriction is activated in the Trackside CCS as a TSR, and that all Train drivers of supervised and unsupervised trains are informed, if relevant.
t13	SPP-11779 - 103A - t13 - End of mission	new	To end train movements as operated from the current cab.
t15	SPP-11781 - 107 - t15 - Arrival at scheduled stop	new	Performing a scheduled stop.

DRAFT

ID	Subtopic	Change (new| modified| unchanged)	Purpose / Scope of subtopic
t16	SPP-11785 - 112 - t16 - Platform start	new	Prepare the train for departure from a platform: ensure that passengers have properly boarded the train, closing doors.
t62	SPP-17089 - 108B - t62 - Reducing Movement Permission by signaller action for a specific location in case of imminent danger	new	Handling a situation that presents imminent danger for a single train at a specific location on the infrastructure, for which the Signaller needs to take action
t64	SPP-21673 - 108C - t64 - Reducing Movement Permission by signaller action for an area in case of imminent danger	new	Handling a situation that presents imminent danger in a certain area on the infrastructure, for which the signaller needs to take action
t68	SPP-21160 - 102G - t68 - Regular execution of planned train movement	new	Creating a safe train path triggered by the actual situation of infrastructure and train, based on the plan as actualised by Traffic Management. Includes release of infrastructure as soon as the train has passed.

DRAFT

9 Operational Processes

This section provides the details about the Operational Processes.
For each process, the following elements are presented:

- **Operational Preconditions** – the conditions that must be satisfied before the process can begin.
- **Operational Rationale** – the justification and purpose of the process.
- **Operational Postconditions** – the state achieved once the process is completed.

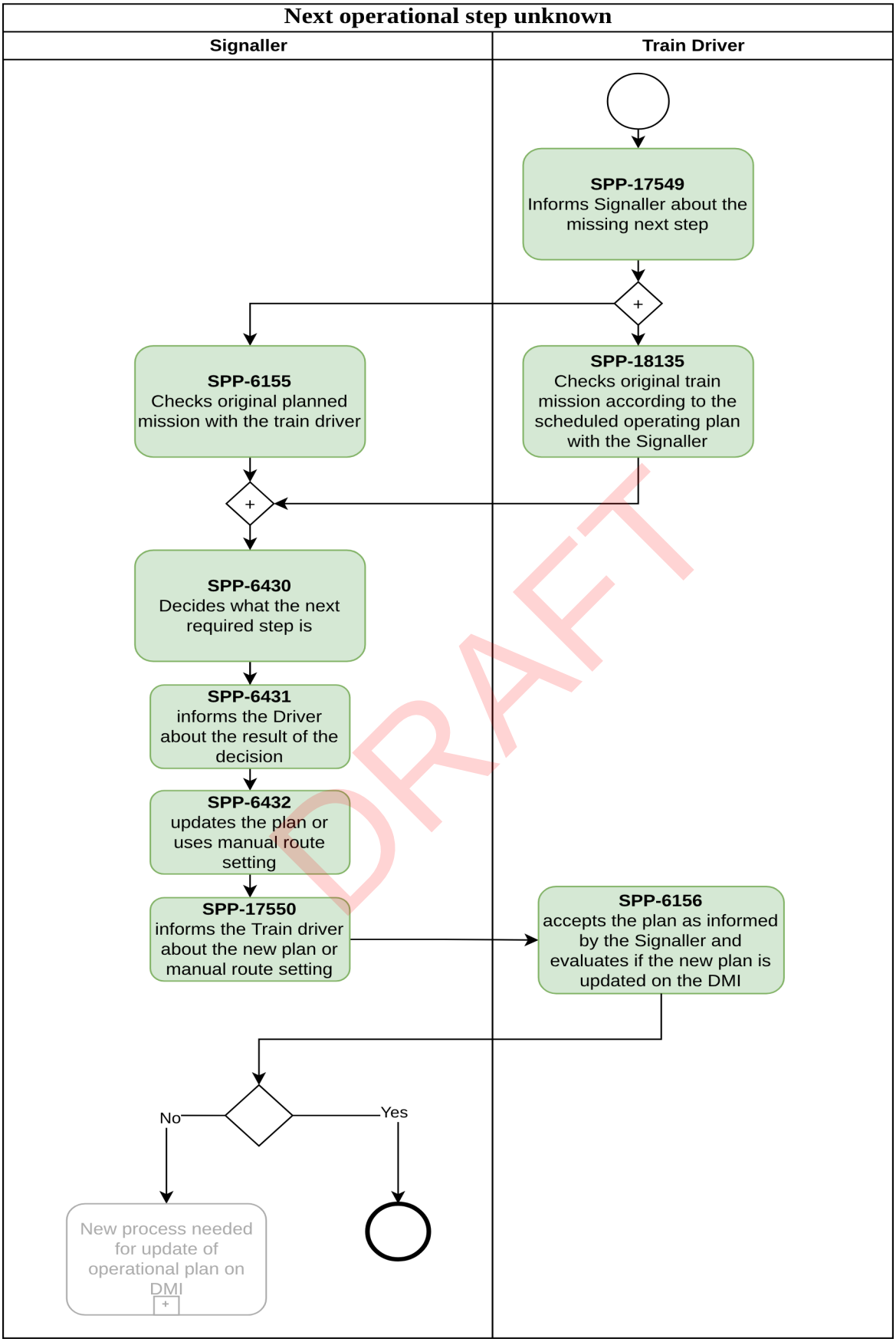
In addition, each **Operational Process** is illustrated with a **process diagram**. The **operational activities** are detailed step by step, followed by a list of the **implemented operational requirements** that the process fulfils.

9.1 Next operational step unknown

Next operational step unknown

ID	SPP-6154
Op.Precondition	A train is at standstill not in a depot or stabling track. Timetable does not contain any further operations for this train
Op.Rationale	Showing how operations can proceed, if the next steps are unknown or haven't been communicated
Op.Postcondition	The train is able to move with a new or updated operational plan

DRAFT


Next operational step unknown
Signaller
Train Driver
SPP-17549
Informs Signaller about the missing next step
+
SPP-6155
Checks original planned mission with the train driver
SPP-18135
Checks original train mission according to the scheduled operating plan with the Signaller
+
SPP-6430
Decides what the next required step is
SPP-6431
informs the Driver about the result of the decision
SPP-6432
updates the plan or uses manual route setting
SPP-17550
informs the Train driver about the new plan or manual route setting
SPP-6156
accepts the plan as informed by the Signaller and evaluates if the new plan is updated on the DMI
No
Yes
New process needed for update of operational plan on DMI
+
DRAFT

[SPP-6428]

9.1.1 Operational Activities involved in Operational Process

Train driver informs Signaller about the missing next step
Driver informs the Signaller about the issue, that no next operational step is known **[**SPP-17549 **]**

Signaller checks original planned mission with the train driver
Signaller checks the original planned mission with the driver **[**SPP-6155 **]**

Train Driver checks original train mission according to the scheduled operating plan with the Signaller
Train Driver checks original train mission according to the scheduled operating plan with the Signaller **[**SPP-18135 **]**

Signaller decides what the next required step is
Signaller decides, if necessary together with the dispatcher, what the next required step is **[**SPP-6430 **]**

Signaller informs the train driver about the result of the decision
Signaller informs the driver about the decision **[**SPP-6431 **]**

Signaller updates the plan or uses manual route setting
Signaller updates the plan or uses manual route setting **[**SPP-6432 **]**

Signaller informs the Train driver about the new plan or manual route setting
Signaller informs the driver about the new plan or manual route setting. **[**SPP-17550 **]**

Train Driver accepts the plan as informed by the Signaller and evaluates if the new plan is updated on the DMI
Driver accepts the plan as informed by the Signaller and evaluates if the new plan is updated on the DMI **[**SPP-6156 **]**

9.1.2 Operational Requirements implemented by Operational Process

SPP-6154: Next operational step unknown:

SPP-18575: The Signaller and the Driver shall rely on a specific procedure even for managing situations when the next operational next is not known:

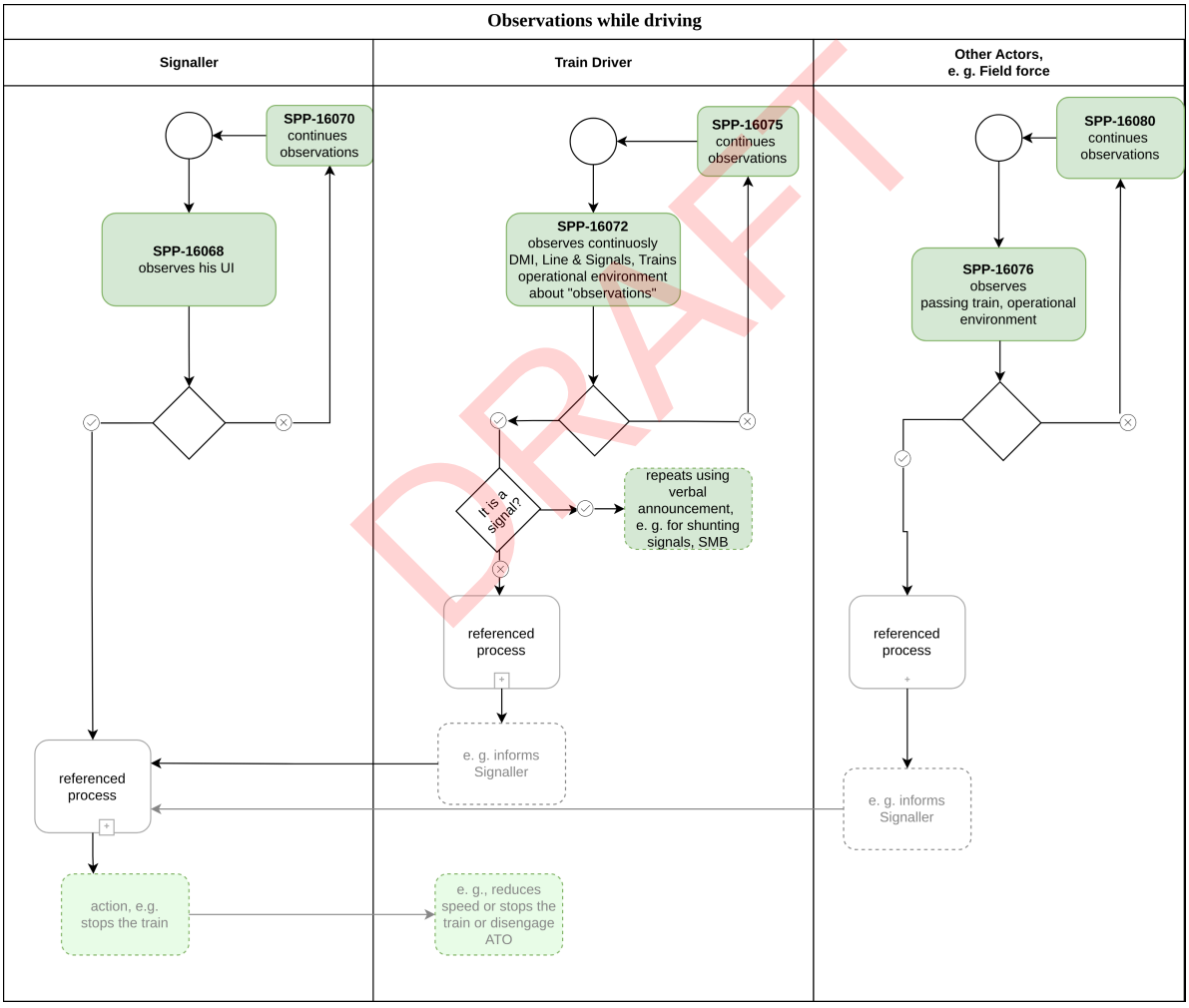
DRAFT

9.2 Observation while driving

Observations while driving process

ID	SPP-16066
Op.Precondition	- movement of a train or vehicles - presence of driver(s) / driver assistants and / or signaller or other operational railway staff

Op.Rationale	- Signaller shall observe passing trains and the related environment. The signaller shall act in case of observations compromising safety by specific measures (e. g. stopping train, emergency call) and/or information of the concerned actors. - Train Driver must observe the behavior of the own train, other trains and the track conditions including signals. The train driver shall act in case of observations compromising safety by specific measures (e. g. reducing speed, stopping train, emergency call, disengaging ATO) and/or information of the concerned actors especially the signaller. - Other Actors involved in train operations especially working on the track and on/for the train, e.g. maintenance people must contribute any observation which is or can compromise safety principles for railway operations. Each actor shall act in case of observations compromising safety by specific measures especially by informing the signaller.
Op.Postcondition	Case 1: Mission / Movement has ended without observations Case 2: If any observation has appeared during movement/mission, it has been treated and communicated as described in the process



[SPP-7284]

DRAFT

9.2.1 Operational Activities involved in Operational Process

The Signaller observes his User Interface
The Signaller observes his user Interface (including sensor messages from detection systems as obstacle detection or hot wheel detection, meteorological conditions) and if possible passing Trains to monitor operational environment **[**SPP-16068 **]**

The Signaller continues observations
The Signaller continues observations **[**SPP-16070 **]**

Train Driver observes DMI, Line & Signals, Train's operational environment
Train Driver observes DMI, Line & Signals, Train's operational environment (even for cabin signalling: need to repeat verbally the value of the signal, e. g. for shunting signals or stop marker boards) **[**SPP-16072 **]**

Train Driver continues observations
Train Driver continues observations **[**SPP-16075 **]**

Field Force observes passing train, operational environment
Field Force observes passing train, operational environment **[**SPP-16076 **]**

Field Force continues observations
Field Force continues observations **[**SPP-16080 **]**

9.2.2 Operational Requirements implemented by Operational Process

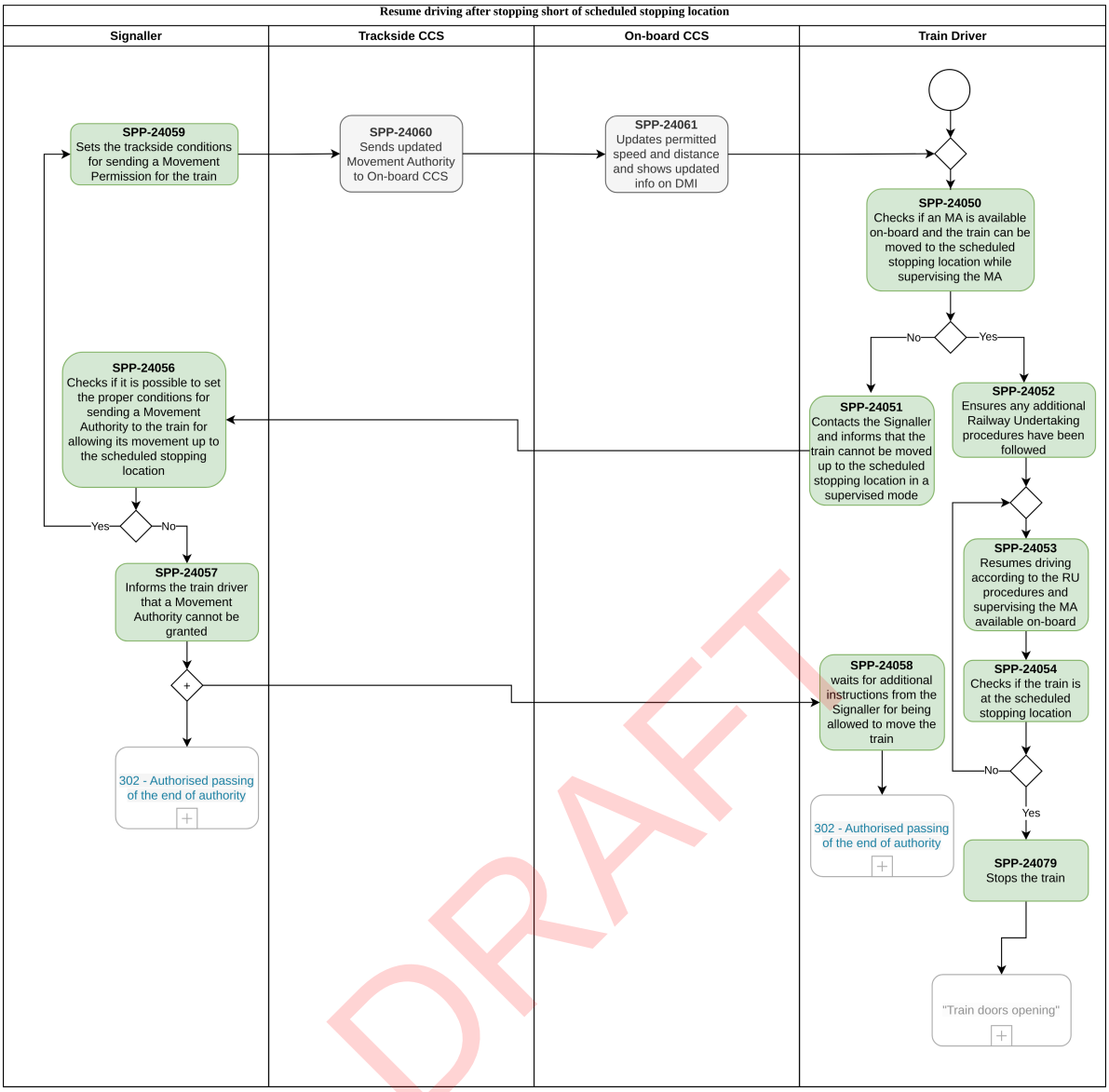
none

DRAFT

9.3 Resume driving after stopping short of scheduled stopping location

Resume driving after stopping short of scheduled stopping location

ID	SPP-6065
Op.Precondition	The train has stopped short of the scheduled stopping location. An MA to advance to the scheduled stopping location may or may not be available. If present, ATO is disengaged.
Op.Rationale	To enable the train to be moved in a supervised way from its actual stopping location to the scheduled stopping location.
Op.Postcondition	- Train at standstill at the scheduled stopping location OR - Train at standstill at the short stopping location, ready to be moved in SR



[SPP-23996]

9.3.1 Operational Activities involved in Operational Process:

The train driver checks if an MA is available on-board and the train can be moved to the scheduled stopping location while supervising the MA.
The train driver checks if an MA is available on-board and the train can be moved to the scheduled stopping location while supervising the MA. [SPP-24050]

Train driver contacts the Signaller and informs that the train cannot be moved up to the scheduled stopping location in a supervised mode.
Train driver contacts the Signaller and informs that the train cannot be moved up to the scheduled stopping location, supervising a valid MA. [SPP-24051]

Train driver ensures any additional Railway Undertaking procedures have been followed.
Train driver ensures any additional Railway Undertaking procedures have been followed.

Note: Harmonization of Railway Undertaking procedures is not in the scope of this task. [SPP-24052]

Train driver resumes driving according to the RU procedures and supervising the MA available on-board.

Train driver resumes driving according to the RU procedures and supervising the MA available on-board. [SPP-24053]

Train driver checks if the train is at the scheduled stopping location.
Train driver checks if the train is at the scheduled stopping location. [SPP-24054]

Signaller checks if it is possible to set the proper conditions for sending a Movement Authority to the train for allowing its movement up to the scheduled stopping location.
Signaller checks if it is possible to set the proper conditions for sending a Movement Authority to the train for allowing its movement up to the scheduled stopping location. [SPP-24056]

Signaller informs the train driver that a Movement Authority cannot be granted.
Signaller informs the train driver that a Movement Authority cannot be granted. [SPP-24057]

Train driver waits for additional instructions from the Signaller for being allowed to move the train.
Train driver waits for additional instructions from the Signaller for being allowed to move the train. [SPP-24058]

Signaller sets the trackside conditions for sending a Movement Permission for the train.
Signaller sets the trackside conditions for sending a Movement Permission for the train. [SPP-24059]

Trackside CCS sends updated Movement Authority to On-board CCS.
Trackside CCS sends updated Movement Authority to On-board CCS. [SPP-24060]

On-board CCS updates permitted speed and distance and shows updated info on DMI.
On-board CCS updates permitted speed and distance and shows updated info on DMI. [SPP-24061]

Train Driver stops the train
Train Driver stops the train at the scheduled stopping location. [SPP-24079]

9.3.2 Operational Requirements implemented by Operational Process

SPP-6065: Resume driving after stopping short of scheduled stopping location:

SPP-23764: A procedure is required to move a train which stopped short of the expected stopping location, if it cannot be moved in a supervised mode.:
A specific procedure shall be defined for allowing the train driver/ATO to reach the target position in case the train has been stopped short of the expected stopping location and the MA available on-board does not allow the train to be moved until the correct stopping location.
SPP-7067: Real time management of routine operational production procedures:
Predefined procedures shall be defined for ensuring real-time optimization of railway operation.

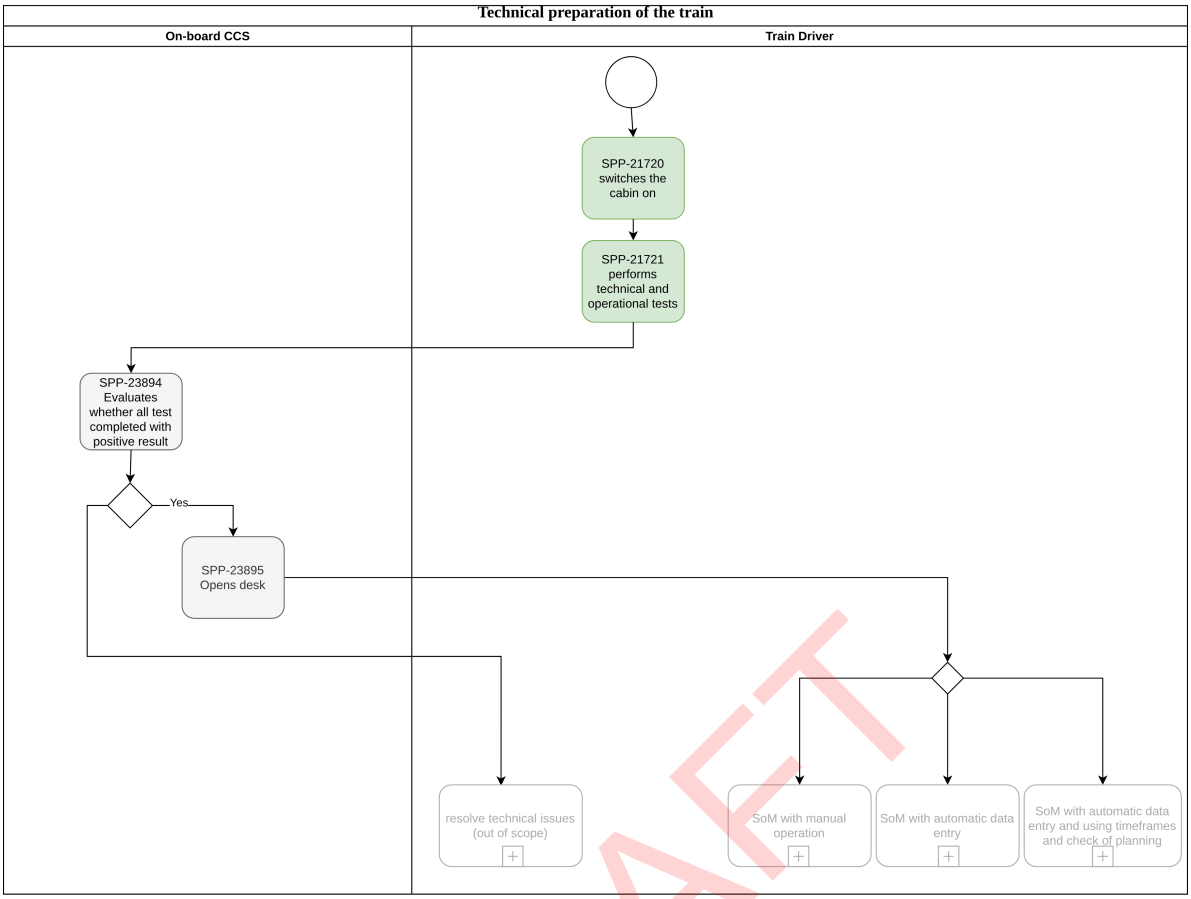
DRAFT

9.4 Train departure / SoM departure

9.4.1 Train departure / SoM general overview (train preparation)

Technical preparation of the train

ID	SPP-21718
Op.Precondition	Train is at standstill in No Power
Op.Rationale	The train is being prepared to start a mission
Op.Postcondition	Train is at standstill. Brake tests completed. Diagnostics checks done. Train is in SB mode. No communication session is established or is being established. Train driver has the route information



[SPP-21719]

9.4.1.1 Operational Activities involved in Operational Process:

Train Driver switches the cabin on
The Train driver switches the cabin on. The train is going from status No Power to Powered.
[SPP-21720]

Train Driver performs technical and operational tests
When a train is powered on by the driver, tests must be done. Depending on the rolling stock, these tests may or may not be carried out automatically. It involves testing the brakes, assessing the safe condition of various parts of the train. Sometimes non-safety-relevant parts are also tested. In this phase, it may also be necessary to enter data for the use of the train in different class B environments. Also specific data for ATO use should be entered, if applicable.
[SPP-21721]

On-board CCS evaluates whether all tests are completed with positive result
At the end of the test phase, depending on the way in which the rolling stock is designed, a notification will be made to the driver via the interface of the train control management system. At that moment, the DMI will show the first screen of the SoM and the driver or the system can start data entry. In some cases, there will be no notification from the train system and the DMI will immediately show the SoM first screen.
The prerequisite for an automatic test phase and for manual tests via the train system is that the tests relevant to a mission in ETCS have been successfully completed.
[SPP-23894]

DRAFT

On-board CCS opens desk
When all the trainside technical tests are completed with a positive result the Train Control Management System allows the On-board CCS to open the desk and to show the first screen of the SoM on the DMI.
[SPP-23895 **]**

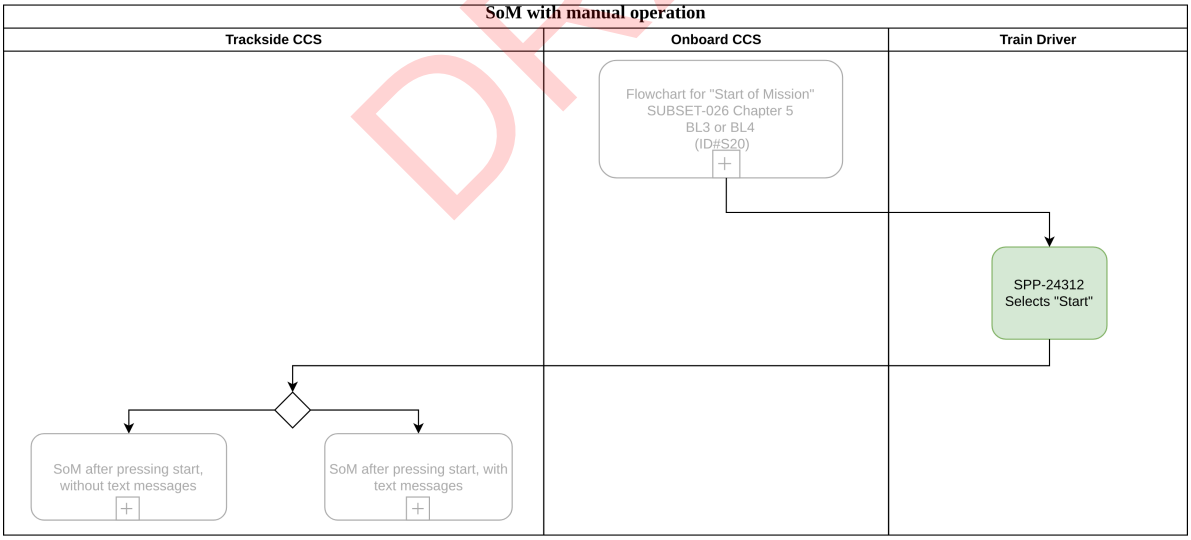
9.4.1.2 Operational Requirements implemented by Operational Process

none

9.4.2 Train departure / SoM with manual operation

Start of Mission with manual operation

ID	SPP-21872
Op.Precondition	Train is at standstill. Train is in SB mode. Brake tests completed. Diagnostics checks done. Desk is open No communication session is established or is being established.
Op.Rationale	Manual data entry: Driver ID, TRN, level choice, train data (length, braking percentage...) Train has to start in Level 2
Op.Postcondition	Train Driver has selected "Start" button. Train has sent a MA request Communication Session with RBC is established



[SPP-21873 **]**

9.4.2.1 Operational Activities involved in Operational Process:

Note: The operational process of SoM with manual operation is as described in SUBSET-26. See harmonisation variations in SPP-21876 - Topic / scenario analysis

DRAFT

Train Driver selects "Start"
Train Driver selects "Start"
[SPP-24312 **]**

9.4.2.2 Operational Requirements implemented by Operational Process

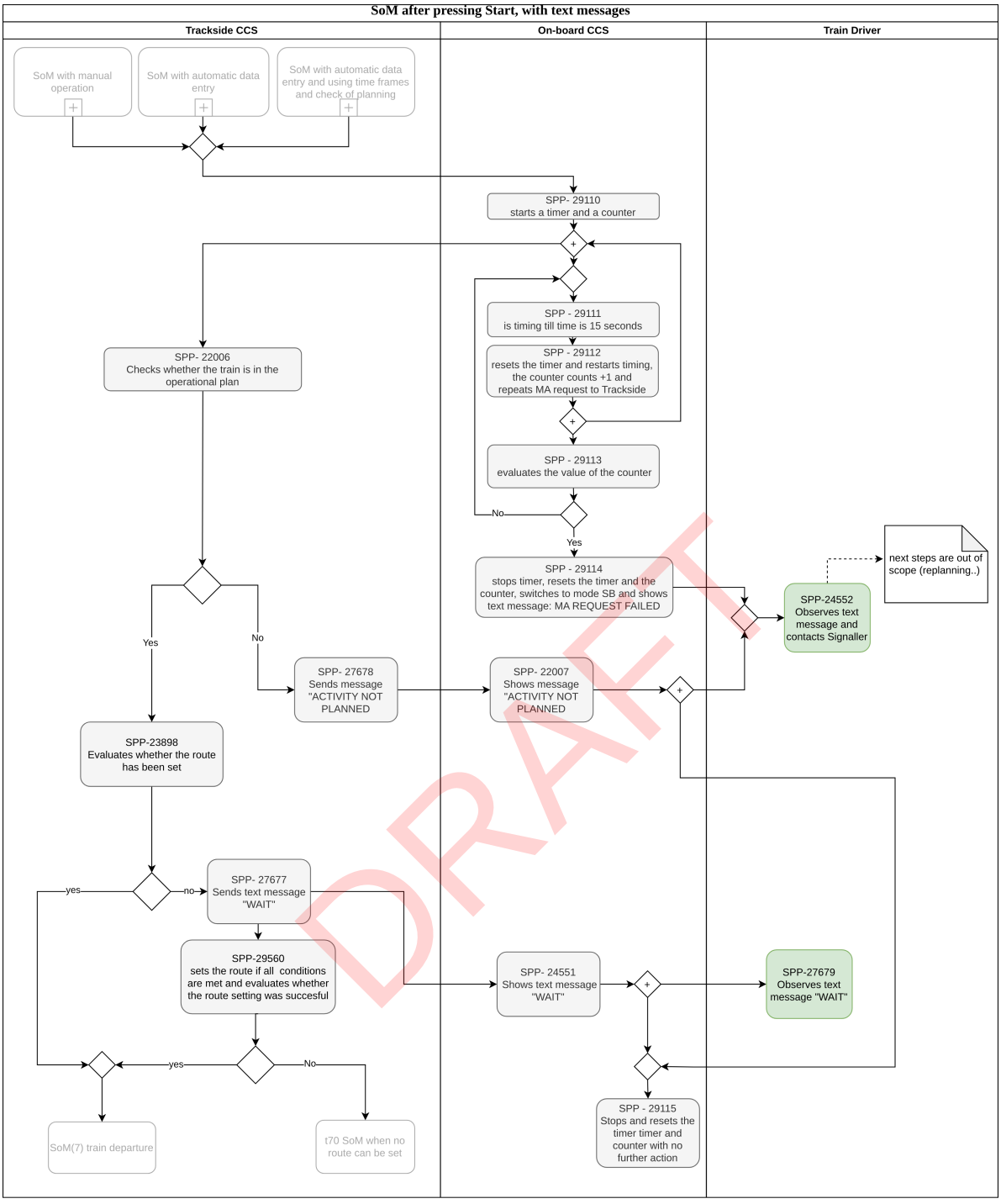
none

9.4.3 Train departure / SoM after pressing start, with text messages

SoM after pressing start, with text messages

ID	SPP-22004
Op.Precondition	Preparation of the train as described in "Technical preparation of the train" is completed, Data entry is completed, Train Driver has selected "Start" button. Train has sent a MA request, Connection is established. Automatic route setting is in use
Op.Rationale	Inform Driver that the MA request is received but the train is not allowed to move yet.
Op.Postcondition	Text message displayed to Driver.

DRAFT



[SPP-22005]

9.4.3.1 Operational Activities involved in Operational Process:

On-board CCS starts a timer and a counter
If a failure occurs after pressing start the onboard will get into a deadlock situation. To prevent this the system will send a new MA request after 15 seconds. After 3 attempts the system will return to the SB mode. [SPP-29110]

On-board CCS is timing till time is 15 seconds
The onboard timer is timing 15 seconds and goes to the following step when 15 seconds are reached [SPP-29111]

On-board CCS resets the timer and restarts timing, the counter counts +1 and repeats MA request to Trackside CCS
On-board CCS resets the timer and restarts timing, the counter counts, Count C = C+1. The On-board CCS also repeats the MA request
[SPP-29112 **]**

On-board CCS evaluates the value of the counter.
If the counter counts 4 the system goes to the following step.
If the counter is lower than 4 the system repeats the former step.
[SPP-29113 **]**

On-board CCS stops timer, resets the timer and the counter, switches to mode SB and shows text message "MA REQUEST FAILED"
The On-board CCS switches to mode SB and shows text message "MA REQUEST FAILED"
[SPP-29114 **]**

Train Driver observes text message and contacts Signaller
Train Driver observes the message and contacts Signaller to resolve the issue that has occurred. The Signaller could decide to replan the train movement or determine that the train does not have to run, next steps are out of the scope.
[SPP-24552 **]**

Trackside CCS checks whether the train is in the operational plan
Trackside CCS checks whether the train is in the planning. **[**SPP-22006 **]**

Trackside CCS evaluates whether the route has been set
Trackside CCS evaluates whether the route has been set.
[SPP-23898 **]**

Trackside CCS sets the route once all conditions are met and evaluates whether route setting was succesful
Trackside CCS sets the route once all conditions are met and evaluates whether route setting was succesful. **[**SPP-29560 **]**

Trackside CCS sends message "ACTIVITY NOT PLANNED"
Trackside CCS sends message "ACTIVITY NOT PLANNED" **[**SPP-27678 **]**

On-board CCS shows message "ACTIVITY NOT PLANNED"
When the train which has requested an MA is not in the planning. On-board CCS shows message "ACTIVITY NOT PLANNED"
In this case a problem has to be solved. The train is not in the operational plan or a wrong TRN is entered, etc.
[SPP-22007 **]**

On-board CCS stops and resets the counter with no further action
The On-board CCS stops and resets the counter with no further action **[**SPP-29115 **]**

Trackside CCS sends text message "WAIT"
Trackside CCS sends text message "WAIT"
[SPP-27677 **]**

On-board CCS shows text message "WAIT"
When the train is in the operational plan but the route is not been set yet. On-board CCS shows text message "WAIT"
Rationale: The text message "Wait" gives the train driver the information that his train was accepted by the trackside CCS, and that he has to wait till the conditions are met to receive an authorisation to move.
[SPP-24551 **]**

Train Driver observes text message "WAIT"
Train Driver observes text message and knows that his train is in the planning and that he has to wait for an MA or a authorisation to move by the system. If no MA has been provided at he planned departure time the driver will call the signaller , unless he has information about the delay. **[**SPP-27679 **]**

DRAFT

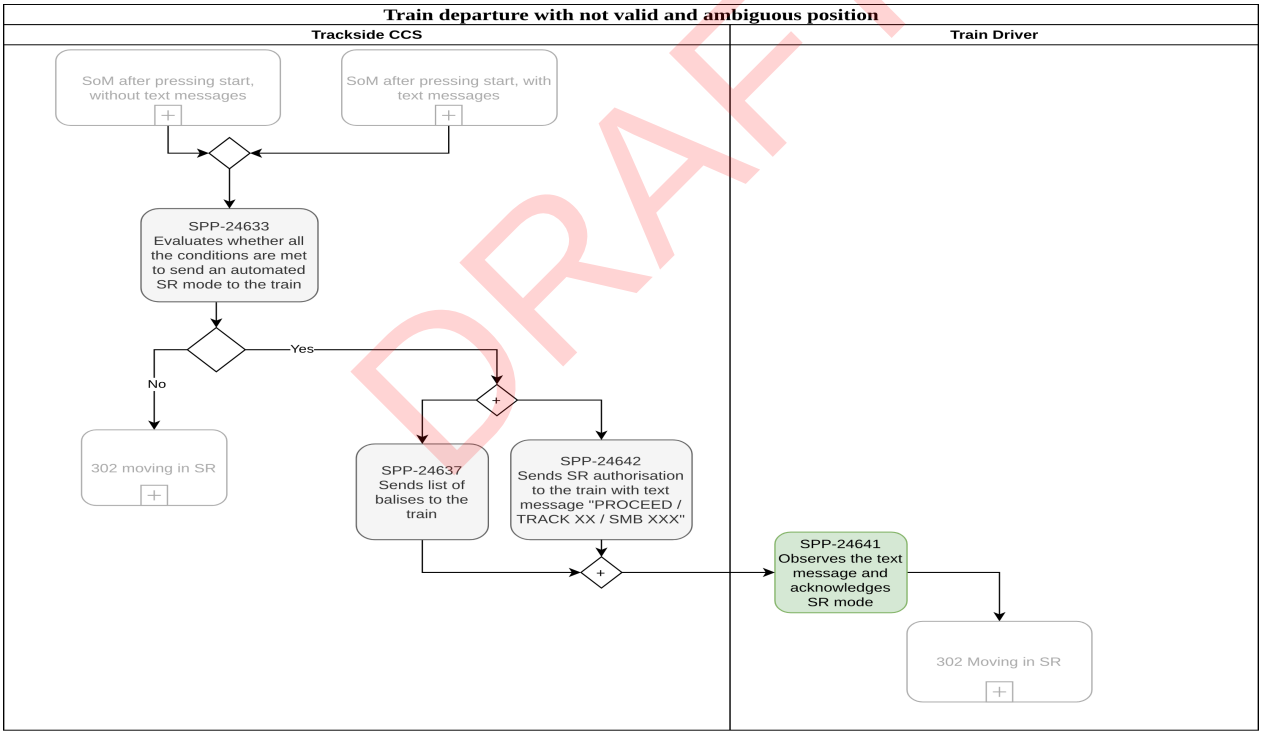
9.4.3.2 Operational Requirements implemented by Operational Process

none

9.4.4 Train departure with not valid and ambiguous position

Train departure with not valid and ambiguous position

ID	SPP-22036
Op.Precondition	The route has been set. Train is ready for departure. The position of the train is not valid and ambiguous.
Op.Rationale	The position of the train is not valid and ambiguous. SR mode will be provided. Train departure in SR with automated EI#7 authorisation and the use of a balise list.
Op.Postcondition	Train is granted to move in SR mode to a defined position.



[SPP-22037]

9.4.4.1 Operational Activities involved in Operational Process:

Trackside CCS evaluates whether all the conditions are met to send an automated SR mode to the train
To send an automated SR mode to the train without any communication between Signaller and Train Driver the following conditions have to be met:
- if the TRN that has been entered by the Train driver, it has to match with the expected TRN in the operational plan and

- the occupancy of the track by the train with this train running number has to match with the expected occupancy in the operational plan
[SPP-24633 **]**

Trackside CCS sends SR authorisation to the train with a text message "PROCEED / TRACK XX / SMB XXX"
In order to give the Train driver the possibility to check whether the given SR authorisation is applicable for his train, a text message is shown in the DMI which states that the train driver can proceed on a specific track till a specific SMB. The track number and the SMB number is shown in the text message.
[SPP-24642 **]**

Trackside CCS sends a list of balises to the train
The list of balises will ensure that the train will be stopped to a standstill if the train encounters a balise which is not in the list. **[**SPP-24637 **]**

Train Driver observes the text message and acknowledges SR mode
The train driver is aware of the information in the text message and checks whether this information is matching with the situation and the operational plan.
The train driver acknowledges SR and takes the responsibility according to the rules of running in SR.
[SPP-24641 **]**

9.4.4.2 Operational Requirements implemented by Operational Process

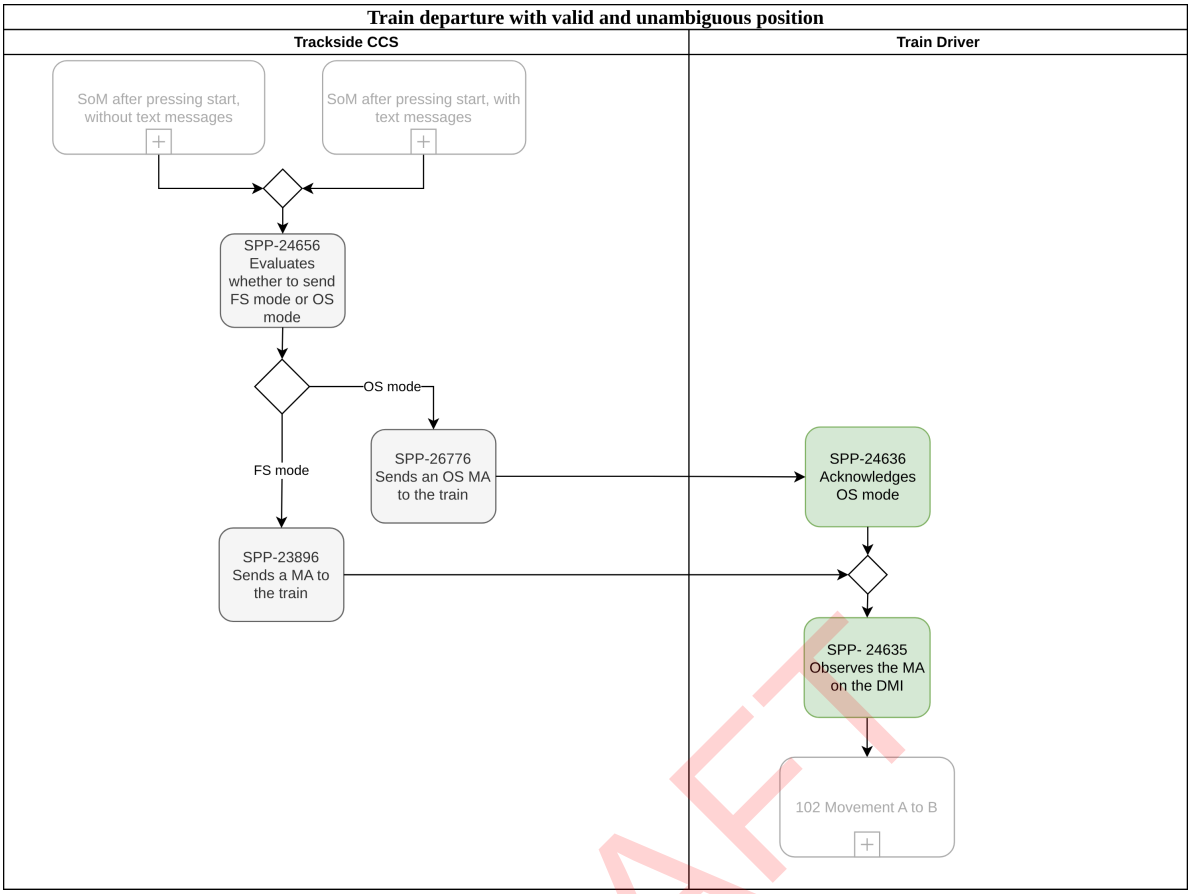
none

9.4.5 Train departure with valid and unambiguous position

Train departure with valid and unambiguous position

ID	SPP-27055
Op.Precondition	The route has been set. Train is ready for departure. The position of the train is valid and unambiguous.
Op.Rationale	The position of the train is valid and unambiguous. The train will get a MA from the trackside. Train departure in FS or OS mode.
Op.Postcondition	Train has received a FS or OS MA.

DRAFT



[SPP-27056]

9.4.5.1 Operational Activities involved in Operational Process:

Trackside CCS evaluates whether to send FS mode or OS mode
Trackside CCS will provide FS when:

- train position (from SoM PR) is “valid”
- train position is NOT ambiguous for the RBC
- path ahead of the train is secured
- it is guaranteed that no other train or object is present in advance of the train

Trackside CCS will provide OS when:

- train position (from SoM PR) is “valid”
- train position is NOT ambiguous for the RBC
- path ahead of the train is secured

(source SoM guideline EUG 3a)
[SPP-24656]

Trackside CCS sends an OS MA to the train
Trackside CCS indicates OS MA availability through an indication on the DMI. [SPP-26776]

SPP-23896: Trackside CCS sends a MA to the train:
Trackside CCS indicates MA availability through an indication on the DMI.

Train Driver acknowledges OS mode
Train Driver acknowledges the OS mode. [SPP-24636]

DRAFT

Train Driver observes the MA on the DMI
Train Driver observes the Movement Authority indicated on the DMI. **[**SPP-24635 **]**

9.4.5.2 Operational Requirements implemented by Operational Process

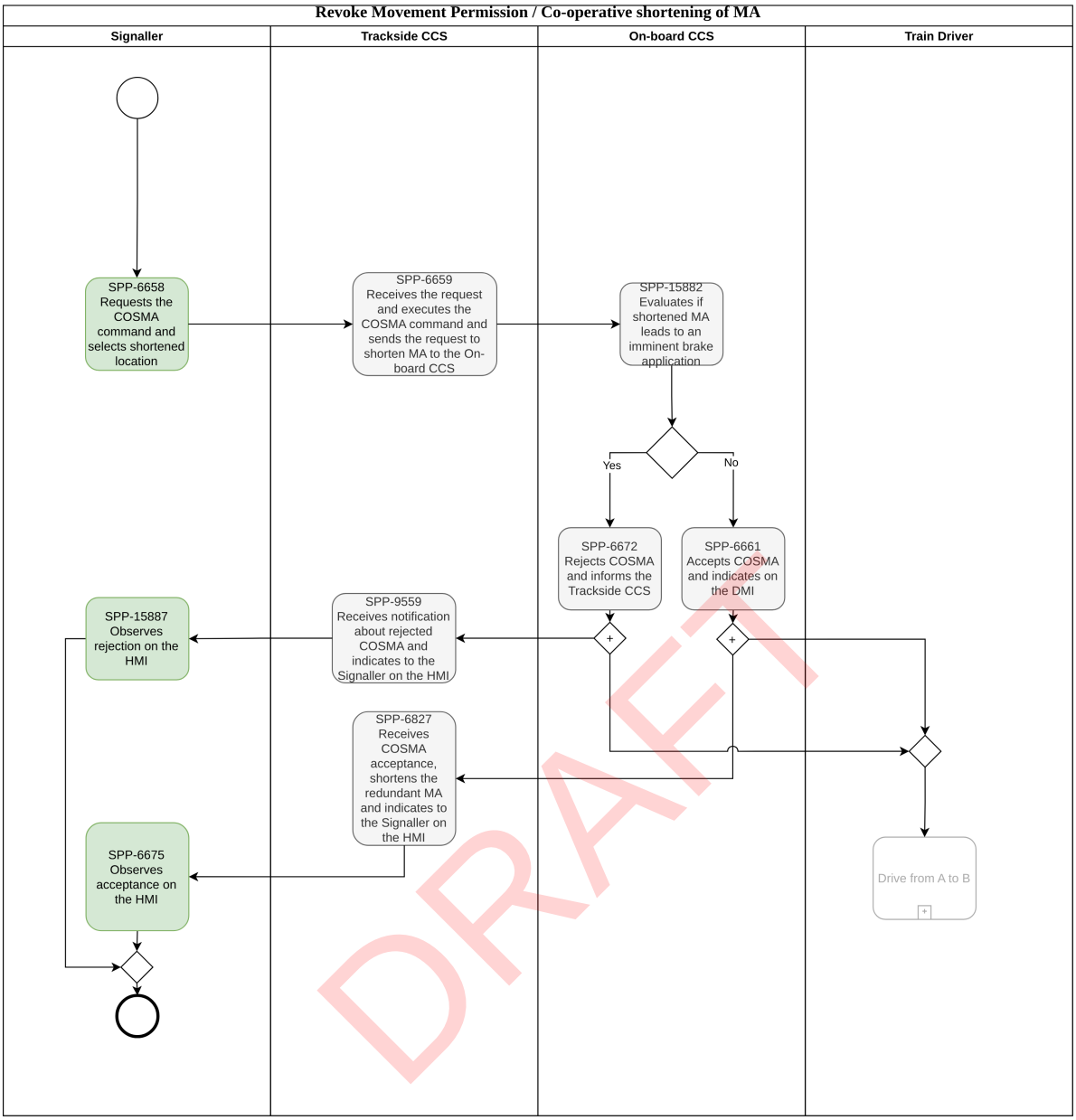
none

9.5 Revoke Movement Permission

Revoke Movement Permission / Co-operative shortening of MA

ID	SPP-6673
Op.Precondition	The train has been granted an FS, SM or OS MA. The Signaller has the operational need to shorten the movement authority.
Op.Rationale	Attempt to shorten the MA assigned to the train for operational purposes.
Op.Postcondition	The MA is shortened and the train is supervised to the new EoA. OR The train is continuing running according to the existing MA, if the COSMA was rejected by the CCS on-board.

DRAFT



DRAFT

9.5.1 Operational Activities involved in Operational Process:

Signaller requests the COSMA command and selects shortened location
The Signaller requests the COSMA command and selects to where the MA should be shortened. **[**SPP-6658 **]**

Trackside CCS receives the request and executes the COSMA command and sends the request to shorten MA to the On-board CCS
The Trackside CCS receives the request and executes the COSMA command and sends the request to shorten the MA to the On-board CCS. **[**SPP-6659 **]**

On-board CCS assesses if shortened MA leads to an imminent brake application
The On-board assesses if the shortened MA will lead to an imminent brake application.

- If the shortened MA results in an imminent need to apply the brakes, the request is rejected.
- If the shortened MA does not result in an imminent need to apply the brakes, the request is accepted.

[SPP-15882]

On-board CCS accepts COSMA and indicates on the DMI
Option On-board CCS accepts: The On-board CCS accepts the request to shorten the MA and indicates the new EoA on the DMI. The On-board CCS informs the Trackside CCS about the acceptance. [SPP-6661]

On-board CCS rejects COSMA and informs the Trackside CCS
Option On-board CCS rejects: The On-board CCS rejects the COSMA request and continues running on the existing MA. The On-board CCS informs the Trackside CCS about the rejection. [SPP-6672]

Trackside CCS receives notification about rejected COSMA and indicates to the Signaller on the HMI
On-board CCS rejects: The Trackside CCS receives the COSMA rejection from the On-board CCS and indicates rejection notification on the HMI. [SPP-9559]

Signaller observes rejection on the HMI
The Signaller Observes on the HMI that the COSMA request was rejected. [SPP-15887]

Trackside CCS receives COSMA acceptance, shortens the redundant MA and indicates to the Signaller on the HMI
On-board CCS accepts: The Trackside CCS receives COSMA acceptance from the On-board CCS, shortens the redundant MA and indicates this to the Signaller on the HMI. [SPP-6827]

Signaller observes acceptance on the HMI
The Signaller observes on the HMI that the COSMA request was accepted by the On-board CCS. [SPP-6675]

DRAFT

9.5.2 Operational Requirements implemented by Operational Process

SPP-6673: Revoke Movement Permission / Co-operative shortening of MA:

SPP-7129: Harmonised SERA operational rules:
Railway operation shall be based on harmonised operational concept and harmonised operational rules in order to support a Single European Railway Area (SERA)
SPP-6932: Signaller shall have a visual representation of the complete, consistent and accurate status of the operational situation:
Signaller shall have a visual representation of the complete, consistent and accurate status of the operational situation in order to react to incidents that have the potential to limit the railway safety and track capacity.
SPP-6858: CCS shall rely on a standardized set of manual controls for normal operations, based on harmonised operational rules:
CCS shall rely on a standardized set of manual controls for normal operations, based on harmonized operational rules. This approach minimizes national variations in Generic Applications.
SPP-6674: Automatic triggering:
It shall be possible to automatically trigger the co-operative shortening of MA based on real-time updates to the train's timetable.

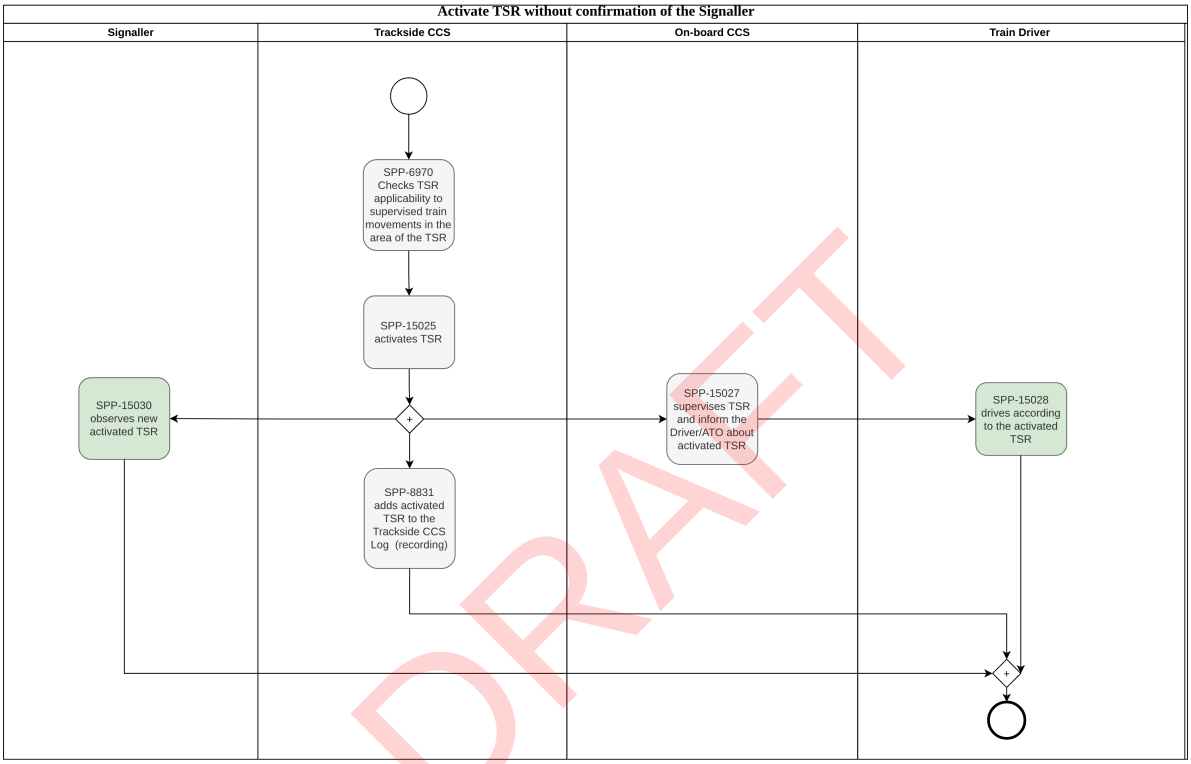
9.6 Activate Temporary Speed Restriction

9.6.1 Activate Temporary Speed Restriction without Signaller Confirmation

Activate Temporary Speed Restriction without Signaller Confirmation

ID	SPP-6961

Op.Precondition	- A temporary speed restriction has been stored in the Trackside CCS. - All the relevant stakeholders (ex. Signaller, Field Force.) can see on their interfaces the planned TSRs. - The conditions for the TSR activation are met. - The TSR activation time is due.
Op.Rationale	Automatic activation of planned TSR without Signaller confirmation.
Op.Postcondition	- All the relevant stakeholders (ex. Signaller, Field Force.) can see on their interfaces the activated TSRs. - Train Driver can see the speed restriction (optionally the reason) on the On Board DMI.



[SPP-15006]

DRAFT

9.6.1.1 Operational Activities involved in Operational Process:

Trackside CCS checks TSR applicability to supervised train movements in the area of the TSR.
Trackside CCS coordinates the applicability of TSR to authorise a train movement based on the train position and train category.
To prevent a brake intervention due to a speed reduction, Trackside CCS only considers the new TSR for trains approaching the TSR position (through an update of the movement authorisation/movement extension). Trackside CCS does not consider the new TSR for trains that have already past the TSR position at the time the TSR is activated. This check can only determine a delay in the TSR activation, not a negative result.
Trackside CCS determines which TSR is applicable for each train category.
[SPP-6970]

Trackside CCS activates TSR

Once the check on supervised train movements is performed, the TSR shall be activated.

In case of overlapping TSR the most restrictive speed is considered.

[SPP-15025]

On-board CCS supervises TSR and informs Train Driver about activated TSR
On-board CCS supervises TSR and informs Train Driver about activated TSR **[**SPP-15027 **]**

Train Driver drives according to the activated TSR
Train Drivers of trains passing the TSR will automatically receive indication about the permitted speed due to a TSR on the On Board CCS when a movement authority is received including the TSR. **[**SPP-15028 **]**

Signaller observes new activated TSR
To inform further non-supervised train movements when relevant. **[**SPP-15030 **]**

Trackside CCS adds activated TSR to the Trackside CCS Log (recording)
The Trackside CCS adds to the recordings the activated TSR. **[**SPP-8831 **]**

9.6.1.2 Operational Requirements implemented by Operational Process

SPP-6961: Activate Temporary Speed Restriction without Signaller Confirmation:

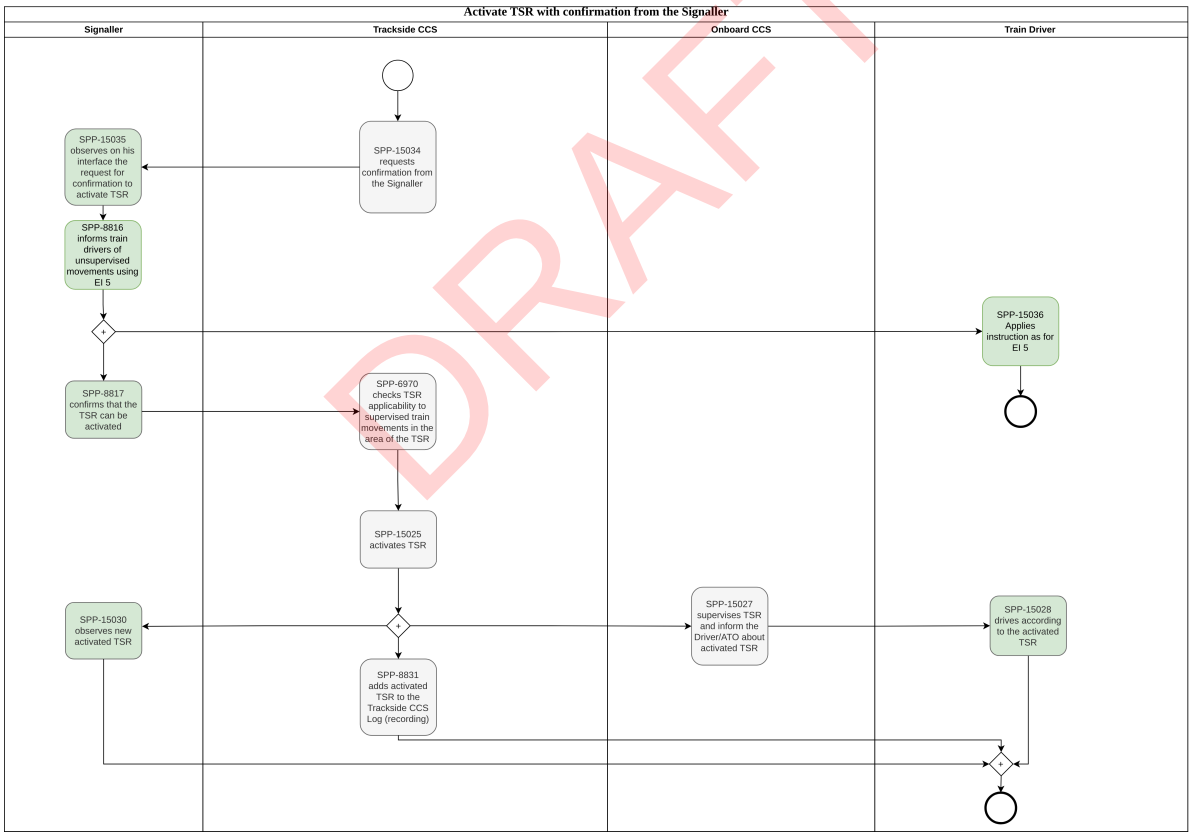
SPP-15032: The activation of planned TSRs requests a signaller confirmation only for specific cases:
The activation of planned TSRs requests a signaller confirmation. Ex: in case the speed limit is lower than the speed allowed for not supervised train movements. The confirmation can be given after the signaller has taken the responsibility of managing the not supervised train movement.
SPP-15031: The activation of planned TSRs is fully managed automatically by the Trackside CCS:
Planned TSRs are stored in the Trackside CCS. The selection of parameters (conditions for the activation, extension, time validity, ecc.) of the stored TSRs is a matter of the planned activity.
SPP-7107: Automated regulation of infrastructure resources deployment:
Operational production procedures shall allow for automated regulation of rail traffic and of deployment of CCS resources.
All the operational production needs, such as the use of available technical/physical or human resources shall be regulated with automation.
SPP-7083: Manned intervention in automated operation:
Where automated operation is provided, standardized operational procedures shall be readily to an operator while ensuring safety, production capacity and automation at the highest possible level.
SPP-7051: The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.:
The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.
SPP-6858: CCS shall rely on a standardized set of manual controls for normal operations, based on harmonised operational rules:
CCS shall rely on a standardized set of manual controls for normal operations, based on harmonized operational rules. This approach minimizes national variations in Generic Applications.
SPP-6679: An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.:
An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.
SPT2OD-4444: Operational production optimisation centralised within the frame of railway traffic efficiency.:
The use of infrastructure resources between train traffic and of other operational production needs - such as human or technical/physical resources availability, maintenance routines, construction management, commissioning or incidents management - shall be optimised to extract the closest possible results in relation to the planned service offer, based on the available operating state information.

DRAFT

9.6.2 Activate Temporary Speed Restriction with Signaller Confirmation

Activate Temporary Speed Restriction with Signaller Confirmation

ID	SPP-8809
Op.Precondition	- A temporary speed restriction has been stored in the Trackside CCS. - Signaller confirmation is needed for activation of the TSR. - All the relevant stakeholders (ex. Signaller, Field Force.) can see on their interfaces the planned TSRs. - The conditions for the TSR activation are met. - The TSR activation time is due.
Op.Rationale	Activation of planned TSR with Signaller confirmation.
Op.Postcondition	- All the relevant stakeholders (ex. Signaller, Field Force.) can see on their interfaces the activated TSRs. - Train Driver can see the speed restriction (optionally the reason) on the On Board DMI.



[SPP-15024]

9.6.2.1 Operational Activities involved in Operational Process:

Trackside CCS requests confirmation from the Signaller

When the Operational Conditions for a planned TSR are met, the Trackside CCS shows to the Signaller interface the request of the TSR activation to be confirmed. [SPP-15034]

DRAFT

Signaller observes on his interface the request for confirmation to activate TSR
Signaller observes on the user interface the request for confirming to activate TSR. **[**SPP-15035 **]**

Signaller informs train drivers of unsupervised movements using EI 5.
Before the confirmation the Signaller shall take the responsibility to inform the Driver of ongoing/future unsupervised movements in the area of the TSR, when the speed restriction is below the speed allowed for movements under Driver responsibility.
[SPP-8816 **]**

Train driver applies instruction as for EI 5.
Train driver communicates with the Signaller and apply the instructions according to EI 5.
[SPP-15036 **]**

Signaller confirms that the TSR can be activated
After the checks on unsupervised movements, the Signaller confirms that the TSR can be activated.
[SPP-8817 **]**

SPP-6970: Trackside CCS checks TSR applicability to supervised train movements in the area of the TSR.:
Trackside CCS coordinates the applicability of TSR to authorise a train movement based on the train position and train category.
To prevent a brake intervention due to a speed reduction, Trackside CCS only considers the new TSR for trains approaching the TSR position (through an update of the movement authorisation/movement extension). Trackside CCS does not consider the new TSR for trains that have already past the TSR position at the time the TSR is activated. This check can only determine a delay in the TSR activation, not a negative result.
Trackside CCS determines which TSR is applicable for each train category.

SPP-15025: Trackside CCS activates TSR:
Once the check on supervised train movements is performed, the TSR shall be activated.
In case of overlapping TSR the most restrictive speed is considered.

SPP-15027: On-board CCS supervises TSR and informs Train Driver about activated TSR:
On-board CCS supervises TSR and informs Train Driver about activated TSR

SPP-15028: Train Driver drives according to the activated TSR:
Train Drivers of trains passing the TSR will automatically receive indication about the permitted speed due to a TSR on the On Board CCS when a movement authority is received including the TSR.

SPP-15030: Signaller observes new activated TSR:
To inform further non-supervised train movements when relevant.

SPP-8831: Trackside CCS adds activated TSR to the Trackside CCS Log (recording):
The Trackside CCS adds to the recordings the activated TSR.

9.6.2.2 Operational Requirements implemented by Operational Process

SPP-8809: Activate Temporary Speed Restriction with Signaller Confirmation:

SPP-15032: The activation of planned TSRs requests a signaller confirmation only for specific cases: The activation of planned TSRs requests a signaller confirmation. Ex: in case the speed limit is lower than the speed allowed for not supervised train movements. The confirmation can be given after the signaller has taken the responsibility of managing the not supervised train movement.
SPP-15031: The activation of planned TSRs is fully managed automatically by the Trackside CCS: Planned TSRs are stored in the Trackside CCS. The selection of parameters (conditions for the activation,

DRAFT

extension, time validity, ecc.) of the stored TSRs is a matter of the planned activity.
SPP-7107: Automated regulation of infrastructure resources deployment:
Operational production procedures shall allow for automated regulation of rail traffic and of deployment of CCS resources.
All the operational production needs, such as the use of available technical/physical or human resources shall be regulated with automation.
SPP-7083: Manned intervention in automated operation:
Where automated operation is provided, standardized operational procedures shall be readily to an operator while ensuring safety, production capacity and automation at the highest possible level.
SPP-7051: The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.:
The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.
SPP-6858: CCS shall rely on a standardized set of manual controls for normal operations, based on harmonised operational rules:
CCS shall rely on a standardized set of manual controls for normal operations, based on harmonized operational rules. This approach minimizes national variations in Generic Applications.
SPP-6679: An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.:
An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.
SPT2OD-4444: Operational production optimisation centralised within the frame of railway traffic efficiency.:
The use of infrastructure resources between train traffic and of other operational production needs - such as human or technical/physical resources availability, maintenance routines, construction management, commissioning or incidents management - shall be optimised to extract the closest possible results in relation to the planned service offer, based on the available operating state information.

DRAFT

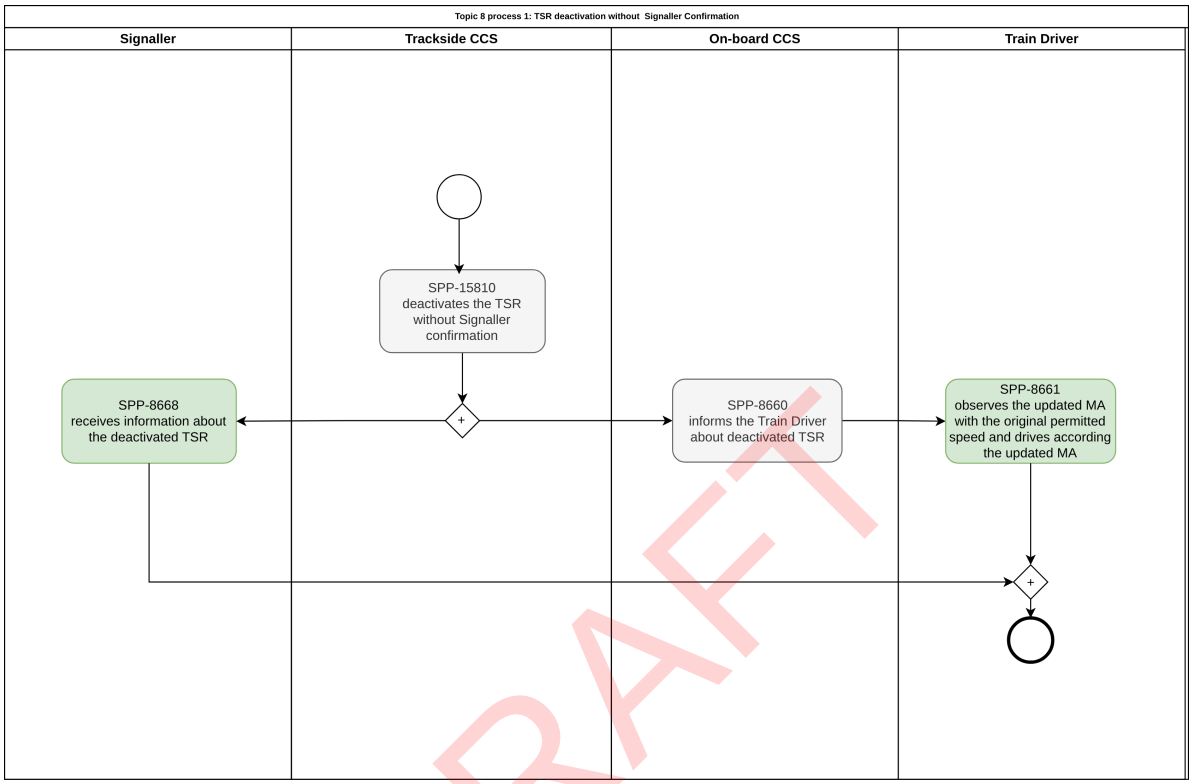
9.7 Deactivate Temporary Speed Restriction

9.7.1 TSR deactivation without Signaller Confirmation

TSR deactivation without Signaller Confirmation

ID	SPP-8655
Op.Precondition	- The TSR deactivation is planned in TMS and the time is due or the reason for the TSR does no longer exist (e.g. track blockage is removed) - An activated temporary speed restriction (TSR) that does not require a Control Room User (e.g.) Signaller confirmation for deactivation of the TSR is available in Trackside CCS. - TSR is activated in On-board CCS - Signaller knows the TSR activated - Train Driver knows the TSR activated
Op.Rationale	TSR deactivation without Signaller Confirmation

Op.Postcondition	Temporary speed restriction (TSR): - TSR is deactivated in On-board CCS - TSR is deactivated in Trackside CCS - Signaller received information that the TSR is deactivated - Train Driver observes the updated MA with the original permitted speed and drives according the updated MA



[SPP-11860 **]**

DRAFT

9.7.1.1 Operational Activities involved in Operational Process:

Trackside CCS deactivates the TSR without Signaller confirmation
Trackside CCS deactivates the TSR if the preconditions to do so are fulfilled and Trackside CCS informs On-board CCS and Signaller **[**SPP-15810 **]**

On-board CCS informs the Train Driver about deactivated TSR
On-board CCS informs the Train Driver about deactivated TSR **[**SPP-8660 **]**

Train Driver observes the updated MA with the original permitted speed and drives according the updated MA
Train Driver observes the updated MA with the original permitted speed and drives according the updated MA **[**SPP-8661 **]**

Signaller receives information about the deactivated TSR
Signaller receives information about the deactivated TSR and can see the status if he/she decides to do so. **[**SPP-8668 **]**

9.7.1.2 Operational Requirements implemented by Operational Process

SPP-8655: TSR deactivation without Signaller Confirmation:

SPP-7107: Automated regulation of infrastructure resources deployment:
Operational production procedures shall allow for automated regulation of rail traffic and of deployment of CCS resources.
All the operational production needs, such as the use of available technical/physical or human resources shall be regulated with automation.
SPP-7083: Manned intervention in automated operation:
Where automated operation is provided, standardized operational procedures shall be readily to an operator while ensuring safety, production capacity and automation at the highest possible level.
SPP-7051: The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.:
The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.
SPP-6858: CCS shall rely on a standardized set of manual controls for normal operations, based on harmonised operational rules:
CCS shall rely on a standardized set of manual controls for normal operations, based on harmonized operational rules. This approach minimizes national variations in Generic Applications.
SPP-6679: An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.:
An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.
SPP-6133: Update log:
The **System** shall log the temporary speed restriction deactivation, when the temporary speed restriction is deactivated and no longer indicated on the signalling control display,
SPT2OD-4444: Operational production optimisation centralised within the frame of railway traffic efficiency.:
The use of infrastructure resources between train traffic and of other operational production needs - such as human or technical/physical resources availability, maintenance routines, construction management, commissioning or incidents management - shall be optimised to extract the closest possible results in relation to the planned service offer, based on the available operating state information.

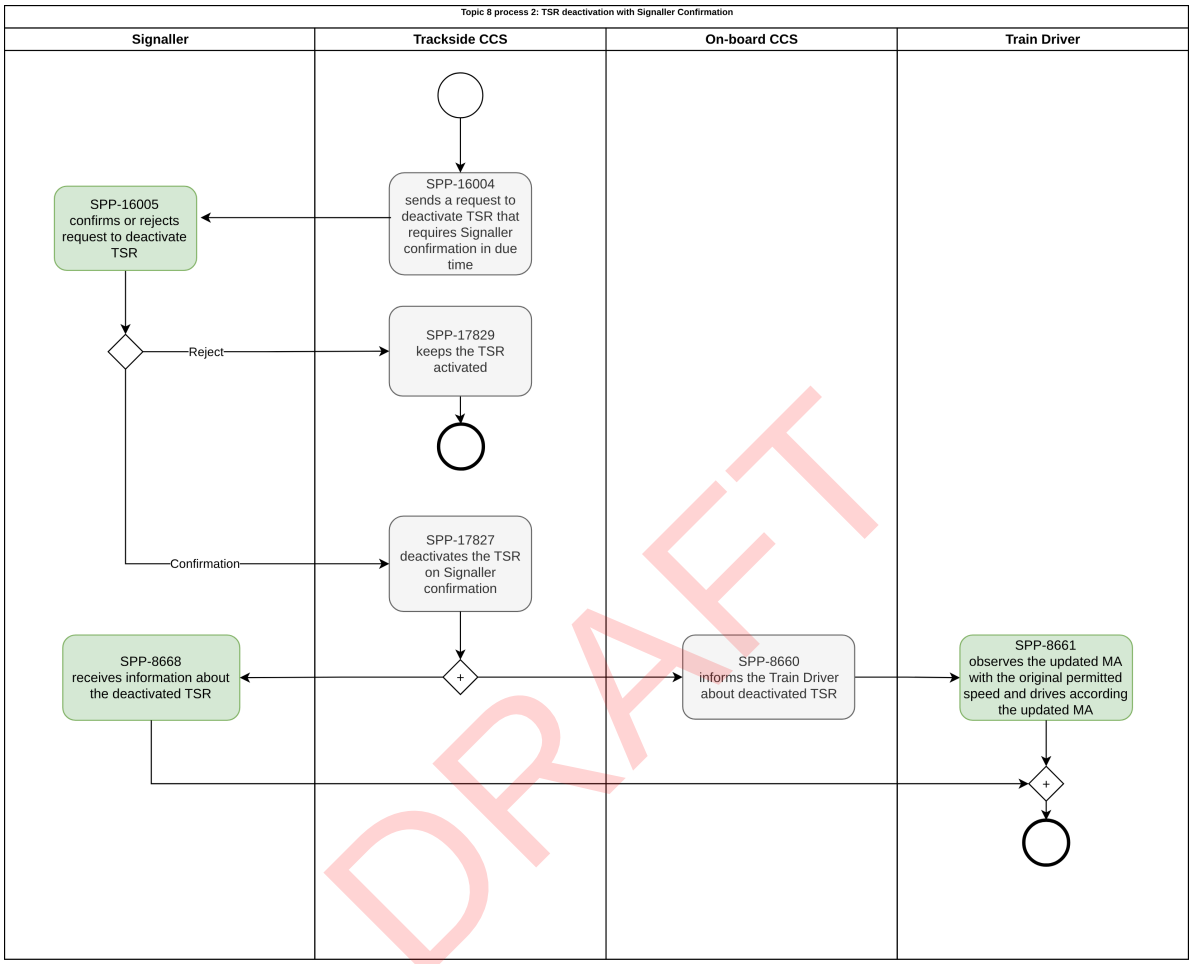
DRAFT

9.7.2 TSR deactivation with Signaller Confirmation

TSR deactivation with Signaller Confirmation

ID	SPP-16001
Op.Precondition	- The TSR deactivation is planned in TMS and the time is due or the reason for the TSR does no longer exist (e.g. track blockage is removed) - Activated temporary speed restriction (TSR) that requires a Signaller confirmation for deactivation of the TSR is available in Trackside CCS. - TSR is activated in On-board CCS - Signaller knows the TSR activated - Train Driver knows the TSR activated
Op.Rationale	TSR deactivation with Signaller Confirmation

Op.Postcondition	Temporary speed restriction (TSR): - TSR is deactivated in Trackside CCS - TSR is deactivated in On-board CCS - Signaller received information that the TSR is deactivated - Train Driver observes the updated MA with the original permitted speed and drives according the updated MA



[SPP-16002]

9.7.2.1 Operational Activities involved in Operational Process:

Trackside CCS sends a request to deactivate TSR that requires Signaller confirmation in due time
Trackside CCS sends a request to deactivate TSR that requires Signaller confirmation in due time [SPP-16004]

Signaller confirms or rejects request to deactivate TSR
Signaller confirms or rejects request to deactivate TSR [SPP-16005]

Trackside CCS deactivates the TSR on Signaller confirmation
If the Signaller confirms the request to deactivate TSR Trackside CCS deactivates the TSR and Trackside CCS informs On-board CCS and Signaller [SPP-17827]

Trackside CCS keeps the TSR activated
If the Signaller rejects the request to deactivate Trackside CCS keeps the TSR activated [SPP-17829]

SPP-8660: On-board CCS informs the Train Driver about deactivated TSR:
On-board CCS informs the Train Driver about deactivated TSR

SPP-8661: Train Driver observes the updated MA with the original permitted speed and drives according the updated MA:
Train Driver observes the updated MA with the original permitted speed and drives according the updated MA

SPP-8668: Signaller receives information about the deactivated TSR:
Signaller receives information about the deactivated TSR and can see the status if he/she decides to do so.

9.7.2.2 Operational Requirements implemented by Operational Process

SPP-16001: TSR deactivation with Signaller Confirmation:

SPP-7083: Manned intervention in automated operation:
Where automated operation is provided, standardized operational procedures shall be readily to an operator while ensuring safety, production capacity and automation at the highest possible level.
SPP-7072: Automated routine operational production procedures for field force work:
Operational production procedures shall support the automated execution of the processes related to field force work (e.g. granting possessions for construction sites, track access for maintenance teams, warning processes, or the change of a point position that a maintenance team needs).
Note:
This includes, for example following operational processes: automatic warning of trackside personnel, management of slow speed sections and possessions, access and entry of a construction site vehicle (e.g. excavator, yellow fleet) into the construction site area, lubrication of points, composition of freight trains.
SPP-6858: CCS shall rely on a standardized set of manual controls for normal operations, based on harmonised operational rules:
CCS shall rely on a standardized set of manual controls for normal operations, based on harmonized operational rules. This approach minimizes national variations in Generic Applications.
SPP-6679: An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.:
An harmonized process shall be defined to automatize and optimize the activation and deactivation of planned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.

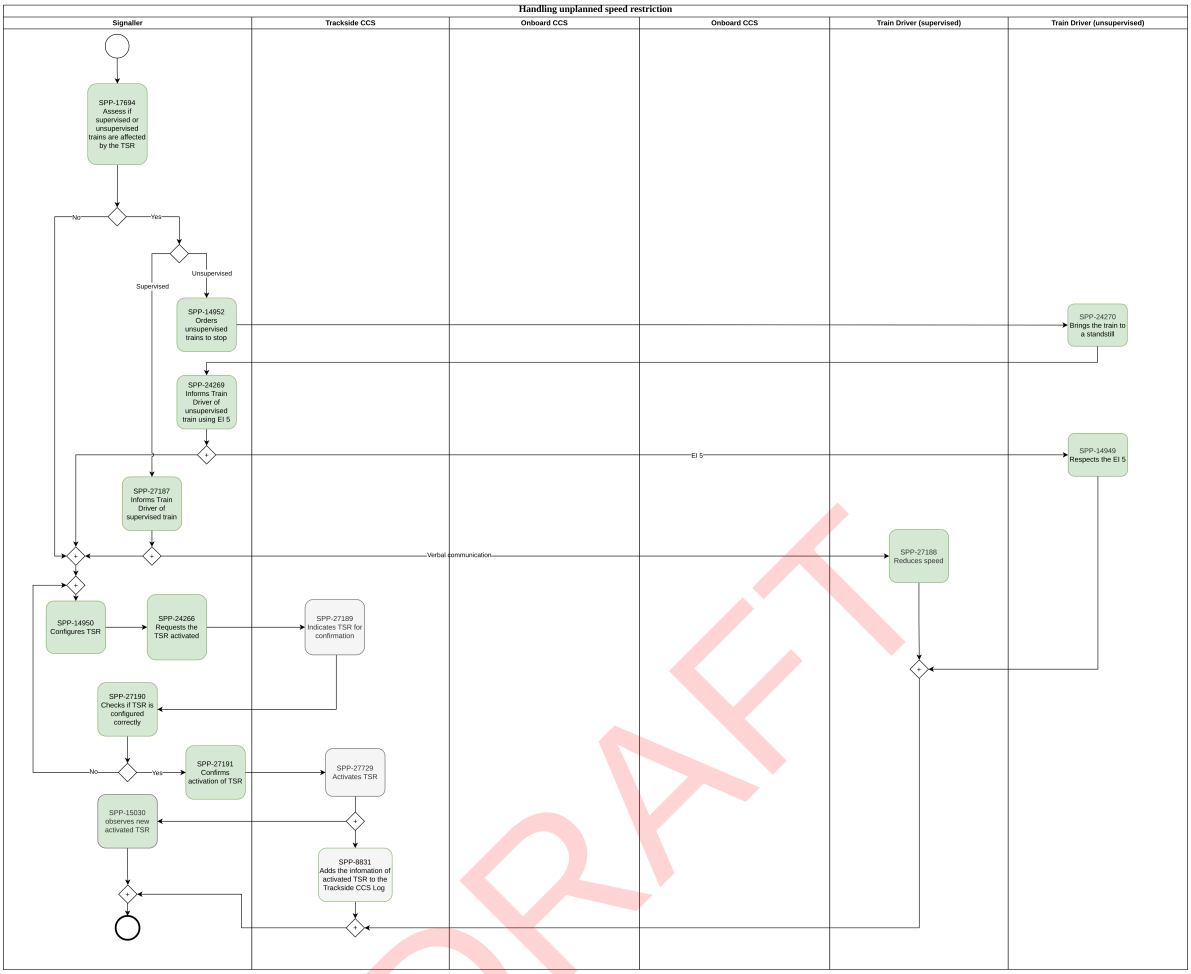
DRAFT

9.8 Handling an unplanned speed restriction

Handling an unplanned speed restriction

ID	SPP-7412
Op.Precondition	An incident has unexpectedly occured that requires lowering the allowed speed for trains passing a certain part of the infrastructure. The Signaller is informed about the needed TSR parameters. The Signaller has disabled automatic mode of operation.
Op.Rationale	Activation of an unplanned speed restriction.

Op.Postcondition	The TSR is activated by the Trackside CCS and trains running in the affected area have reduced their speed accordingly.



[SPP-11675]

DRAFT

9.8.1 Operational Activities involved in Operational Process:

Signaller assesses if supervised or unsupervised trains are affected by the TSR
The Signaller assesses if any supervised or unsupervised trains that already have an authority to run in the area where the TSR will be activated must be informed. [SPP-17694]

Signaller informs Train Driver of supervised train
If relevant, the Signaller informs the Train driver of any supervised train in the affected area to lower the speed to the TSR target. [SPP-27187]

Train driver reduces speed
The Train driver reduces the speed of the train manually to the TSR target as informed by the Signaller. [SPP-27188]

Signaller orders unsupervised trains to stop
If relevant, the Signaller contacts the Train Driver of any unsupervised train in the affected area and orders them to stop. [SPP-14952]

Train Driver brings the train to a standstill
The Train Driver brings train to a standstill as ordered by the Signaller. [SPP-24270]

Signaller informs Train Driver of unsupervised train using EI 5
The Signaller fills in the information about the speed restriction on the EI 5 and conveys the content to the Train Driver. **[**SPP-24269 **]**

Train Driver of unsupervised train respects the EI 5
The Train Driver continues driving and applies the information on the EI 5. **[**SPP-14949 **]**

Signaller configures TSR
The Signaller configures (as a minimum speed, location, and informative text message) the required TSR directly in the Trackside CCS, bypassing TMS planning tools. **[**SPP-14950 **]**

Signaller requests the TSR activated
The Signaller requests that the TSR is activated in the Trackside CCS. **[**SPP-24266 **]**

Trackside CCS indicates TSR for confirmation
The Trackside CCS indicates the requested TSR parameters on the HMI and requests the Signaller's confirmation of activation. **[**SPP-27189 **]**

Signaller checks if TSR is configured correctly
The Signaller check if the indicated TSR on the HMI is configured correctly. **[**SPP-27190 **]**

Signaller confirms activation of TSR
If the TSR is correctly configured, the Signaller confirms to the Trackside CCS that the TSR can be activated. **[**SPP-27191 **]**

Trackside CCS activates TSR
The Trackside CCS activates the TSR.

Note: The TSR will only be supervised in MAs issued after the activation is completed. Trains already having an MA over the TSR area will not be affected by the activation of the TSR. **[**SPP-27729 **]**

SPP-15030: Signaller observes new activated TSR:
To inform further non-supervised train movements when relevant.

SPP-8831: Trackside CCS adds activated TSR to the Trackside CCS Log (recording):
The Trackside CCS adds to the recordings the activated TSR.

DRAFT

9.8.2 Operational Requirements implemented by Operational Process

SPP-7412: Handling an unplanned speed restriction:

SPP-9037: An harmonized process shall be defined to automatically or semi-automatic trigger pre-defined mitigation measures:
An harmonized process shall be defined to automatically or semi-automatic trigger pre-defined mitigation measures based on recognition of abnormal events in the railway production using real-time "sensor fusion" information.
SPP-8650: An harmonized process shall be defined to mitigation measures to react in case of an incident:
An harmonized process shall be defined to mitigation measures to react in case of an incident (e.g. track section sweeping, deploying/requesting unplanned maintenance routines, etc.)
SPP-6859: CCS shall rely on a standardized set of manual controls for degraded operations, based on harmonized operational rules:
CCS shall rely on a standardized set of manual controls for degraded operations, based on harmonized operational rules. This approach minimizes national variations in Generic Applications.
SPP-6680: An harmonized process shall be defined to automatize and optimize the activation and deactivation of unplanned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.:
An harmonized process shall be defined to automatize and optimize the activation and deactivation of

unplanned usage restriction and to define the role or tasks carried out by trackside personnel and non-trackbound vehicles during those restrictions.

9.9 End of misison

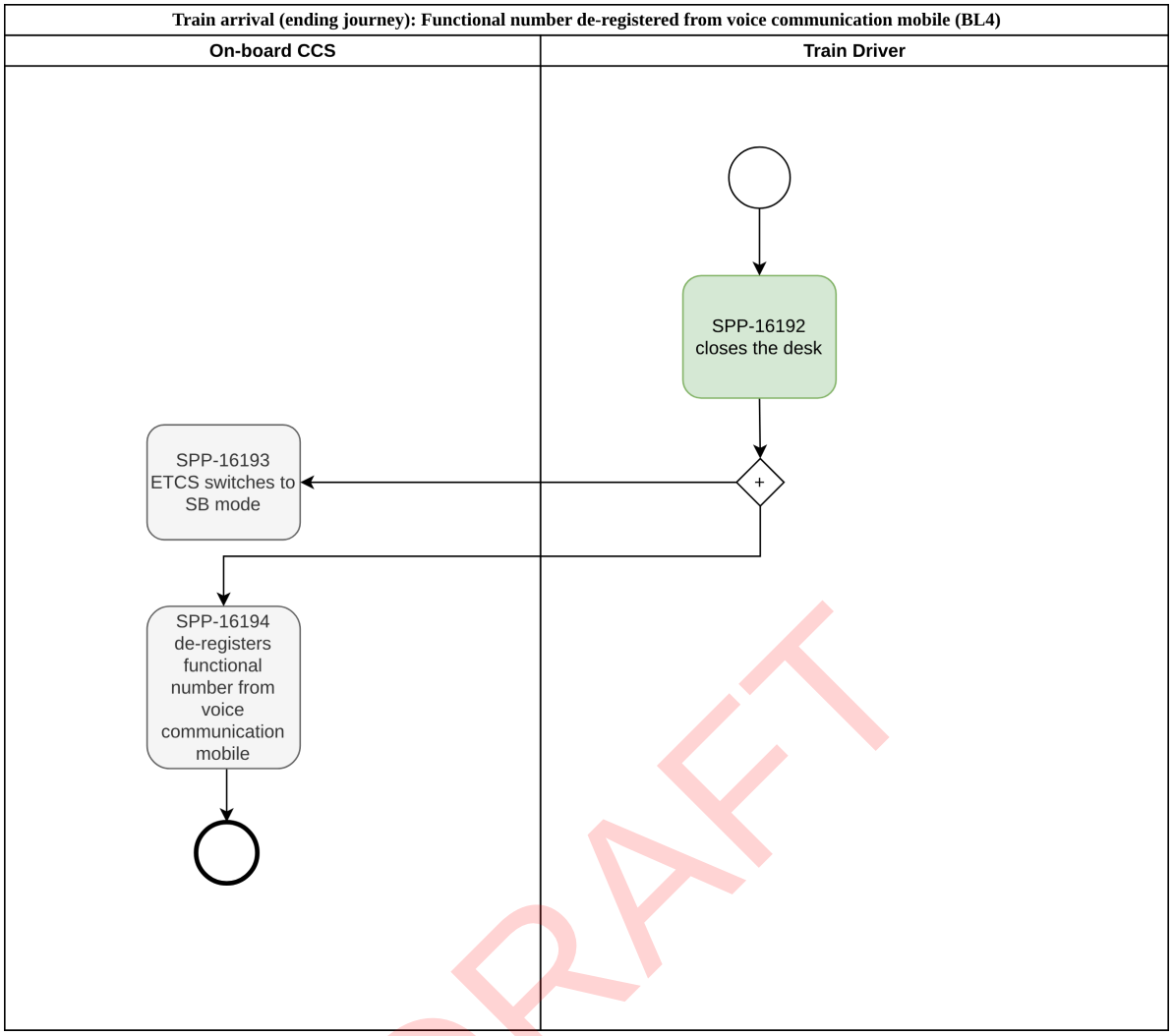
9.9.1 Train arrival (ending journey): Functional number de-registered from voice communication mobile (BL4)

SPT2ARC-4612 - SV3.0

Train arrival (ending journey): Functional number de-registered from voice communication mobile (BL4)

ID	SPP-20688
Op.Precondition	- Train stops at the planned location on track to perform the service according to the plan (OD scenario 107 Arrival at scheduled stop is not in scope of this document) - Train Driver based on planned instructions knows how to proceed (EoM, parking). Shunting movements are not in scope of this process - ATO is disengaged (see OD scenario 107) if ATO is available in the on-board - On-board CCS has a registered Functional number at voice communication mobile
Op.Rationale	Train arrival (ending journey): Functional number de-registered from voice communication mobile
Op.Postcondition	- Desk is closed (i.e DMI shows black screen) - On-board CCS ETCS is in SB mode - On-board CCS has de-registered functional number from voice communication mobile - Data radio communication is still established

DRAFT



[SPP-20686]

DRAFT

9.9.1.1 Operational Activities involved in Operational Process:

Train Driver closes the desk
Train Driver closes the desk. [SPP-16192]

On-board CCS ETCS switches to SB mode
On-board CCS switches to SB mode and data radio communication remains [SPP-16193]

On-board CCS de-registers functional number from voice communication mobile (new)
On-board CCS de-registers functional number from voice communication mobile [SPP-16194]

9.9.1.2 Operational Requirements implemented by Operational Process

none

9.9.2 Shutdown (CR1350 'always connected always reporting' not implemented) (BL3)

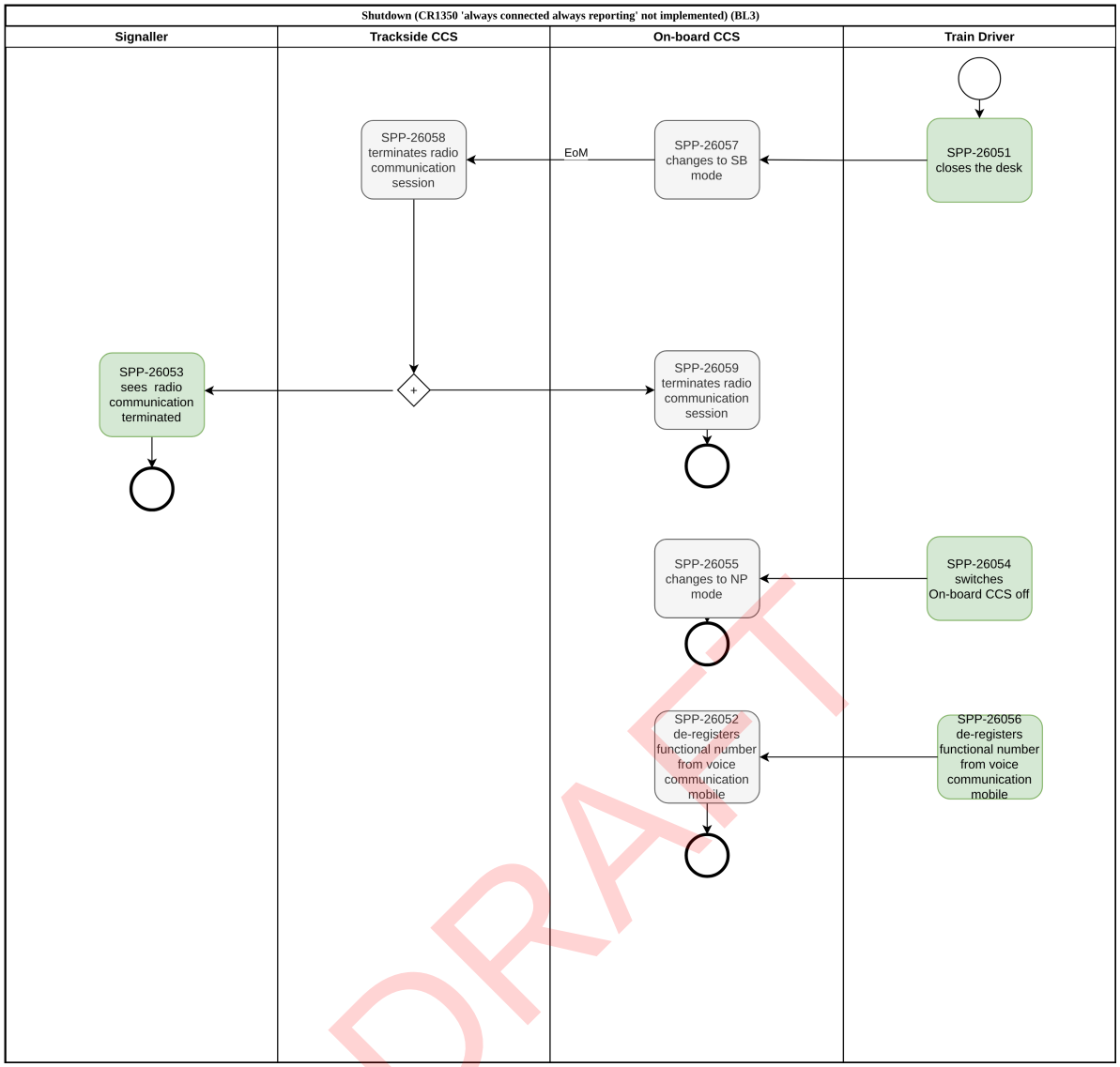
SPT2ARC-4613 - SV2.1

SPT2ARC-5005 - SV2.2

Shutdown (CR1350 'always connected always reporting' not implemented) (BL3)

ID	SPP-25311
Op.Precondition	- Desk is closed (i.e DMI shows black screen) - On-board CCS ETCS is in SB mode - On-board CCS has de-registered functional number from voice communication mobile - Data radio communication is closed
Op.Rationale	Train Driver decides to switch the On-board CCS off because there is no other mission planned - CR1350 'always connected always reporting' is not implemented
Op.Postcondition	- Data radio communication is closed - On-board CCS ETCS is in NP mode - Functional number is de-registered from voice communication mobile - ATO de-energized/switch off if ATO on-board is available on the train

DRAFT



DRAFT

[SPP-25310]

9.9.2.1 Operational Activities involved in Operational Process:

Train Driver closes the desk
Train Driver closes the desk [SPP-26051]

On-board CCS changes to SB mode
On-board CCS changes to SB mode and sends a message 'EoM' to Trackside CCS [SPP-26057]

Trackside CCS terminates the radio communication session
Trackside CCS terminates the radio communication session when if receives message 'EoM' from On-board CCS [SPP-26058]

On-board CCS terminates the radio communication session
On-board CCS terminates the radio communication session when it is triggered by Trackside CCS [SPP-26059]

Signaller sees the radio communication terminated
Signaller sees the radio communication terminated if he/she is interested in that information [SPP-26053]

Train Driver switches On-board CCS off
Train Driver switches On-board CCS off **[**SPP-26054 **]**

On-board CCS changes to NP mode
On-board CCS changes to NP mode when On-board CCS is switched off **[**SPP-26055 **]**

Train Driver de-registers functional number from voice communication
Train Driver de-registers functional number from voice communication **[**SPP-26056 **]**

On-board CCS de-registers functional number from voice communication
On-board CCS de-registers functional number from voice communication **[**SPP-26052 **]**

9.9.2.2 Operational Requirements implemented by Operational Process

SPP-25311: Shutdown (CR1350 'always connected always reporting' not implemented) (BL3):

SPP-25172: The Train Driver shall be able to switch off the Train:
The Train Driver shall be able to switch off the Train

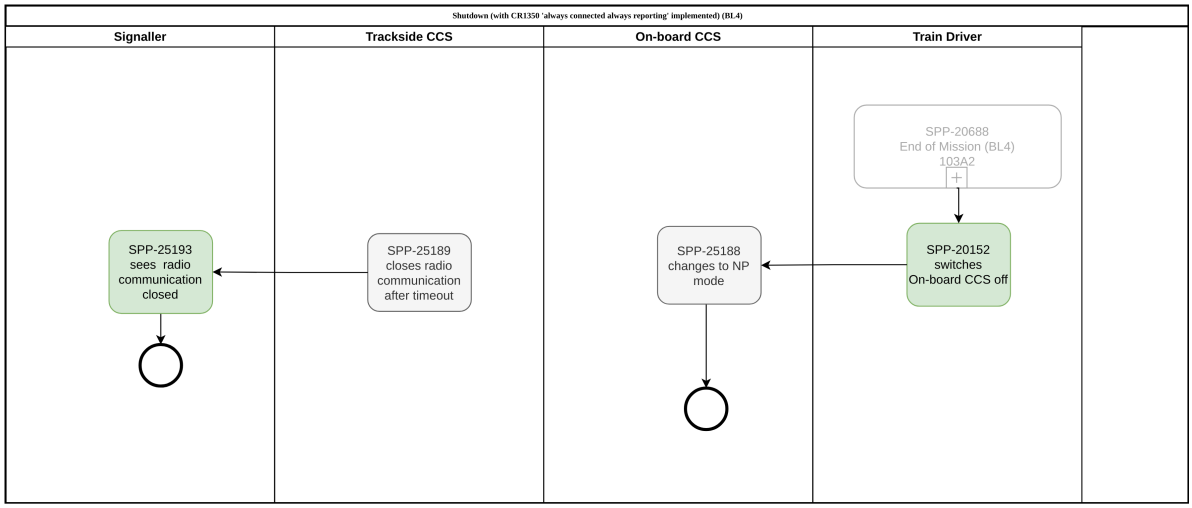
9.9.3 Shutdown (with CR1350 'always connected always reporting' implemented) BL4

SPT2ARC-4612 - SV3.0

Shutdown (with CR1350 'always connected always reporting' implemented) (BL4)

ID	SPP-25175
Op.Precondition	- Desk is closed (i.e DMI shows black screen) - On-board CCS ETCS is in SB mode - On-board CCS has de-registered functional number from voice communication mobile - Data radio communication is still established
Op.Rationale	Train Driver decides to switch the On-board CCS off because there is no other mission planned - CR1350 'always connected always reporting' implemented
Op.Postcondition	- Data radio communication is closed - On-board CCS ETCS is in NP mode - Signaller sees data radio communication is closed as if it was closed accidentally - ATO de-energized/switch off if ATO on-board is available on the train

DRAFT



[SPP-25176]

9.9.3.1 Operational Activities involved in Operational Process:

Train Driver switches On-board CCS off
Train Driver switches On-board CCS off.
Note: in the target system this may need to be changed to a 'shutdown' procedure instead of just switching off the On-board CCS. In the 'current process' SPP-25311 - Shutdown (CR1350 'always connected always reporting' not implemented) (BL3) switching off on-board is possible because the communication session is terminated regularly when the on-board CCS system switches to SB mode [SPP-20152]

On-board CCS changes to NP mode
On-board CCS changes to NP mode and does not send any information to Trackside CCS [SPP-25188]

Trackside CCS closes radio communication after timeout
Trackside CCS monitors if the connection with On-board CCS is available. If the connection is lost Trackside CCS closes the radio communication after a defined timeout (5 minutes). This timeout is part of the standard Subset 26
Note: There is no regular termination of the communication in this process. [SPP-25189]

Signaller sees radio communication closed
Signaller sees radio communication closed as if it was closed accidentally (e.g. communication session lost) [SPP-25193]

9.9.3.2 Operational Requirements implemented by Operational Process

SPP-25175: Shutdown (with CR1350 'always connected always reporting' implemented) (BL4):

SPP-25172: The Train Driver shall be able to switch off the Train:
The Train Driver shall be able to switch off the Train

9.10 Arrival at scheduled stop

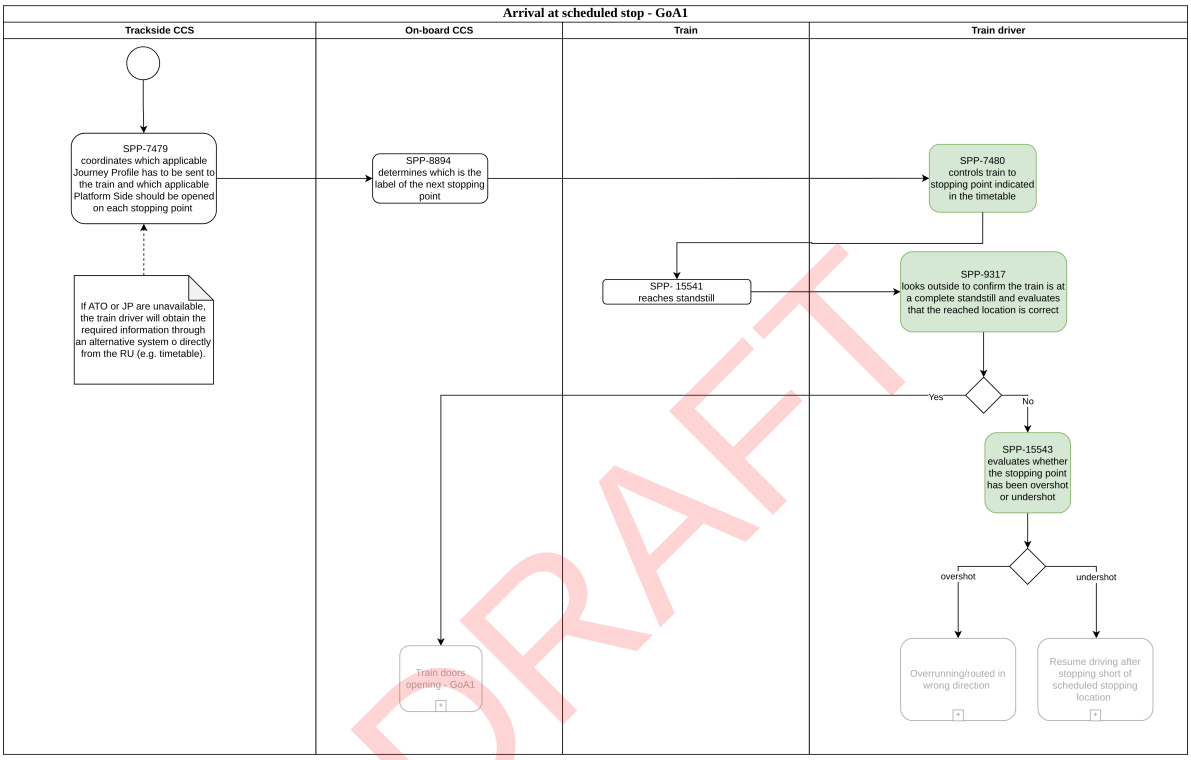
9.10.1 Arrival at scheduled stop - GoA1

SPT2ARC-3746 - GoA1

DRAFT

Arrival at scheduled stop - GoA1

ID	SPP-7478
Op.Precondition	A route has been set and track ahead is free. The train is moving with an MA on-board and is approaching its scheduled stop. ATO is available without AD enabled.
Op.Rationale	Driver stops the train at correct position according to time table.
Op.Postcondition	Train is at standstill at the scheduled stopping point.



DRAFT

[SPP-8838]

9.10.1.1 Operational Activities involved in Operational Process:

SPP-7479: Trackside CCS coordinates which applicable Journey Profile has to be sent to the train and which applicable Platform Side should be opened on each stopping point:
Trackside CCS coordinates which applicable Journey Profile has to be sent to the train and which applicable Platform Side should be opened on each stopping point.
Note: If ATO or JP are unavailable, the Train driver will obtain the required information through an alternative system o directly from the RU (e.g. timetable). This interface is outside the scope of SERA

SPP-8894: On-board CCS determines which is the label of the next stopping point:
On-board CCS determines which is the label of the next stopping point, including arrival time and specific platform information (for example, platform number and section).

Train driver controls train to stopping point indicated in the timetable
The Train Driver must control the train to a standstill at the scheduled stopping location point as indicated in the timetable and respect the braking curve indications. [SPP-7480]

SPP-15541: Train reaches standstill:
The train reaches standstill.

Train driver looks outside of the cabin to confirm the train is at a complete standstill and evaluates that the reached location is correct
The train driver looks outside of the cabin to confirm the train is at a complete standstill and evaluates if reached location is correct. **[**SPP-9317 **]**

Train driver evaluates whether the stopping point has been overshot or undershot
Option reached location not correct: the train driver evaluates whether the stopping point has been overshot or undershot. **[**SPP-15543 **]**

9.10.1.2 Operational Requirements implemented by Operational Process

SPP-7478: Arrival at scheduled stop - GoA1:

SPP-9612: On-board indication of stop location to train driver:
The train driver shall have a clear indication of the most suitable location for its service on the track, according to the length of the train, preferably by means of on-board indications.
SPP-9610: Audible information regarding approach to stopping point:
If GoA2 is not implemented, an audio solution shall be used to inform the train driver when approaching the stopping point, rather than on-board indications displayed on the DMI.

SPP-9607: Stop at correct location:
The train shall be able to move in case of stopping point overshooting or stopping short.
Manual forward and backward movement shall be allowed for the train driver in case of stopping short or overshooting the stopping point.
SPP-9600: Approaching stop location - GoA1:
If the train operates in GoA1, the approach shall be managed manually by train driver. The train driver shall stop the train at the correct position on the platform, to accurately approach a stopping point, e.g., to be able to use station platform length or protection equipment for opening the doors on the correct side.
SPP-9595: Stopping point close to an EoA:
When the scheduled stopping point is near the EoA, the train shall approach the EoA as closely as possible.
The use of release speed shall be considered if the stopping point is close to an EoA. The train doors are finally opened.
SPP-9593: Scheduled stopping point:
The scheduled stopping point shall be before or at the EoA indicated on the DMI but must not exceed it.
The stopping point shall consider the location of points that should not be unnecessarily occupied by the rear end of the train.

DRAFT

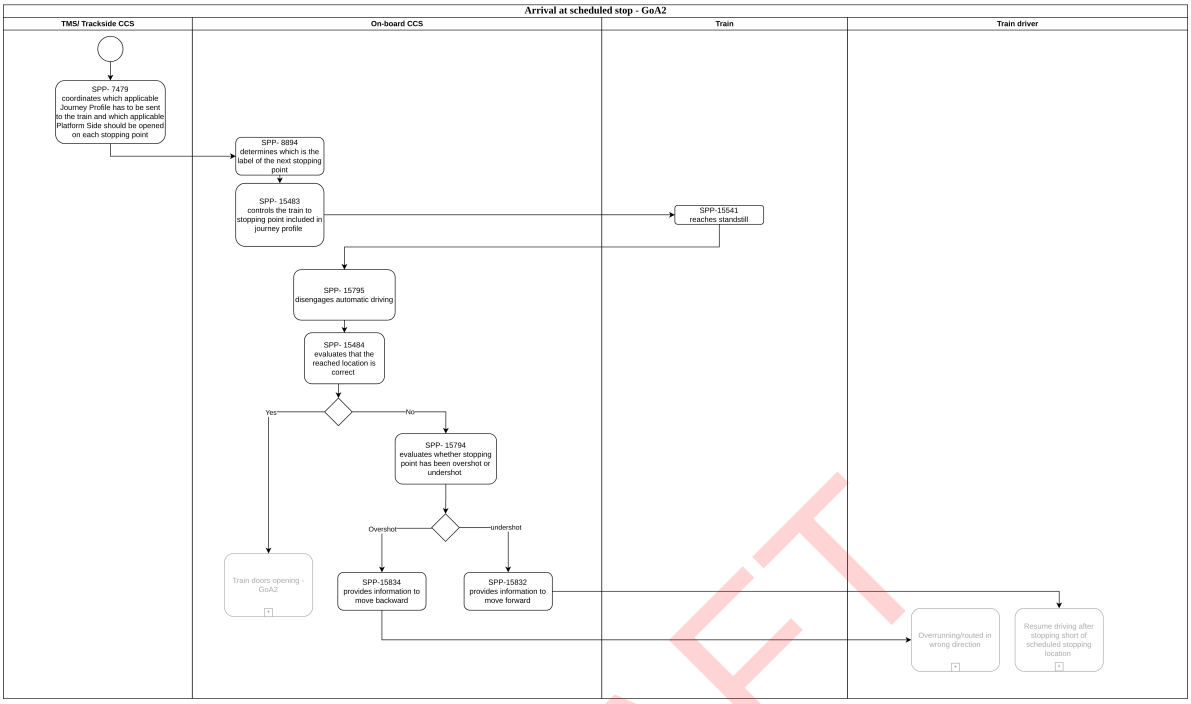
9.10.2 Arrival at scheduled stop - GoA2

SPT2ARC-3751 - GoA2

Arrival at scheduled stop - GoA2

ID	SPP-15477
Op.Precondition	A route has been set. The On-board CCS is in AD mode and EG State. The train is moving with an MA on-board and is approaching its scheduled stop.
Op.Rationale	ATO stops the train at correct position according to time table.

Op.Postcondition	The On-board CCS is in AD mode and AV State. Train is at standstill in the scheduled stopping location.



[SPP-15482]

9.10.2.1 Operational Activities involved in Operational Process:

Trackside CCS coordinates which applicable Journey Profile has to be sent to the train and which applicable Platform Side should be opened on each stopping point
Trackside CCS coordinates which applicable Journey Profile has to be sent to the train and which applicable Platform Side should be opened on each stopping point.
Note: If ATO or JP are unavailable, the Train driver will obtain the required information through an alternative system o directly from the RU (e.g. timetable). This interface is outside the scope of SERA [SPP-7479]

On-board CCS determines which is the label of the next stopping point
On-board CCS determines which is the label of the next stopping point, including arrival time and specific platform information (for example, platform number and section). [SPP-8894]

On-board CCS controls the train to stopping point included in journey profile
On-board CCS drives the train and applies the brakes to a standstill at the stopping point included in the journey profile, with defined accuracy in both time and location. [SPP-15483]

Train reaches standstill
The train reaches standstill. [SPP-15541]

On-board CCS disengages automatic driving
On-board CCS disengages automatic driving. [SPP-15795]

On-board CCS evaluates that the reached location is correct
The On-board CCS evaluates if reached location is correct. [SPP-15484]

On-board CCS evaluates whether the stopping point has been overshot or undershot
Option reached location not correct: On-board CCS evaluates whether the stopping point has been overshot or undershot. [SPP-15794]

DRAFT

On-board CCS provides information to move forward
On-board CCS provides information to move forward. **[**SPP-15832 **]**

On-board CCS provides information to move backward
On-board CCS provides information to move backward **[**SPP-15834 **]**

9.10.2.2 Operational Requirements implemented by Operational Process

SPP-15477: Arrival at scheduled stop - GoA2:

SPP-28689: Approaching stop location - GoA2:
If the train operates in GoA2, the approach can be managed automatically by Onboard CCS or manually by the train driver. Onboard CCS shall drive the train and stop the train at the correct position on the platform.
SPP-9612: On-board indication of stop location to train driver:
The train driver shall have a clear indication of the most suitable location for its service on the track, according to the length of the train, preferably by means of on-board indications.
SPP-9610: Audible information regarding approach to stopping point:
If GoA2 is not implemented, an audio solution shall be used to inform the train driver when approaching the stopping point, rather than on-board indications displayed on the DMI.

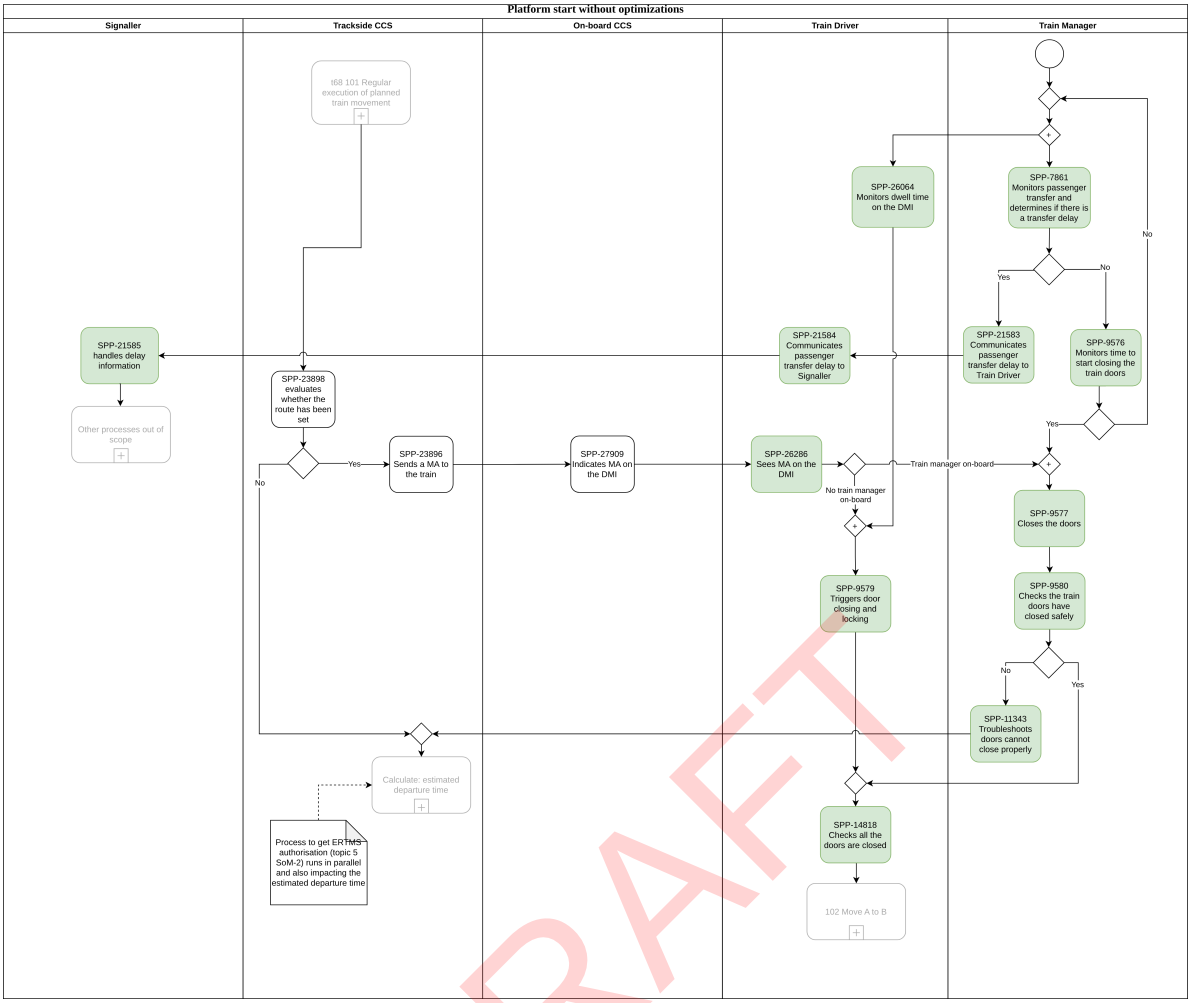
SPP-9607: Stop at correct location:
The train shall be able to move in case of stopping point overshooting or stopping short.
Manual forward and backward movement shall be allowed for the train driver in case of stopping short or overshooting the stopping point.
SPP-9600: Approaching stop location - GoA1:
If the train operates in GoA1, the approach shall be managed manually by train driver. The train driver shall stop the train at the correct position on the platform, to accurately approach a stopping point, e.g., to be able to use station platform length or protection equipment for opening the doors on the correct side.
SPP-9595: Stopping point close to an EoA:
When the scheduled stopping point is near the EoA, the train shall approach the EoA as closely as possible.
The use of release speed shall be considered if the stopping point is close to an EoA. The train doors are finally opened.
SPP-9593: Scheduled stopping point:
The scheduled stopping point shall be before or at the EoA indicated on the DMI but must not exceed it.
The stopping point shall consider the location of points that should not be unnecessarily occupied by the rear end of the train.

9.11 Platform start (without optimizations)

Platform start without optimizations

ID	SPP-21529
Op.Precondition	Train is at standstill. Train doors are open.
Op.Rationale	Closing the doors to make the train ready to depart.
Op.Postcondition	All train doors are closed and the Train Driver has been given authorisation to start the movement.

DRAFT



[SPP-21530]

DRAFT

9.11.1 Operational Activities involved in Operational Process:

Train Driver monitors dwell time on the DMI
Train Driver monitors dwell time on the DMI. [SPP-26064]

SPP-7861: Train Manager monitors passenger transfer and determines if there is a transfer delay:
The Train Manager monitors passenger transfer. At any point in time, the Train Manager needs to mind the estimated departure time and decide if a delay is likely.

Train Manager communicates passenger transfer delay to Train Driver
Option there is a delay: Train Manager shall inform the Train Driver of any delays in the passenger transfer process. [SPP-21583]

Train Driver communicates passenger transfer delay to Signaller
Train Driver informs Signaller about passenger transfer delay. [SPP-21584]

Signaller handles delay information
Signaller handles delay information received from Train Driver. [SPP-21585]

SPP-9576: Train Manager monitors time to start closing the train doors:
The Train Manager shall decide when the procedure for door closing shall be triggered, respecting the MIN_DWELL_TIME and as far as possible the estimated departure time.

SPP-23898: Trackside CCS evaluates whether the route has been set:
Trackside CCS evaluates whether the route has been set.

Trackside CCS sends a MA to the train
Trackside CCS indicates MA availability through an indication on the DMI.
[SPP-23896 **]**

On-board CCS indicates MA on the DMI
On-board CCS indicates MA on the DMI **[**SPP-27909 **]**

Train driver sees MA on the DMI
Train driver sees MA on the DMI
Rationale: the Train driver will instantly get a response of the trackside which is visible in the DMI when the route has been set. In this case no text message is needed. **[**SPP-26286 **]**

SPP-9577: Train Manager closes the doors:
Train Manager closes the doors.

Note: the passenger transfer completed can be informed by the train manager with a whistle, and/or handled automatically by train systems using sound and light or passenger information systems performing an announcement on the platform

SPP-9579: Train driver triggers door closing and locking:
Train driver triggers door closing and locking only when the train is equipped with a centralised doors operation and there is no Train manager on-board.

SPP-9580: Train Manager checks the train doors have closed safely and informs the Train Driver:
Train Manager ensures the train doors have closed and there are no passengers trapped between the doors, or between the train and the platform, according to Railway Undertaking specific rules. Train Manager is also responsible for verifying that there are no further safety risks, including situations like overcrowding on the platform adjacent to the train's departure location.

SPP-14818: Train driver checks all the doors are closed:
If the train doors are closed: Train driver checks all the doors are closed, according to Railway Undertaking specific rules. Train Driver checks that all doors are displayed as closed on the DMI.

SPP-11343: Train Manager troubleshoots door cannot close properly:
If the doors are not closed: Train Manager starts the Railway Undertaking-specific procedure for troubleshooting the door closing problem and notifies a delay to the passenger transfer procedure to CCS Trackside.

Note: this one is a separate operational process with more details. As the details are not CCS-related, it is not in scope of the SP, thus left here as an operational activity as a placeholder.

9.11.2 Operational Requirements implemented by Operational Process

SPP-21529: Platform start without optimizations:

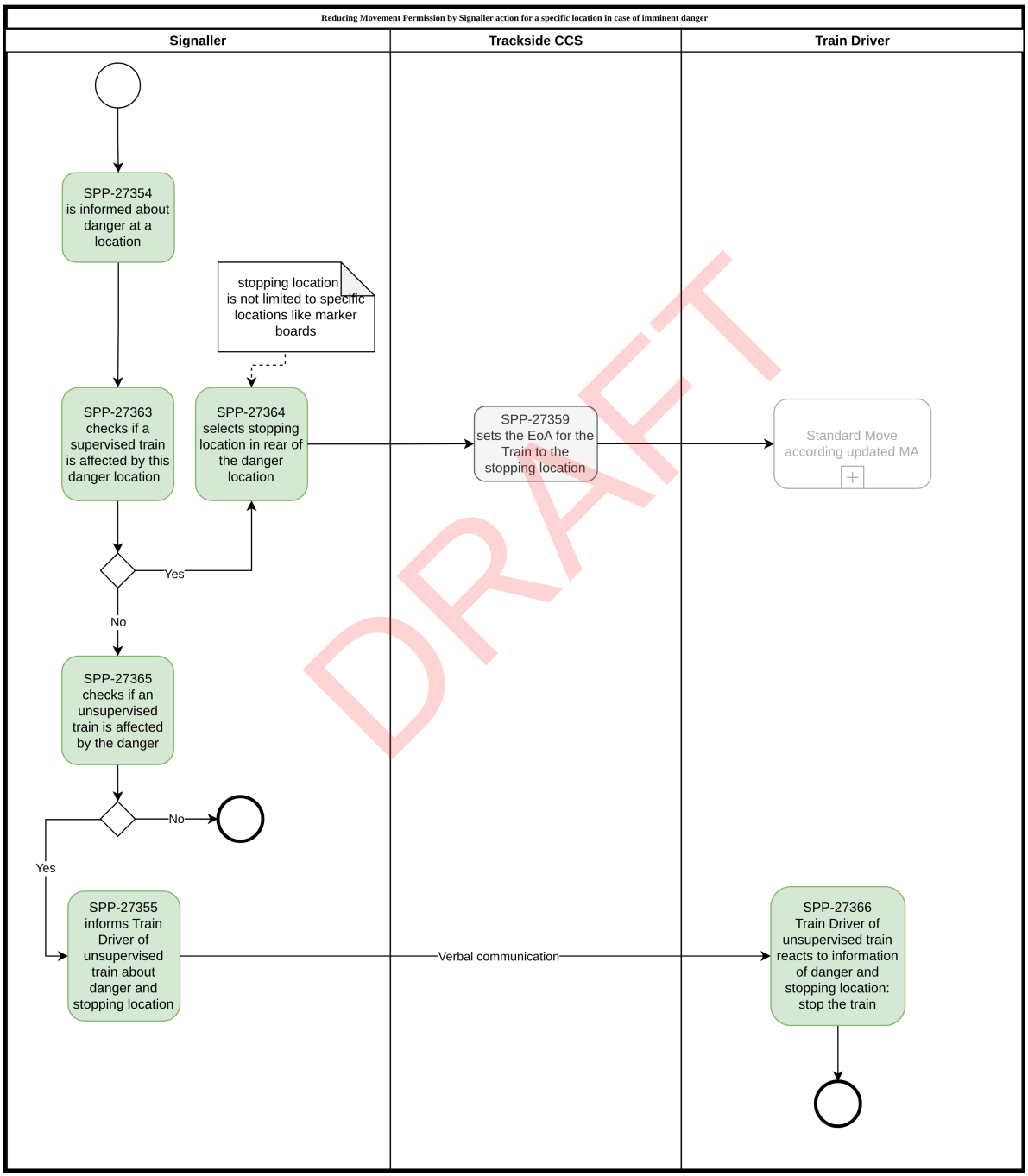
9.12 Reducing Movement Permission by Signaller action for a specific location in case of imminent danger

Reducing Movement Permission by Signaller action for a specific location in case of imminent danger

ID	SPP-21290

DRAFT

Op.Precondition	A situation has occurred that presents imminent danger for a single train at a specific location on the infrastructure, which the CCS system cannot automatically detect and mitigate.
Op.Rationale	Handling a situation that presents imminent danger for a single train at a specific location on the infrastructure, for which the signaller needs to take action.
Op.Postcondition	The train moving towards or on the affected infrastructure has been stopped.



[SPP-26791]

9.12.1 Operational Activities involved in Operational Process:

Signaller is informed about danger at a location
Signaller is informed about danger at a location. **[**SPP-27354 **]**

Signaller checks if a supervised train is affected by this danger location
Signaller checks if a supervised train is affected by this danger location. **[**SPP-27363 **]**

Signaller selects stopping location in rear of the danger location
Signaller selects stopping location at, or in rear of, the danger location
Note: Stopping location is not limited to specific locations like marker boards and can be anywhere between the front end of the train and the current EoA of the MA. **[**SPP-27364 **]**

Trackside CCS sets the EoA for the train to the stopping location
Trackside CCS sets the EoA for the train to the stopping location.

Note: If the stopping location is close to the train the emergency brakes could be applied and if the EoA is passed the train is tripped. **[**SPP-27359 **]**

Signaller checks if an unsupervised train is affected by the danger
The Signaller checks if an unsupervised train is affected by the danger location.
[SPP-27365 **]**

Signaller informs Train Driver of unsupervised train about danger and stopping location
Signaller informs Train Driver of unsupervised train about the danger and stopping location **[**SPP-27355 **]**

Train Driver of unsupervised train reacts to information of danger
Train Driver of unsupervised train react to information of danger and stopping location: stop the train **[**SPP-27366 **]**

9.12.2 Operational Requirements implemented by Operational Process

SPP-21290: Reducing Movement Permission by Signaller action for a specific location in case of imminent danger:

SPP-27380: Reduce commands:
To avoid mistakes, the options (commands) available to revoke a given authorisation should be as few as possible.
SPP-27377: Reduce the risk of tripping a train:
The Trackside CCS shall support the Signaller in selecting a suitable stopping location to which an MA for a train is shortened, to help ensure that trains are not tripped unnecessarily.

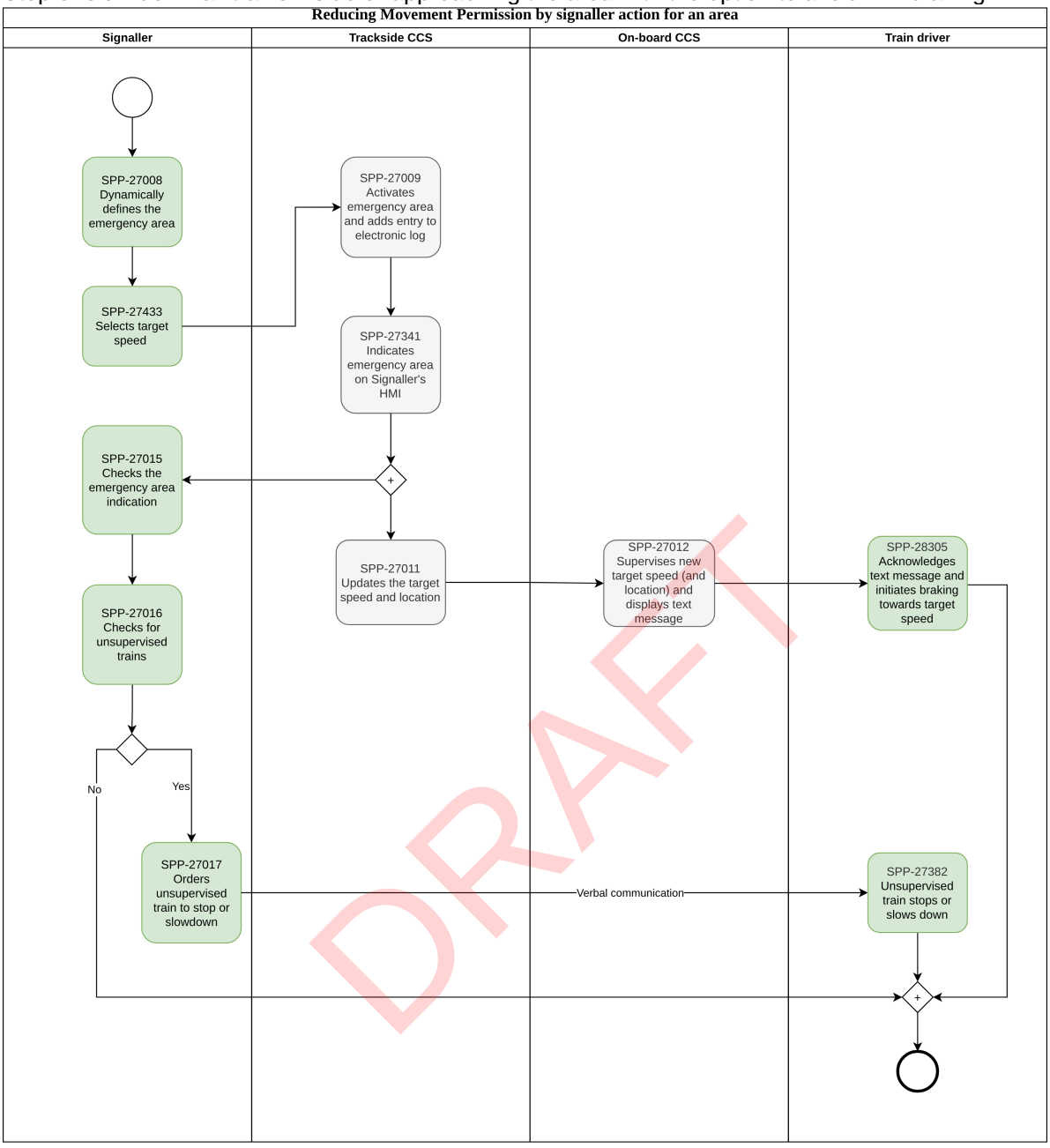
DRAFT

9.13 Reducing Movement Permission by signaller action for an area in case of imminent danger

Reducing Movement Permission by Signaller action for an area in case of imminent danger

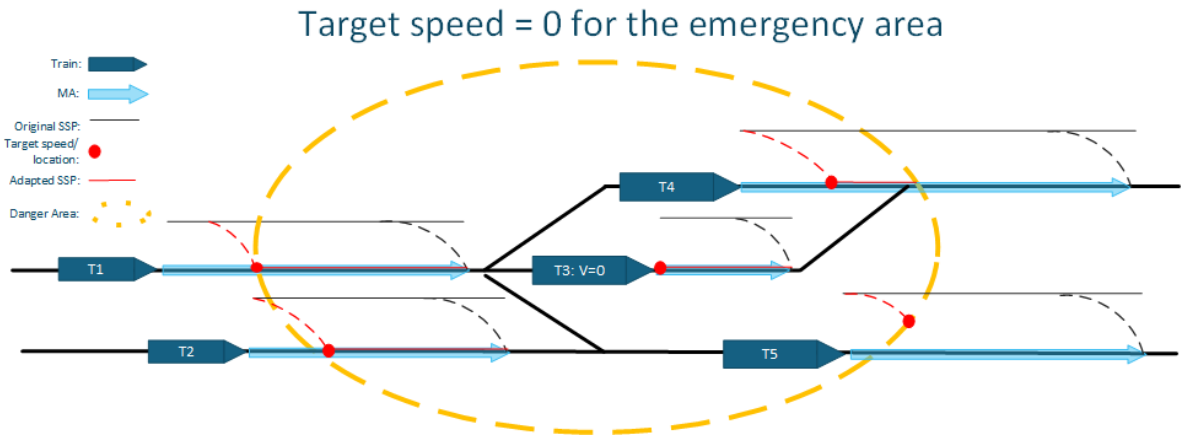
ID	SPP-21322
Op.Precondition	A situation has occurred that presents imminent danger in a certain area on the infrastructure, which the CCS system cannot automatically mitigate.
Op.Rationale	Handling a situation that presents imminent danger in a certain area on the infrastructure, for which the signaller needs to take action.
Op.Postcondition	Any train moving towards or on the affected infrastructure has been stopped or slowed down. No trains have been tripped as a result of the reduced movement permission.

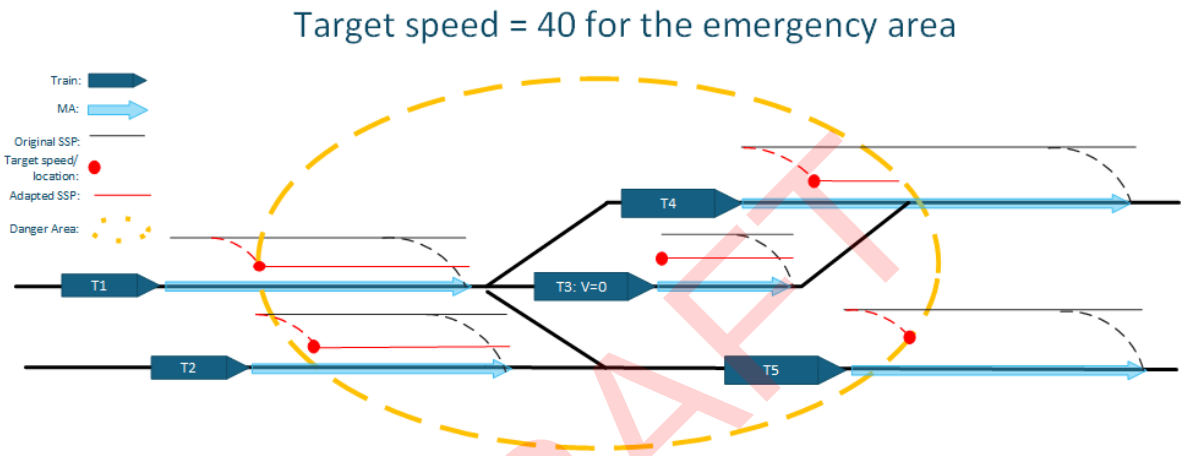
Stop or slow down all trains inside or approaching the area with the option to avoid EM braking.



[SPP-27432]

The diagrams below illustrate the target speed and location for the emergency area for trains outside or inside the area.





Where:
T1: Train on approach, the target speed can be reached at border of the area
T2: Train on approach, close to the border, the target speed cannot be reached at border
T3: Train inside area, as train speed is zero, the train front is target location
T4: Train inside area, target speed reached inside area (outside the area, the original SSP applies)
T5: Train inside area, target speed not reached inside area (outside the area, the original SSP applies)

DRAFT

9.13.1 Operational Activities involved in Operational Process:

Signaller dynamically defines the emergency area
The Signaller dynamically defines the needed emergency area on the HMI. **[**SPP-27008 **]**

Signaller selects target speed
The Signaller selects the target speed for the defined emergency area and requests the activation of the area.

Note: The default target speed is 0 km/h but other values can be chosen if the Signaller only wishes to slow down the trains in the area. **[**SPP-27433 **]**

Trackside CCS activates emergency area and adds entry to electronic log
The Trackside CCS activates the requested emergency area and selected target speed for the area. Trackside CCS makes an entry in the electronic log detailing the activated emergency area and target speed. **[**SPP-27009 **]**

Trackside CCS indicates emergency area on Signaller's HMI
The Trackside CCS indicates the active emergency area on the Signaller's HMI. **[**SPP-27341 **]**

Trackside CCS updates the target speed and location
The Trackside CCS calculates the target location for the target speed in the area and sends updated MAs

(including a standard text message to instruct the driver to stop or slow down) to any trains in, or approaching, the activated emergency area. The target location is based on the reported speed and location and considers the configured assumed SB brake performance and time.

Note: The assumed SB brake performance can be train category specific. If the assumed SB brake performance is high, trains will immediate apply EM brakes for the supervised target speed and location. **[**SPP-27011 **]**

On-board CCS supervises new target speed (and location) and displays text message
The On-board CCS of any train with an MA inside, or approaching, the emergency area supervises the new target speed and location and, if required, applies the brake. The On-board CCS indicates the text message on the DMI and requests the Train Driver to acknowledge.

Note: if the train exits the emergency area, either braked or running with the allowed target speed, the original allowed speed and EoA/SvL of the original MA are applicable. The text message will disappear and the train can continue normally. **[**SPP-27012 **]**

Train Driver acknowledges the text message and initiates braking towards target speed
The Train Driver acknowledges the text message and initiates braking towards target speed indicated on the DMI. **[**SPP-28305 **]**

The Signaller checks the emergency area indication
The Signaller checks the indication of the activated emergency area on the HMI. **[**SPP-27015 **]**

The Signaller checks for unsupervised trains
The Signaller checks if there are any unsupervised trains which are affected by the activated emergency area. **[**SPP-27016 **]**

The Signaller orders unsupervised train to stop or slowdown
The Signaller contacts the Train Driver of any affected unsupervised train and orders them to stop or slow down. **[**SPP-27017 **]**

Train driver of unsupervised train stops or slows down
The Train driver of the unsupervised train stops, or slows down, the train as ordered by the Signaller. **[**SPP-27382 **]**

DRAFT

9.13.2 Operational Requirements implemented by Operational Process

SPP-21322: Reducing Movement Permission by Signaller action for an area in case of imminent danger:

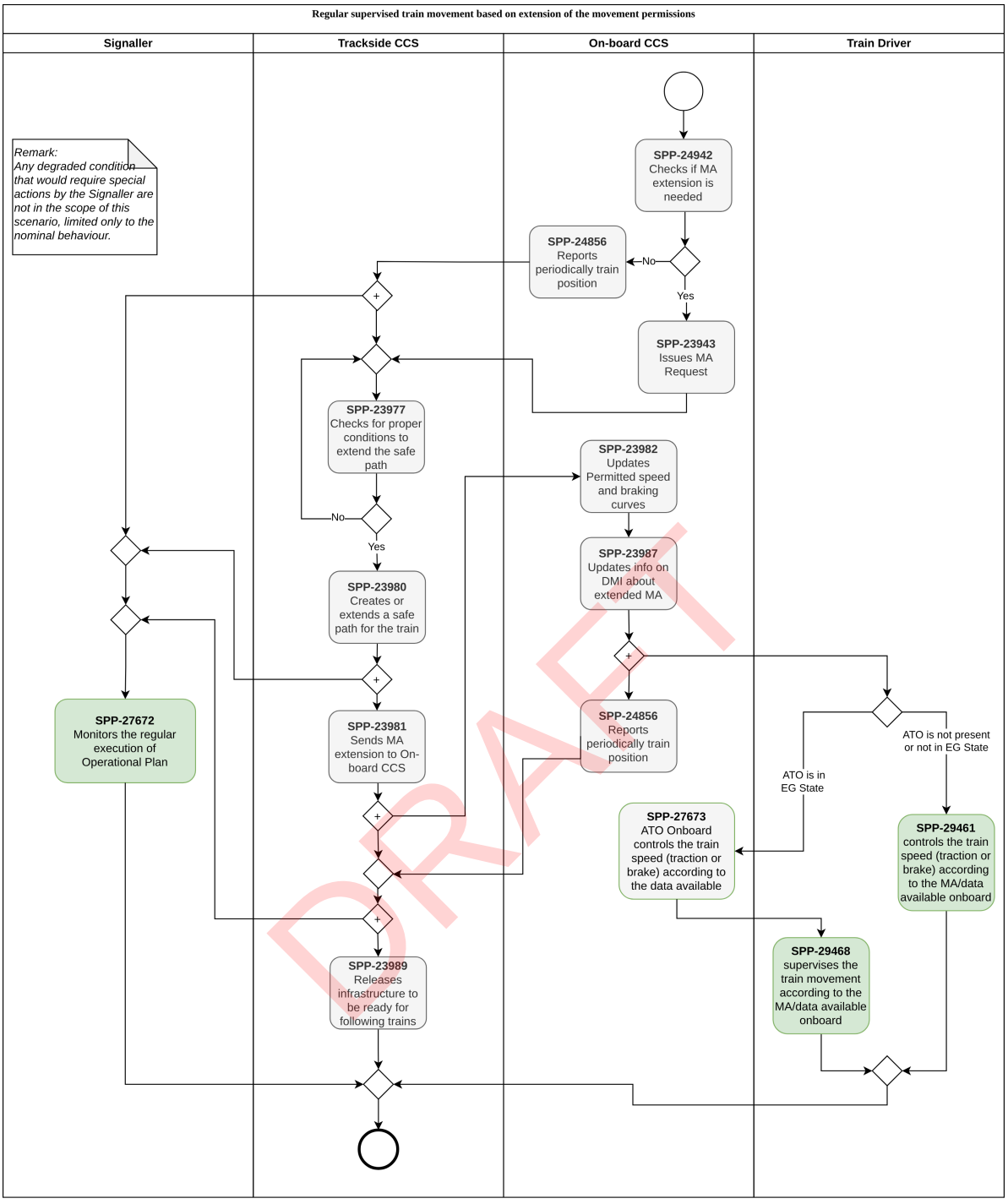
SPP-7071: Automated routine operational production procedures for train movements or shunting movements:
Operational production procedures shall support the automated and/or the unattended execution of the processes related to routine train movements or shunting movements; i.e. the processes executed during 'normal' operation and the processes that are routinely used for the management or recovery of degraded situations.
SPP-7051: The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.:
The operational processes shall be simplified in order to optimize as much as possible the commercial and operational production processes within the Railway System boundary.
SPP-6932: Signaller shall have a visual representation of the complete, consistent and accurate status of the operational situation:
Signaller shall have a visual representation of the complete, consistent and accurate status of the operational situation in order to react to incidents that have the potential to limit the railway safety and track capacity.

9.14 Regular execution of planned train movement

Regular supervised train movement based on extension of the movement permissions

ID	SPP-23605
Op.Precondition	- The train is moving with a MA and approaching the End of Authority. - An extension of the MA is needed to keep the train moving according to the plan. - Conditions allow automatic execution of the plan.
Op.Rationale	To allow a regular train supervised movement based on extensions of the movement permissions on safe train paths. The regular train movement includes also the release of infrastructure as soon as the train has passed, in order to be ready for other trains.
Op.Postcondition	- MA has been extended in time (i.e. before entering the braking curves) - Infrastructure that the train has passed has been released for other trains.

DRAFT



[SPP-23606]

9.14.1 Operational Activities involved in Operational Process:

On-board CCS checks if MA extension is needed
On-board CCS, based on train position and dimension of the MA available onboard, checks if an MA extension is needed (that is, the train is approaching the braking intervention point. If yes, an MA Request is issued, if not no MA Request is sent to Trackside CCS but only train position on a periodical base.
[SPP-24942]

On-Board CCS issues a MA Request
On-board CCS transmits a MA Request message to Trackside CCS. **[**SPP-24943 **]**

On-board CCS reports periodically train position
On-board CCS reports on a periodical base the train position to Trackside CCS, issuing Position Reports. **[**SPP-24856 **]**

Trackside CCS checks for proper conditions to extend the safe path
Trackside CCS checks if, based on MA Requests, the train's position and characteristics, signalling conditions and the Operational Plan, it is possible to create/extend a safe path for the train. If not, Trackside CCS continues checking periodically. **[**SPP-23977 **]**

Trackside CCS creates or extends a safe path for the train
When the proper conditions are met, the Trackside CCS creates or extends the safe path allocated to the train. **[**SPP-23980 **]**

Trackside CCS sends MA extension to On-board CCS
Trackside CCS sends an extended Movement Authority to On-board CCS. **[**SPP-23981 **]**

On-board CCS updates Permitted Speed and braking curves
On-board CCS updates the Permitted Speed and the braking curves according to the extended Movement Authority received from Trackside CCS. **[**SPP-23982 **]**

On-board CCS updates info on DMI about extended MA
On-board CCS updates info on DMI for displaying the extended MA and its related driving parameters. **[**SPP-23987 **]**

The Signaller monitors the regular execution of Operational Plan
The Signaller monitors the regular execution of the plan and periodically checks train locations, the extension of MA allocated to trains, and the status of the infrastructure. **[**SPP-27672 **]**

Trackside CCS releases the infrastructure to be ready for following trains
Trackside CCS releases safe path according to train's position reports and/or the status of occupation of trackside detection devices in use, in order to be ready to grant the path to following trains. **[**SPP-23989 **]**

Onboard ATO controls the train speed (traction or brake) according to the data available
The Onboard ATO drives the train and controls the train speed (applying traction or brakes as needed) according to the data available onboard. **[**SPP-27673 **]**

The Train Driver controls the train speed (traction or brake) according to the MA/data available onboard
The Train Driver controls the train movement (applying traction or brakes as needed) according to the MA/data available onboard and visible on the Driver Machine Interface (DMI). **[**SPP-29461 **]**

The Train Driver supervises the train movement according to the MA/data available onboard
The Train Driver supervises the train movement according to the MA/data available onboard and visible on the Driver Machine Interface (DMI), while the speed control is guaranteed by ATO GoA2. **[**SPP-29468 **]**

DRAFT

9.14.2 Operational Requirements implemented by Operational Process

SPP-23605: Regular supervised train movement based on extension of the movement permissions:

SPP-23860: Creating a safe train path depending on the actual situation of infrastructure and train's location and based on the plan managed by Traffic Management.:
During the regular supervised movement of a train a safe path shall be created for it and allocated as an updated Movement Authority. This path shall depend on the actual situation of infrastructure and train's location and shall be based on the Automatic Operational Plan managed by the Plan Execution System.

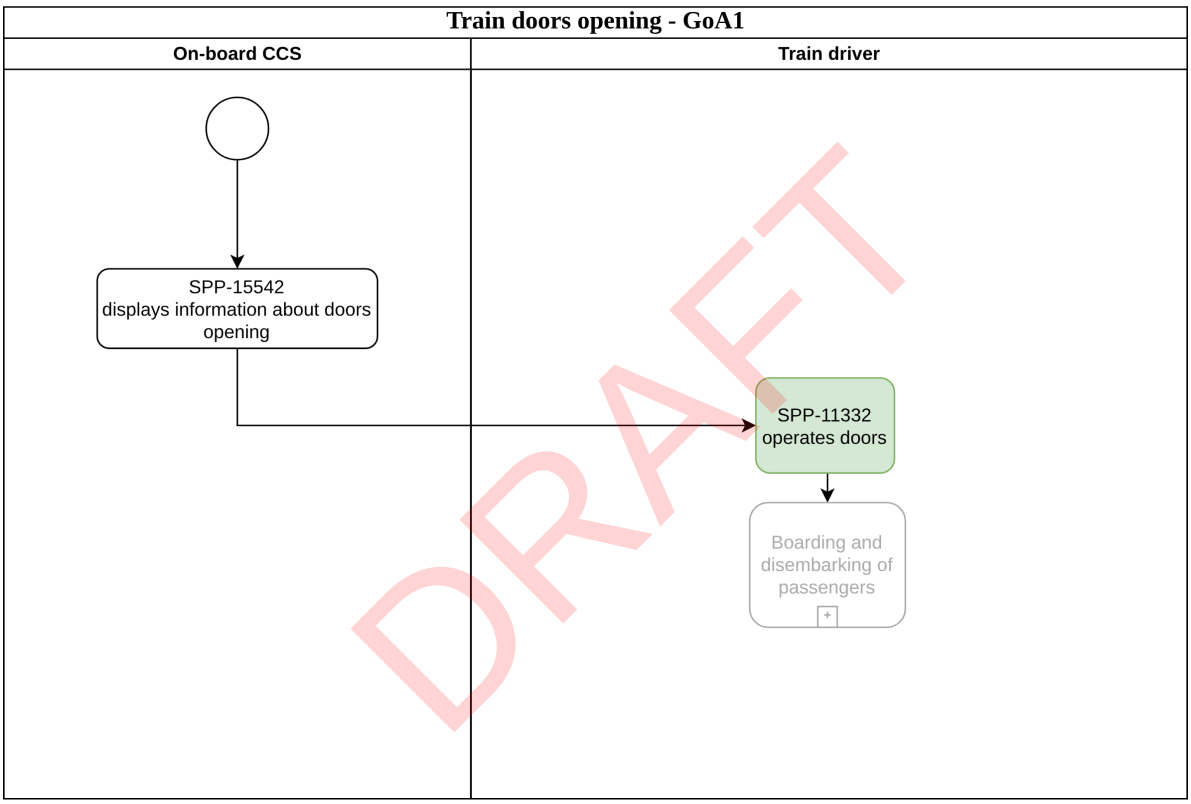
9.15 Building blocks

9.15.1 Train doors opening - GoA1

SPT2ARC-3746 - GoA1

Train doors opening - GoA1

ID	SPP-24329
Op.Precondition	Passenger train is at standstill at the scheduled stopping point
Op.Rationale	Driver opens the doors when the train is correctly positioned and stationary.
Op.Postcondition	Train doors are opened, allowing passenger movement.



[SPP-24330]

9.15.1.1 Operational Activities involved in Operational Process:

On-board CCS displays information about doors opening
Option reached location correct: On-board CCS displays doors management information, for manual or automatic (only GoA2 operations) door opening indication, with the corresponding symbol in the DMI. This information refers to the side of the train where the doors should be opened (left, right or both sides).
[SPP-15542]

Train driver operates doors
The train driver unlocks the doors. [SPP-11332]

9.15.1.2 Operational Requirements implemented by Operational Process

SPP-24329: Train doors opening - GoA1:

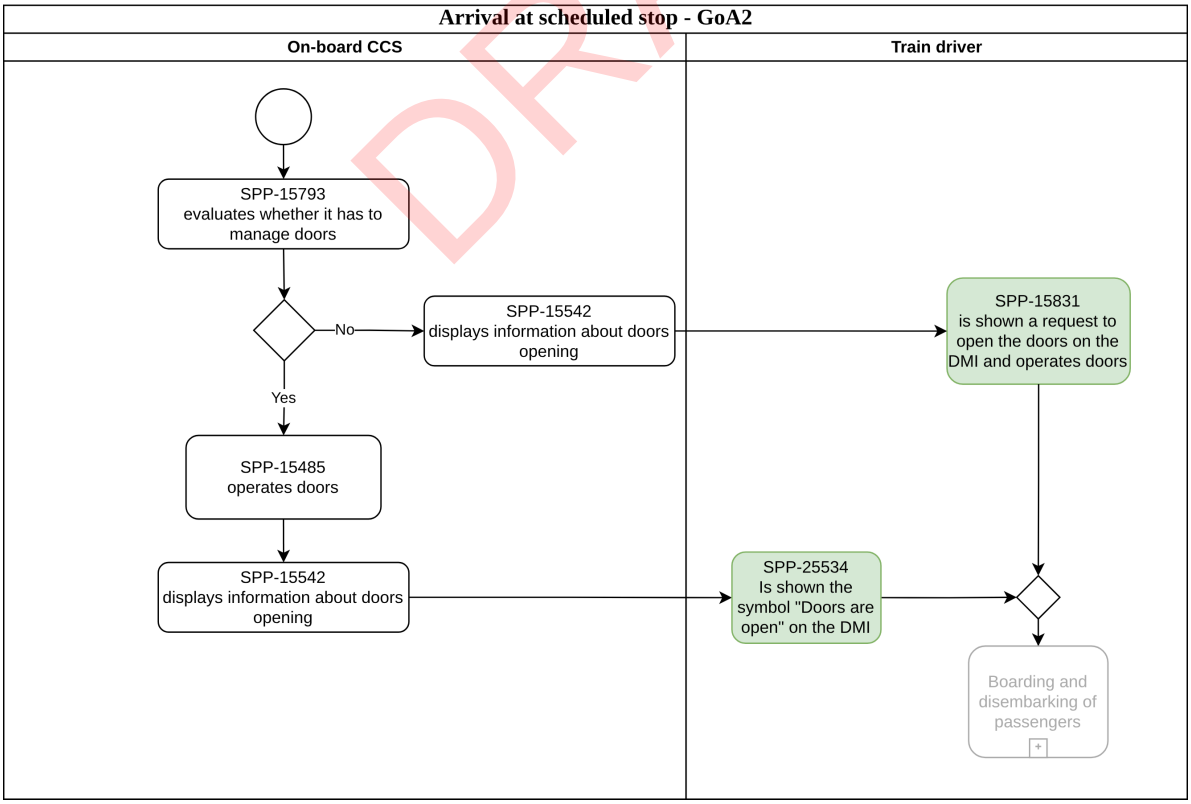
SPP-9600: Approaching stop location - GoA1:
If the train operates in GoA1, the approach shall be managed manually by train driver. The train driver shall stop the train at the correct position on the platform, to accurately approach a stopping point, e.g., to be able to use station platform length or protection equipment for opening the doors on the correct side.
SPP-9595: Stopping point close to an EoA:
When the scheduled stopping point is near the EoA, the train shall approach the EoA as closely as possible.
The use of release speed shall be considered if the stopping point is close to an EoA. The train doors are finally opened.

9.15.2 Train doors opening - GoA2

SPT2ARC-3751 - GoA2

Train doors opening - GoA2

ID	SPP-24336
Op.Precondition	The On-board CCS is not in AD mode. Train is at standstill at the scheduled stopping point
Op.Rationale	Driver or ATO opens the doors when the train is correctly positioned and stationary.
Op.Postcondition	Train doors are opened, allowing passenger movement.



[SPP-24337]

DRAFT

9.15.2.1 Operational Activities involved in Operational Process:

On-board CCS evaluates whether it has to manage doors
On-board CCS evaluates whether it has to manage the doors. **[**SPP-15793 **]**

On-board CCS operates doors
If automatic doors operation is present, the On-board CCS operates the doors when automatic doors operation is present. **[**SPP-15485 **]**

SPP-15542: On-board CCS displays information about doors opening:
Option reached location correct: On-board CCS displays doors management information, for manual or automatic (only GoA2 operations) door opening indication, with the corresponding symbol in the DMI. This information refers to the side of the train where the doors should be opened (left, right or both sides).

Train driver is shown the symbol "Doors are open" on the DMI
When automatic doors operation is present, the Train driver is shown the symbol "doors are open" on the DMI. **[**SPP-25534 **]**

Train driver is shown a request to open the doors on the DMI and operates doors
When automatic doors operation is not present, the Train driver is shown a request to open the doors on the DMI and manually operates the doors accordingly. **[**SPP-15831 **]**

9.15.2.2 Operational Requirements implemented by Operational Process

SPP-24336: Train doors opening - GoA2:

SPP-28689: Approaching stop location - GoA2:
If the train operates in GoA2, the approach can be managed automatically by Onboard CCS or manually by the train driver. Onboard CCS shall drive the train and stop the train at the correct position on the platform.

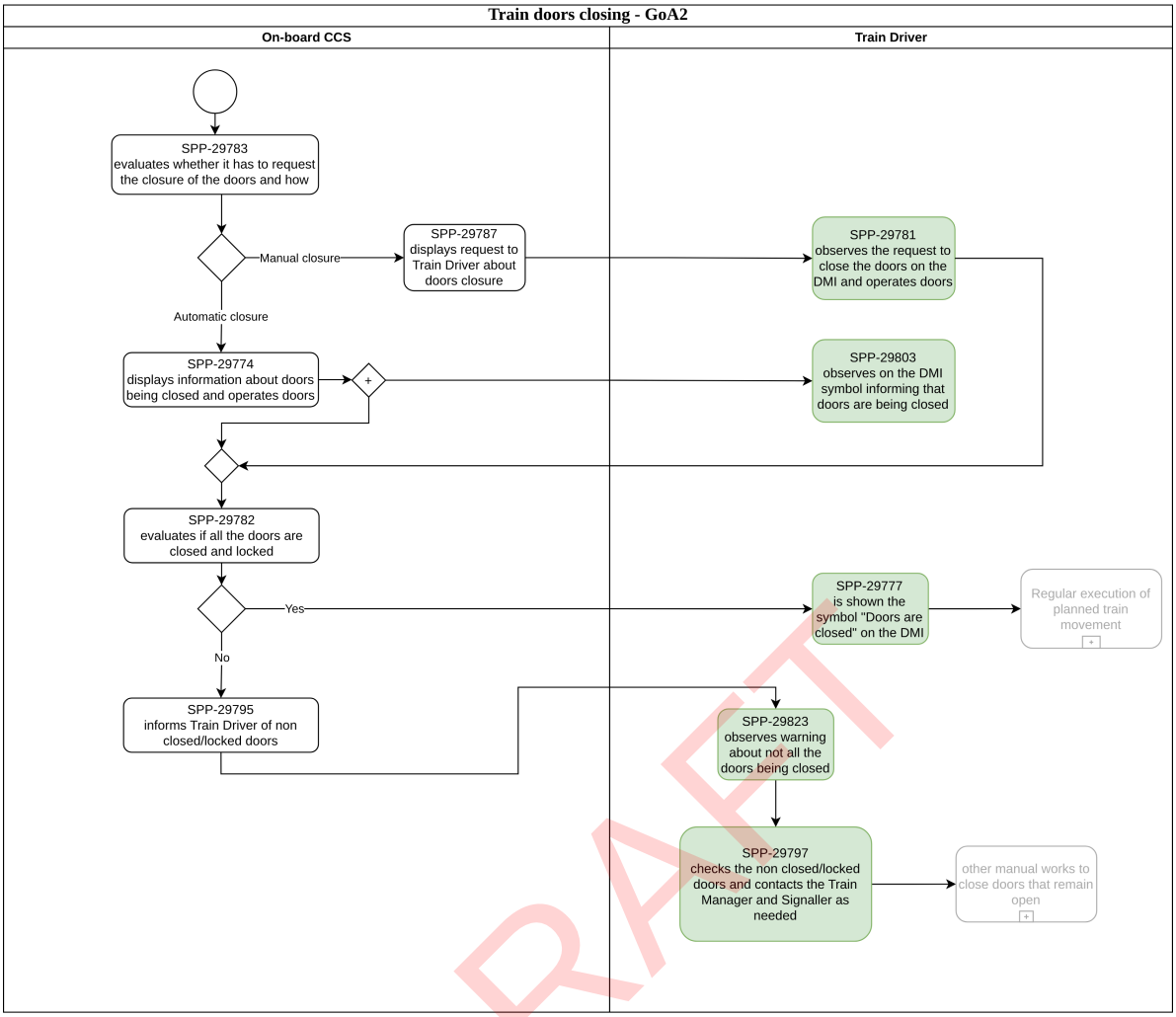
9.15.3 Train doors closing - GoA2

SPT2ARC-3751 - GoA2

Train doors closing - GoA2

ID	SPP-29775
Op.Precondition	On-board is in AD mode. Static configuration allows automatic door closing or static configuration requests manual door closing. Trackside CCS (ATO-TS) has provided the Journey Profile to On-board (ATO-OB) with the doors information.
Op.Rationale	Closure and lock of the doors could be done manually or automatically.
Op.Postcondition	All the doors are closed and locked and train can complete the platform start and continue its departure.

DRAFT



[SPP-29773 **]**

DRAFT

9.15.3.1 Operational Activities involved in Operational Process:

On-board CCS evaluates whether it has to request the closure of the doors and how
On-board CCS evaluates whether it has to request the closure of the doors and how (manually from driver or automatically by ATO-OB). Conditions for requesting the closure of the doors are subject to further safety analysis, as a minimum the following conditions have been identified:
- dwell time is greater or equal than the time to close the doors and the doors are not closed and locked
- train is ready for departure and On-board CCS has received an MA long enough to leave the platform or its reception is imminent
- there are no obstructions to close the doors known by the On-board CCS **[**SPP-29783 **]**

On-board CCS displays request to Train Driver about doors closure
When automatic doors operation is not present, On-board CCS request Train Driver to close the doors by displaying the DMI symbol "Request driver to close doors". **[**SPP-29787 **]**

Train Driver observes the request to close the doors on the DMI and operates doors

Train Driver observes the DMI symbol "Request driver to close doors" and manually closes the doors accordingly. **[**SPP-29781 **]**

On-board CCS displays information about doors being closed and operates doors
If automatic doors operation is present, the On-board CCS operates the doors and shows on the DMI

symbol "Doors are being
closed by ATO". [SPP-29774]

Train Driver observes on the DMI symbol informing that doors are being closed

Train Driver observes on the DMI symbol "Doors are being closed by ATO" and takes no further action for the moment. [SPP-29803]

On-board CCS evaluates if all the doors are closed and locked
On-board (ATO-OB) should be aware if all the doors are closed and locked (at least for passenger trains) so if not all the doors are closed/locked, On-board CCS should provide this information to the Train Driver. [SPP-29782]

Train Driver is shown the symbol "Doors are closed" on the DMI
When automatic doors operation is present, the Train driver is shown the DMI symbol "Doors are closed"

is displayed. [SPP-29777]

On-board CCS informs Train Driver of non closed/locked doors
On-board (ATO-OB) should be able to warn the Train Driver and identify which specific doors are not closed/locked (at least for passenger trains). The way this warning is displayed to Train Driver should be further evaluated, see Open Issue SPP-29815 - Evaluate which are the options to display a warning to driver for non closed/loc... [SPP-29795]

Train Driver observes warning about not all the doors being closed
Train Driver will be warned about not all the doors being closed. The way this warning is displayed to Train Driver should be further evaluated, see Open Issue SPP-29815 - Evaluate which are the options to display a warning to driver for non closed/loc... [SPP-29823]

Train Driver checks the non closed/locked doors and contacts the Train Manager and the Signaller as needed
In some trains, the Train Driver will be able to check in the train diagnostics pannel and check which are the doors that fail to close. In other trains not equipped with a train diagnostic pannel, the Train Driver shall contact the Train Manager if applicable for help with the doors closure. Train Driver shall also contact the Signaller to communicate any delay to the Operational Plan. [SPP-29797]

DRAFT

9.15.3.2 Operational Requirements implemented by Operational Process

none

10 Derived operational needs

List of derived needs from operational process.

10.1 Next operational step unknown

Derived needs from Operational Process / Activity:

SPP-6154: Next operational step unknown:

SPP-18135: Train Driver checks original train mission according to the scheduled operating plan with the Signaller:

SPP-21591: Driver - Signaller verbal communication
Verbal communication between Driver and Signaller. No interaction with CCS system.

SPP-17550: Signaller informs the Train driver about the new plan or manual route setting:

SPP-21591: Driver - Signaller verbal communication
Verbal communication between Driver and Signaller. No interaction with CCS system.

SPP-17549: Train driver informs Signaller about the missing next step:

SPP-21591: Driver - Signaller verbal communication
Verbal communication between Driver and Signaller. No interaction with CCS system.

SPP-6432: Signaller updates the plan or uses manual route setting:

SPP-7237: Analysis of OA SPP-6432

- Besides the fact, that the Dispatcher needs a UI to modify all plans and missions (which is not in scope here), the Signaller must have the possibility to make updates in the presented missions, timetables, etc
- An agreement about the changes has to be made between the Signaller and the Dispatcher, if not happend beforehand in the process
- Manual route setting shall be possible, in case automatic route setting fails (extent and influence on the UI to be discussed, see open points section below)

SPP-6431: Signaller informs the train driver about the result of the decision:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-6430: Signaller decides what the next required step is:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need

DRAFT

towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-6156: Train Driver accepts the plan as informed by the Signaller and evaluates if the new plan is updated on the DMI:

SPP-7234: Analysis of OA SPP-6156

- On the UI (not ETCS-DMI) or other mission-related interfaces/displays, the driver shall have the possibility to insert, get updates and acknowledge changes in the existing plan

---

SPP-6155: Signaller checks original planned mission with the train driver:

SPP-7233: Analysis of OA SPP-6155

- The Signaller must have access to all planned missions on the HMI(UI)

10.2 Observations while driving

Derived needs from Operational Process / Activity:

SPP-16066: Observations while driving process:

SPP-16080: Field Force continues observations:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-16076: Field Force observes passing train, operational environment:

SPP-18293: Analysis of SPP-16076
Field Force is able to observe passing train, operational environment.

SPP-16075: Train Driver continues observations:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-16072: Train Driver observes DMI, Line & Signals, Train's operational environment:

SPP-18295: Analysis of SPP-16072
The Train Driver is able to observe DMI, Line and Signals, train's operational environment.

SPP-16070: The Signaller continues observations:

DRAFT

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-16068: The Signaller observes his User Interface:

SPP-18241: Analysis of SPP-16068
The signaller is able to observe his User Interface including messages coming from obstacle detection systems, hot wheel detection devices and meteorological survey; if possible the signaller observes also passing trains.

10.3 Resume driving after stopping short of scheduled stopping location

Derived needs from Operational Process / Activity:

SPP-6065: Resume driving after stopping short of scheduled stopping location:

SPP-24079: Train Driver stops the train:

SPP-24323: Analysis of SPP-24079
Train Drive must be able to apply traction to the train for moving it at a proper (likely slow) speed until the train reaches the scheduled stopping location. The driver must be able to understand that the final correct position has been reached by the train.

SPP-24061: On-board CCS updates permitted speed and distance and shows updated info on DMI.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24060: Trackside CCS sends updated Movement Authority to On-board CCS.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24059: Signaller sets the trackside conditions for sending a Movement Permission for the train.:

SPP-24321: Analysis of SPP-24059
The Signaller must be able to set up manually the right conditions for allowing Trackside CCS to issue an extended Movement Authority to the train.
As possible actions, the Signaller should be able to:
- set extended route
- remove the reason/s of the MA withdrawal
- apply new dedicated commands.

DRAFT

SPP-24058: Train driver waits for additional instructions from the Signaller for being allowed to move the train.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24057: Signaller informs the train driver that a Movement Authority cannot be granted.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24056: Signaller checks if it is possible to set the proper conditions for sending a Movement Authority to the train for allowing its movement up to the scheduled stopping location.:

SPP-24268: Analysis of SPP-24056
Signaller has to rely on the complete set of information for making the evaluation if it is possible to set up again the path for the train. The Signaller must be able to see on Trackside CCS HMI the exact train location, the extension (if any) of the MA available onboard, the reason why the MA has been withdrawn and the validity of the signalling condition for being able to set up dedicated procedure for allowing Trackside CCS to extend the MA up to the final scheduled location.

SPP-24054: Train driver checks if the train is at the scheduled stopping location.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24053: Train driver resumes driving according to the RU procedures and supervising the MA available on-board.:

SPP-24271: Analysis of SPP-24053
Train Driver must be able, applying power traction to the train, to move the train while supervising the available MA. Train Driver must rely on continuously updated information about the permitted speed, actual speed and the distance to the final stopping position, for being able to decide when applying the brake and stopping the train.

SPP-24052: Train driver ensures any additional Railway Undertaking procedures have been followed.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24051: Train driver contacts the Signaller and informs that the train cannot be moved up to the scheduled stopping location in a supervised mode.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need

DRAFT

towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24050: The train driver checks if an MA is available on-board and the train can be moved to the scheduled stopping location while supervising the MA.:

SPP-24267: Analysis of SPP-24050
The train driver must be able to decide, based on all the information shown on the Onboard DMI, if the train can be moved in a supervised mode. (possible information to be shown: extension of the MA, remaining distance to the EoA, permitted/release speed based on Overlap/Danger Point, any speed restriction or track condition etc.).

SPP-15832: On-board CCS provides information to move forward:

SPP-16625: Topic 15 107 - Analysis of OA
If GoA2 is in operation, the automatic jogging is available and the train has undershot the stopping point :

- The Onboard CCS provides information to the train to move forward.

SPP-15543: Train driver evaluates whether the stopping point has been overshot or undershot:

SPP-16636: Topic 15 107 - Analysis of OA Train driver evaluates whether the stopping point has been overshot or undershot
If GoA1 is in operation:

- The train driver evaluates if the train has overshot or undershot the stopping point.

Based on analysis there is no need for a specific system requirement for this operational activity.

DRAFT

10.4 Train departure / SoM departure

10.4.1 Train departure / SoM general overview (train preparation)

Derived needs from Operational Process / Activity:

SPP-21718: Technical preparation of the train:

SPP-23895: On-board CCS opens desk:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23894: On-board CCS evaluates whether all tests are completed with positive result:

SPP-25270: Analysis of OA SPP-23894
Analysis of OA SPP-23894
On-board CCS must be able to show to the train driver on the DMI, at the end of the test phase, any

notification received from the Train Control management System and the first screen of the SoM procedure, when launched.

SPP-21721: Train Driver performs technical and operational tests:

SPP-25269: Analysis of OA SPP-21271
Analysis of OA SPP-21271
After the cabin is powered on, the Train Driver must be able to execute all the required technical and operational tests that cannot be executed automatically. Through a proper set of commands or input devices the Train Driver must be able to to select the complete list of tests and command their execution.

SPP-21720: Train Driver switches the cabin on:

SPP-25268: Analysis of SPP-21720
Analysis of OA 21720
Train Driver must be able to switch the On-board CCS on/off. This command must be executable through an input device placed on the cabin's consolle (e.g. button, switch, key etc.).

10.4.2 Train departure / SoM with manual operation

Derived needs from Operational Process / Activity:

SPP-21872: Start of Mission with manual operation:

SPP-24312: Train Driver selects "Start":

SPP-29810: Analysis of OA SPP-24312
Analysis of OA SPP-24312
The On Board CCS shows to Train Driver, on the DMI, the "Start" button when the proper conditions allow to enable its pushing.

SPP-23895: On-board CCS opens desk:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

10.4.3 Train departure / SoM after pressing start, with text messages

Derived needs from Operational Process / Activity:

SPP-22004: SoM after pressing start, with text messages:

SPP-29560: Trackside CCS sets the route once all conditions are met and evaluates whether route setting was succesful:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

DRAFT

SPP-29114: On-board CCS stops timer, resets the timer and the counter, switches to mode SB and shows text message "MA REQUEST FAILED":

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-29113: On-board CCS evaluates the value of the counter.:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-29112: On-board CCS resets the timer and restarts timing, the counter counts +1 and repeats MA request to Trackside CCS:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-29111: On-board CCS is timing till time is 15 seconds:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-29110: On-board CCS starts a timer and a counter:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27679: Train Driver observes text message "WAIT":

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27678: Trackside CCS sends message "ACTIVITY NOT PLANNED":

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27677: Trackside CCS sends text message "WAIT":

DRAFT

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24552: Train Driver observes text message and contacts Signaller:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24551: On-board CCS shows text message "WAIT":

SPP-25921: Analysis of OA SPP-24551
Analysis of OA SPP-24551
When On-board CCS receives this command from Trackside CCS, it must be able to show on the DMI the text message "WAIT" to the driver. This text message has the scope to let the driver being informed that the trackside conditions (likely the route in front of the train) is not set yet, so he/she has to wait until the proper conditions are set.

SPP-24312: Train Driver selects "Start":

SPP-29810: Analysis of OA SPP-24312
Analysis of OA SPP-24312
The On Board CCS shows to Train Driver, on the DMI, the "Start" button when the proper conditions allow to enable its pushing.

SPP-23898: Trackside CCS evaluates whether the route has been set:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-22007: On-board CCS shows message "ACTIVITY NOT PLANNED":

SPP-25922: Analysis of OA SPP-22007
Analysis of OA SPP-22007
When On-board CCS receives this command from Trackside CCS, it must be able to show on the DMI the text message "ACTIVITY NOT PLANNED" to the driver. This text message has the scope to ask to the driver to contact the Signaller in order to agree how to handle the train that does not have an operational plan assigned.

SPP-22006: Trackside CCS checks whether the train is in the operational plan:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

DRAFT

10.4.4 Train departure with not valid and ambiguous position

Derived needs from Operational Process / Activity:

SPP-22036: Train departure with not valid and ambiguous position:

SPP-29560: Trackside CCS sets the route once all conditions are met and evaluates whether route setting was succesful:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24642: Trackside CCS sends SR authorisation to the train with a text message "PROCEED / TRACK XX / SMB XXX":

SPP-25935: Analysis of OA SPP-24642
Analysis of OA SPP-24642
On-board CCS must be able to show on its DMI the text message sent by Trackside CCS together with the SR Authorization message. The text message will be used by the driver to check if he/she can move the train in SR along the track XX up to SMB XXX.

SPP-24641: Train Driver observes the text message and acknowledges SR mode:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24637: Trackside CCS sends a list of balises to the train:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24633: Trackside CCS evaluates whether all the conditions are met to send an automated SR mode to the train:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23898: Trackside CCS evaluates whether the route has been set:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

DRAFT

10.4.5 Train departure with valid and ambiguous position

Derived needs from Operational Process / Activity:

SPP-27055: Train departure with valid and unambiguous position:

SPP-29560: Trackside CCS sets the route once all conditions are met and evaluates whether route setting was succesful:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-26776: Trackside CCS sends an OS MA to the train:

SPP-29859: Analysis of SPP-26776
Analysis of SPP-26776
The OS MA availability must be shown through proper indications on the onboard DMI. E.g. icon linked to OS mode.

SPP-24656: Trackside CCS evaluates whether to send FS mode or OS mode:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24636: Train Driver acknowledges OS mode:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24635: Train Driver observes the MA on the DMI:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23898: Trackside CCS evaluates whether the route has been set:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23896: Trackside CCS sends a MA to the train:

SPP-27019: Analysis of SPP-23896 / SPP-27909 / 26286
The DMI indicates the MA to the Driver.

DRAFT

10.5 Revoke Movement Permission

Derived needs from Operational Process / Activity:

SPP-6673: Revoke Movement Permission / Co-operative shortening of MA:

SPP-15887: Signaller observes rejection on the HMI:

SPP-15901: Analysis of OA SPP-15887
The HMI must also actively provide the Signaller with information that the COSMA has been rejected by the On-board CCS.

SPP-15882: On-board CCS assesses if shortened MA leads to an imminent brake application:

SPP-15900: Analysis of OA SPP-15882
Standard On-board functionality. The On-board assesses if the proposed shortened MA will lead to an imminent brake application. There are no requirements for the Trackside CCS or subsystems to be identified.

SPP-9559: Trackside CCS receives notification about rejected COSMA and indicates to the Signaller on the HMI:

SPP-15902: Analysis of OA SPP-9559
When the Trackside CCS receives a rejection of the COSMA request, the Trackside CCS must forward the information to the Signaller on the HMI.

SPP-6827: Trackside CCS receives COSMA acceptance, shortens the redundant MA and indicates to the Signaller on the HMI:

SPP-10058: Analysis of OA SPP-6827
The Signaller must be able to see route setting information on the HMI. Refer to SPP-7069.

After successfully applying the co-operative shortening of movement authority, the Trackside CCS system must release the related "route" corresponding to the shortened movement authority as soon as possible hereafter and without a timer delay unless other conditions prevents this.

SPP-6675: Signaller observes acceptance on the HMI:

SPP-10054: Analysis of OA SPP-6675
The Signaller must see the shortened MA on HMI. The HMI must also actively provide the Signaller with confirmation that the COSMA has been accepted by the On-board CCS.

SPP-6672: On-board CCS rejects COSMA and informs the Trackside CCS:

SPP-10056: Analysis of OA SPP-6672
There is an interface between the On-board CCS and Trackside CCS where the response to the COSMA request is transferred. Not a requirement for this topic.

SPP-6661: On-board CCS accepts COSMA and indicates on the DMI:

SPP-10055: Analysis of OA SPP-6661
The new MA is indicated on the DMI.

DRAFT

There is an interface between the On-board CCS and Trackside CCS where the response to the COSMA request is transferred. Not a requirement for this topic.

SPP-6659: Trackside CCS receives the request and executes the COSMA command and sends the request to shorten MA to the On-board CCS:

SPP-10052: Analysis of OA SPP-6659
Once the COSMA command is received from the Signaller, the Trackside CCS must forward the request to the On-board CCS. An active indication on the Signaller's HMI that the COSMA function is active is expected.

SPP-6658: Signaller requests the COSMA command and selects shortened location:

SPP-10050: Analysis of OA SPP-6658 / 2
The Signaller should have an active indication that the COSMA command has been sent and is being processed.
SPP-10048: Analysis of OA SPP-6658
The Trackside CCS should be able to support the Signaller with visual indications on the HMI about possible locations where the MA can be shortened to without affecting the braking curve of the train immediately or within xx seconds (to be decided later). Depending on the length of the MA, there could be more locations to where the MA could be shortened.

It must also be possible to automatically trigger the co-operative shortening of MA based on real-time updates to the train's timetable. This is probably more a TMS issue.

10.6 Activate Temporary Speed Restriction

10.6.1 Activate Temporary Speed Restriction without Signaller Confirmation

Derived needs from Operational Process / Activity:

SPP-6961: Activate Temporary Speed Restriction without Signaller Confirmation:

SPP-15030: Signaller observes new activated TSR:

SPP-18466: Analysis of OA SPP-15030
The Signaller must be able to see on his video interface the activation of the TSR on the layout of the line.

SPP-15028: Train Driver drives according to the activated TSR:

SPP-19159: Analysis of SPP-15028
The train Driver must be able to see on his/her DMI the information related to the activated TSR, as shown by Onboard CCS.
SPP-18470: Analysis of OA SPP-15028
The On Board CCS shows to Train Driver, on the DMI, the permitted speed to be respected, that takes into account the speed restriction received with the updated MA.

SPP-15027: On-board CCS supervises TSR and informs Train Driver about activated TSR:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need

DRAFT

towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-15025: Trackside CCS activates TSR:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-8831: Trackside CCS adds activated TSR to the Trackside CCS Log (recording):

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-6970: Trackside CCS checks TSR applicability to supervised train movements in the area of the TSR.:

SPP-18465: Analysis of OA SPP-6970
This is a pure statement related to Trackside CCS, no UI need can be defined for it. Before this OA the planned TSR is stored in the Trackside CCS and the involved stakeholders (ex. Signaller and Field Force), can see the planning status of the TSR on their video interfaces.

10.6.2 Activate Temporary Speed Restriction with Signaller Confirmation

Derived needs from Operational Process / Activity:

SPP-8809: Activate Temporary Speed Restriction with Signaller Confirmation:

SPP-15036: Train driver applies instruction as for EI 5.:

SPP-18504: Analysis of OA SPP-15036
Train driver that is moving under his responsibility get information about the unplanned speed restriction by the mean of the EI5 and the speed restriction is lower than the maximum speed allowed for the on going movement.

SPP-15035: Signaller observes on his interface the request for confirmation to activate TSR:

SPP-18502: Analysis of OA SPP-15035
Signaller can see the planned TSR (with ID and parameters) on his interface and receives on his interface the request for confirmation linked to TSR ID.

SPP-15034: Trackside CCS requests confirmation from the Signaller:

SPP-18501: Analysis of OA SPP-15034
According to the planning parameters the TSR activation needs a confirmation from the Signaller. When the conditions to activate the TSR are met Trackside CCS automatically request to the Signaller the confirmation, by showing the request on the Signaller interface.

SPP-15030: Signaller observes new activated TSR:

DRAFT

SPP-18466: Analysis of OA SPP-15030
The Signaller must be able to see on his video interface the activation of the TSR on the layout of the line.

SPP-15028: Train Driver drives according to the activated TSR:

SPP-19159: Analysis of SPP-15028
The train Driver must be able to see on his/her DMI the information related to the activated TSR, as shown by Onboard CCS.
SPP-18470: Analysis of OA SPP-15028
The On Board CCS shows to Train Driver, on the DMI, the permitted speed to be respected, that takes into account the speed restriction received with the updated MA.

SPP-15027: On-board CCS supervises TSR and informs Train Driver about activated TSR:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-15025: Trackside CCS activates TSR:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-8831: Trackside CCS adds activated TSR to the Trackside CCS Log (recording):

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-8817: Signaller confirms that the TSR can be activated:

SPP-18505: Analysis of OA SPP-8817
Signaller confirm on his interface that the TSR can be activated.

SPP-8816: Signaller informs train drivers of unsupervised movements using EI 5.:

SPP-18503: Analysis of OA SPP-8816
Signaller contacts train driver via voice radio and gives instructions by the means of EI5.

SPP-6970: Trackside CCS checks TSR applicability to supervised train movements in the area of the TSR.:

SPP-18465: Analysis of OA SPP-6970
This is a pure statement related to Trackside CCS, no UI need can be defined for it. Before this OA the planned TSR is stored in the Trackside CCS and the involved stakeholders (ex. Signaller and Field Force), can see the planning status of the TSR on their video interfaces.

DRAFT

10.7 Deactivate Temporary Speed Restriction

10.7.1 TSR deactivation without Signaller Confirmation

Derived needs from Operational Process / Activity:

SPP-8655: TSR deactivation without Signaller Confirmation:

SPP-15810: Trackside CCS deactivates the TSR without Signaller confirmation:

SPP-16549: Analysis of OA SPP-15810

1. Trackside CCS shall deactivate the TSR if following preconditions are fulfilled:
    a. TSR deactivation time is due AND
    b. TSR ready to be deactivated flag is set (Parameter is set prior to deactivation of the TSR, if the owner (Signaller or other owner) of the TSR has checked that all precondition to deactivate the TSR are fulfilled e.g. work is completed and people are outside the track,… OR if the TSR can be deactivated automatically e.g in combination with a Working Area Deactivation) AND
    c. TSR is to be acknowledged OR not to be acknowledged by Signaller (Parameter is set during TSR activation) AND
    d. TSR owner is defined (Parameter is set during TSR deactivation: e.g. automatic) AND
    e. TSR start and end km (Parameters are set during TSR activation and is mentioned in the deactivation plan) AND
    f. TSR start and end element (e.g. a track section or a part of a point: tip or branch) (Parameters are set during TSR activation and are mentioned in the deactivation plan)
    g. TSR ID is known (Parameters are set during TSR activation and is mentioned in the deactivation plan)
2. Trackside CCS shall inform On-board CCS about the deactivation of the TSR
3. Trackside CCS shall delete the TSR and trackside CCS updates the log with the deactivation and deletion status and the identification who deleted the TSR (e.g. automatic)
4. Trackside CCS shall inform the Signaller about the deactivated TSR in a list of items with the deactivation and deletion status and the identification of whom deleted the TSR (e.g. automatic)

SPP-8668: Signaller receives information about the deactivated TSR:

SPP-20765: Analysis of OA SPP-8668
Signaller shall be able to see the information as described in SPP-17830 - Analysis of OA SPP-16004 on the Signaller's HMI view to double-check that the information is correctly updated.
SPP-9567: Analysis of OA SPP-8668
Signaller shall be able to see the information as described in SPP-16549 - Analysis of OA SPP-15810 on the Signaller's HMI view if he/she decides to do so

---

SPP-8661: Train Driver observes the updated MA with the original permitted speed and drives according the updated MA:

SPP-8891: Analysis of OA SPP-8661
Train Driver shall be able observe the updated MA with the original permitted speed and drive according the updated MA as described in SPP-16546 - Analysis of OA SPP-8660 on the DMI

SPP-8660: On-board CCS informs the Train Driver about deactivated TSR:

DRAFT

SPP-16546: Analysis of OA SPP-8660
On-board CCS shall get the original permitted speed immediately from Trackside CCS if the TSR has attribute revocable set and DMI displays the recommended speed to the Train Driver

---

10.7.2 TSR deactivation with Signaller Confirmation

Derived needs from Operational Process / Activity:

SPP-16001: TSR deactivation with Signaller Confirmation:

SPP-17829: Trackside CCS keeps the TSR activated:

SPP-20767: Analysis of OA SPP-17829
If the Signaller rejects the request to deactivate the TSR, Trackside CCS shall keep the TSR activated and the TSR parameters unchanged.

SPP-17827: Trackside CCS deactivates the TSR on Signaller confirmation:

SPP-20766: Analysis of OA SPP-17827
Signaller shall check the parameters as described in SPP-17830 - Analysis of OA SPP-16004 on the Signaller's HMI view.
Signaller shall select the reject option for TSR deactivation if there are problems with the current traffic or work situation which prevent the TSR deactivation.

SPP-16005: Signaller confirms or rejects request to deactivate TSR:

SPP-20760: Analysis of OA SPP-16005
Signaller shall check the parameters as described in SPP-17830 - Analysis of OA SPP-16004 on the Signaller's HMI view and Signaller shall select the confirm or reject option for TSR deactivation on the Signaller's HMI view.

SPP-16004: Trackside CCS sends a request to deactivate TSR that requires Signaller confirmation in due time:

SPP-17830: Analysis of OA SPP-16004

1. The Trackside CCS shall provide following information to the Signaller's HMI view:
    a. Confirm or reject option
    b. Time the TSR is due to be deactivated (Parameter is set during TSR activation and can be updated prior to deactivation by the owner of the TSR)
    c. TSR ready to be deactivated flag is set (Parameter is set prior to deactivation of the TSR, if the owner (Signaller or other owner) of the TSR has checked that all precondition to deactivate the TSR are fulfilled e.g. work is completed and people are outsite the track,...)
    d. TSR Owner (Parameter is set during TSR activation and cannot be changed: : e.g. Signaller, other owner
    e. TSR ID (Parameters are set during TSR activation and is mentioned in the deactivation request)
    f. TSR start and end km (Parameters are set during TSR activation and is mentioned in the deactivation plan)
    g. TSR start and end element (e.g. a track section or a part of a point: tip or branch) (Parameters are set during TSR activation and is mentioned in the deactivation plan)

DRAFT

SPP-8668: Signaller receives information about the deactivated TSR:

SPP-20765: Analysis of OA SPP-8668
Signaller shall be able to see the information as described in SPP-17830 - Analysis of OA SPP-16004 on the Signaller's HMI view to double-check that the information is correctly updated.
SPP-9567: Analysis of OA SPP-8668
Signaller shall be able to see the information as described in SPP-16549 - Analysis of OA SPP-15810 on the Signaller's HMI view if he/she decides to do so

---

SPP-8661: Train Driver observes the updated MA with the original permitted speed and drives according the updated MA:

SPP-8891: Analysis of OA SPP-8661
Train Driver shall be able observe the updated MA with the original permitted speed and drive according the updated MA as described in SPP-16546 - Analysis of OA SPP-8660 on the DMI

SPP-8660: On-board CCS informs the Train Driver about deactivated TSR:

SPP-16546: Analysis of OA SPP-8660
On-board CCS shall get the original permitted speed immediately from Trackside CCS if the TSR has attribute revocable set and DMI displays the recommended speed to the Train Driver

---

10.8 Handling an unplanned speed restriction

Derived needs from Operational Process / Activity:

SPP-7412: Handling an unplanned speed restriction:

SPP-27729: Trackside CCS activates TSR:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27191: Signaller confirms activation of TSR:

SPP-27328: Analysis of SPP-27191
The Signaller shall be able to confirm the activation of the TSR.

SPP-27190: Signaller checks if TSR is configured correctly:

SPP-27327: Analysis of SPP-27190
The Signaller shall be able to confirm the TSR configuration or update the TSR configuration parameters.

SPP-27189: Trackside CCS indicates TSR for confirmation:

SPP-27326: Analysis of SPP-27189
All relevant TSR parameters shall be indicated to the Signaller together with a request for confirmation.

SPP-27188: Train driver reduces speed:

DRAFT

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27187: Signaller informs Train Driver of supervised train:

SPP-27325: Analysis of SPP-27187
The information to the Train driver can be forwarded using verbal communication, text message or other way.

SPP-24270: Train Driver brings the train to a standstill:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24269: Signaller informs Train Driver of unsupervised train using EI 5:

SPP-24497: Analysis of SPP-24269
The content of a European Instruction is for now assumed to be transmitted verbally, but it should be considered if an electronic method should be developed for the SERA to speed up the process and reduce the risk of errors.

SPP-24266: Signaller requests the TSR activated:

SPP-24500: Analysis of SPP-24266
Once the TSR is configured, the Trackside CCS must provide the Signaller with the option to request the activation of the TSR.

SPP-17694: Signaller assesses if supervised or unsupervised trains are affected by the TSR:

SPP-24498: Analysis of SPP-17694
The Signaller is using the HMI to assess the presence of supervised and unsupervised trains with authority in the affected area. For this task, the HMI must provide the Signaller with information about:

- Location of trains
- Extent of MAs
- Mode of trains

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-15030: Signaller observes new activated TSR:

SPP-18466: Analysis of OA SPP-15030
The Signaller must be able to see on his video interface the activation of the TSR on the layout of the line.

SPP-14952: Signaller orders unsupervised trains to stop:

SPP-19124: Analysis of SPP-14952
The interaction between the Signaller and the driver of unsupervised trains is purely verbal. So no user

DRAFT

needs can be defined. But it is worth to consider that the signaller/driver could have a digital communication tool other than a phone in order to perform a voice communication.

SPP-14950: Signaller configures TSR:

SPP-19149: Analysis of SPP-14950
The Signaller must be able to configure a temporary speed restriction on the HMI. The HMI must allow to insert the following data:

- start location
- end location
- applicable speed
- if the speed restriction must be respected with the train front or with the train rear;
- the list of the involved track between start and end;
- (optional) the train category/ies the speed restriction is relevant to;
- (optional) the specific train ID the speed restriction is relevant to

---

SPP-14949: Train Driver of unsupervised train respects the EI 5:

SPP-19125: Analysis of SPP-14949
Being the train is not supervised, this statement refers to manual actions performed by the driver with no harmonized operations. No user need is supposed to be defined for that.

SPP-8831: Trackside CCS adds activated TSR to the Trackside CCS Log (recording):

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

DRAFT

10.9 End of Mission

10.9.1 Train arrival (ending journey): Functional number de-registered from voice communication mobile (BL4)

Derived needs from Operational Process / Activity:

SPP-20688: Train arrival (ending journey): Functional number de-registered from voice communication mobile (BL4):

SPP-16194: On-board CCS de-registers functional number from voice communication mobile (new):

SPP-21419: Analysis OA SPP-16194
On-board CCS shall de-register the functional number from voice communication mobile
Rationale: this closes the voice communication mobile automatically when the desk is closed: this is new compared to the current TSI standard where the Train Driver manually de-registers the functional number

---

SPP-16193: On-board CCS ETCS switches to SB mode:

SPP-21418: Analysis OA SPP-16193
On-board CCS and Trackside CCS shall maintain the radio communication established even when the

desk is closed
Rationale: this shall allow faster start of mission

SPP-16192: Train Driver closes the desk:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

10.9.2 Shutdown (CR1350 'always connected always reporting' not implemented) (BL3)

Derived needs from Operational Process / Activity:

SPP-25311: Shutdown (CR1350 'always connected always reporting' not implemented) (BL3):

SPP-26059: On-board CCS terminates the radio communication session:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-26058: Trackside CCS terminates the radio communication session:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-26057: On-board CCS changes to SB mode:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-26056: Train Driver de-registers functional number from voice communication:

SPP-27197: Analysis of SPP-26056
It shall be possible for the Driver to de-register the functional number from the voice communication.

SPP-26055: On-board CCS changes to NP mode:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-26054: Train Driver switches On-board CCS off:

DRAFT

SPP-27196: Analysis of SPP-26054
It shall be possible for the Driver to switch off On-board CCS.

SPP-26053: Signaller sees the radio communication terminated:

SPP-27195: Analysis of SPP-26053 and SPP-25193
It shall be possible for the Signaller to see when the radio communication is terminated.

SPP-26052: On-board CCS de-registers functional number from voice communication:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-26051: Train Driver closes the desk:

SPP-27194: Analysis of SPP-26051
It shall be possible for the Driver to close the desk.

10.9.3 Shutdown (with CR1350 'always connected always reporting' implemented) BL4

Derived needs from Operational Process / Activity:

SPP-25175: Shutdown (with CR1350 'always connected always reporting' implemented) (BL4):

SPP-25193: Signaller sees radio communication closed:

SPP-27195: Analysis of SPP-26053 and SPP-25193
It shall be possible for the Signaller to see when the radio communication is terminated.

SPP-25189: Trackside CCS closes radio communication after timeout:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-25188: On-board CCS changes to NP mode:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-20152: Train Driver switches On-board CCS off:

SPP-27198: Analysis of SPP-20152
It shall be possible for the Driver to switch off On-board CCS.

DRAFT

10.10 Arrival at scheduled stop

Derived needs from Operational Process / Activity:

SPP-7478: Arrival at scheduled stop - GoA1:

SPP-15543: Train driver evaluates whether the stopping point has been overshot or undershot:

SPP-16636: Topic 15 107 - Analysis of OA Train driver evaluates whether the stopping point has been overshot or undershot
If GoA1 is in operation:

- The train driver evaluates if the train has overshot or undershot the stopping point.

Based on analysis there is no need for a specific system requirement for this operational activity.

SPP-15541: Train reaches standstill:

SPP-16634: Topic 15 107 - Analysis of OA Train reaches standstill
The Onboard CCS determines that the train is not moving. However, Onboard CCS reporting “standstill” does not guarantee that there is no train movement at all (TSI CCS SS23). According to TSI LOC & PAS, a train is assumed to be at a standstill when the speed has decreased to 3 km/h or less for the purpose of Exterior doors: passenger access to and egress from Rolling Stock.

SPP-9317: Train driver looks outside of the cabin to confirm the train is at a complete standstill and evaluates that the reached location is correct:

SPP-11510: Topic 15 107 - Analysis of OA Train driver evaluates that the reached location is correct
If GoA1 is in operation:

- The train driver must know the exact stopping point
- The train driver must verify that the train has stopped at the designated location.

Based on analysis there is no need for a specific system requirement for this operational activity.

SPP-8894: On-board CCS determines which is the label of the next stopping point:

SPP-9659: Topic 15 107 - Analysis of OA Onboard CCS shows entering stopping point
The Trackside CCS sends stopping point information to the Onboard CCS.

The Onboard CCS communicates to the train driver or ATO-OB, depending on the grade of automation, that the train is approaching a stopping point to ensure timely and accurate railway operation.

SPP-7480: Train driver controls train to stopping point indicated in the timetable:

SPP-9655: Topic 15 107 - Analysis of OA Train driver controls train to stopping point indicated in the timetable
If GoA1 is in operation:

- The Onboard CCS shall indicate to the train driver the exact stopping point.
- The train driver is responsible of ensuring that the train stops at the scheduled stopping point as indicated in the timetable. For example, the train should stop in a specific section of a platform in a station.
- The train driver shall control the speed of the train and braking systems to ensure a complete stop at the designated stopping points and shall respect the brake curve indications when approaching the stopping point.

DRAFT

SPP-7479: Trackside CCS coordinates which applicable Journey Profile has to be sent to the train and which applicable Platform Side should be opened on each stopping point:

SPP-9653: Topic 15 107 - Analysis of OA Trackside CCS determines stopping point
The Traffic Management System determines where the train should stop and the Trackside CCS evaluates the availability of the track ahead up to the stopping point. The track ahead is the path from the train front end and stopping point selected for the movement. In principle, this path may not be unique. For normal operation, which do not involve coupling or parking on an occupied track, the path should be free.

10.11 Platform start (without optimizations)

Derived needs from Operational Process / Activity:

SPP-21529: Platform start without optimizations:

SPP-27909: On-board CCS indicates MA on the DMI:

SPP-27019: Analysis of SPP-23896 / SPP-27909 / 26286
The DMI indicates the MA to the Driver.

SPP-26286: Train driver sees MA on the DMI:

SPP-27019: Analysis of SPP-23896 / SPP-27909 / 26286
The DMI indicates the MA to the Driver.

SPP-26064: Train Driver monitors dwell time on the DMI:

SPP-27018: Analysis of SPP-26064
The Driver must be able to see the dwell time on the DMI.

SPP-23898: Trackside CCS evaluates whether the route has been set:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23896: Trackside CCS sends a MA to the train:

SPP-27019: Analysis of SPP-23896 / SPP-27909 / 26286
The DMI indicates the MA to the Driver.

SPP-21585: Signaller handles delay information:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

DRAFT

SPP-21584: Train Driver communicates passenger transfer delay to Signaller:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-21583: Train Manager communicates passenger transfer delay to Train Driver:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-14818: Train driver checks all the doors are closed:

SPP-28086: Analysis of SPP-14818
The DMI displays status of doors; closed or open.

SPP-11343: Train Manager troubleshoots door cannot close properly:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-9580: Train Manager checks the train doors have closed safely and informs the Train Driver:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-9579: Train driver triggers door closing and locking:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-9577: Train Manager closes the doors:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-9576: Train Manager monitors time to start closing the train doors:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need

DRAFT

towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-7861: Train Manager monitors passenger transfer and determines if there is a transfer delay:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

10.12 Reducing Movement Permission by signaller action for a specific location in case of imminent danger

Derived needs from Operational Process / Activity:

SPP-21290: Reducing Movement Permission by Signaller action for a specific location in case of imminent danger:

SPP-27366: Train Driver of unsupervised train reacts to information of danger:

SPP-28482: Analysis of OA SPP-27366
Analysis of OA SPP-27366
The Train Driver will be able to apply any type of braking capability available onboard until the train gets the standstill position.

SPP-27365: Signaller checks if an unsupervised train is affected by the danger:

SPP-28474: Analysis of OA SPP-27365
Analysis of OA SPP-27365
The Signaller must be able to verify if any unsupervised train is potentially affected by the detected danger situation at a specific location. He/she must known the position of each unsupervised train's location, its operating mode if available, its direction of movement, its speed and the presence of a path already planned and locked between the train front and the danger location. In such case he/she will react accordingly.
The location of each unsupervised train's location and the other relevant data could be visible on the Signaller's HMI.

SPP-27364: Signaller selects stopping location in rear of the danger location:

SPP-28466: Analysis of OA SPP-27364
Analysis of OA SPP-27364
The Signaller must be able to select on his/her HMI the new stopping location of the train in the rear of the danger location. The new stopping location could be, but not limited to, a marker board upstream the location of the danger. He/she must be allowed to the Signaller to select any point between the train front and the danger location.

SPP-27363: Signaller checks if a supervised train is affected by this danger location:

SPP-28473: Analysis of OA SPP-27363
Analysis of OA SPP-27363
The Signaller must be able to verify if any supervised train is potentially affected by the detected danger situation at a specific location. He/she must see on the HMI the position of each supervised train's

DRAFT

location, its operating mode, direction of movement, speed and the presence of a path already planned and locked between the train front and the danger location. In such case he/she will react accordingly.

SPP-27359: Trackside CCS sets the EoA for the train to the stopping location:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27355: Signaller informs Train Driver of unsupervised train about danger and stopping location:

SPP-28481: Analysis of OA 27355
Analysis of OA 27355
The Signaller must be able to communicate with the Train Driver of an unsupervised train in order to forward the information about the danger location, the type of danger (if available and relevant) and the requested reaction to be applied. The communication will be verbal or through any digital device but of the ETCS devices.

SPP-27354: Signaller is informed about danger at a location:

SPP-28431: Analysis of OA SPP-27354
Analysis of OA SPP-27354
The Signaller must be able to receive information about a danger at a specific location. He/she will get this information from any possible source:
- phone call from the Train Driver
- Field Force working along the track.

DRAFT

10.13 Reducing Movement Permission by signaller action for an area in case of imminent danger

Derived needs from Operational Process / Activity:

SPP-21322: Reducing Movement Permission by Signaller action for an area in case of imminent danger:

SPP-28305: Train Driver acknowledges the text message and initiates braking towards target speed:

SPP-28467: Analysis of SPP-28305
DMI indicates the text message. The Driver acknowledges it and immediately starts braking to reach the indicated target speed as soon as possible.

SPP-27433: Signaller selects target speed:

SPP-28459: Analysis of SPP-27433
The defined emergency area can be activated by the Signaller on the HMI. Optionally a low target speed can be selected different from the default value 0 km/h. The value of the optional low target speed is also a predefined value, but the low target speed value could be configurable on a user level to support different Infrastructure Manager needs

---

SPP-27382: Train driver of unsupervised train stops or slows down:

SPP-28469: Analysis of SPP-27017
The Signaller shall be able to contact the Train Driver of any affected unsupervised train by Voice radio, or other means, to order them to stop or slow down the train.

SPP-27341: Trackside CCS indicates emergency area on Signaller's HMI:

SPP-28460: Analysis of SPP-27341
The Signaller shall be able to see any activated emergency area and related target speed on the HMI.

SPP-27017: The Signaller orders unsupervised train to stop or slowdown:

SPP-28469: Analysis of SPP-27017
The Signaller shall be able to contact the Train Driver of any affected unsupervised train by Voice radio, or other means, to order them to stop or slow down the train.

SPP-27016: The Signaller checks for unsupervised trains:

SPP-28468: Analysis of SPP-27016
Unsupervised trains shall be indicated on the HMI, easily identifiable.

SPP-27015: The Signaller checks the emergency area indication:

SPP-28460: Analysis of SPP-27341
The Signaller shall be able to see any activated emergency area and related target speed on the HMI.

SPP-27012: On-board CCS supervises new target speed (and location) and displays text message:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27011: Trackside CCS updates the target speed and location:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27009: Trackside CCS activates emergency area and adds entry to electronic log:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27008: Signaller dynamically defines the emergency area:

SPP-28458: Analysis of SPP-27008
The HMI shall support dynamic definition of an emergency area, e.g. by drawing a border on the screen to define the area.

DRAFT

10.14 Regular execution of planned train movement

Derived needs from Operational Process / Activity:

SPP-23605: Regular supervised train movement based on extension of the movement permissions:

SPP-29777: Train Driver is shown the symbol "Doors are closed" on the DMI:

SPP-30007: Analysis of SPP-29777
DMI displays symbol "Doors are closed" to the Driver.

SPP-29468: The Train Driver supervises the train movement according to the MA/data available onboard:

SPP-24151: Analysis of OA SPP-23987 / SPP-29468 / SPP-29461
Onboard DMI shall display to the driver all the data needed for the train speed control or supervision after the Onboard CCS processing.
Some of the main data to be shown are:
- the extension of MA and the distance to the updated EoA;
- the permitted speed curve;
- the current operating mode;
- any speed restriction and/or speed profile;
- any relevant text message triggering a driver's action;
- etc.

SPP-29461: The Train Driver controls the train speed (traction or brake) according to the MA/ data available onboard:

SPP-24151: Analysis of OA SPP-23987 / SPP-29468 / SPP-29461
Onboard DMI shall display to the driver all the data needed for the train speed control or supervision after the Onboard CCS processing.
Some of the main data to be shown are:
- the extension of MA and the distance to the updated EoA;
- the permitted speed curve;
- the current operating mode;
- any speed restriction and/or speed profile;
- any relevant text message triggering a driver's action;
- etc.

SPP-27673: Onboard ATO controls the train speed (traction or brake) according to the data available:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-27672: The Signaller monitors the regular execution of Operational Plan:

SPP-28127: Analysis of OA SPP-27672
The Signaller's HMI must display on a regular base the following information received from Trackside CCS:

DRAFT

- the train location;
- the extension of the Movement Authority issued to the train, shown as the path to be run by the train along the track layout;
- the actual status of the infrastructure (e.g. points position, track occupancy status, route locking and/or release status, level crossing protection status, speed restrictions, working area status, etc).

SPP-24943: On-Board CCS issues a MA Request:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24942: On-board CCS checks if MA extension is needed:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-24856: On-board CCS reports periodically train position:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23989: Trackside CCS releases the infrastructure to be ready for following trains:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23987: On-board CCS updates info on DMI about extended MA:

SPP-24151: Analysis of OA SPP-23987 / SPP-29468 / SPP-29461
Onboard DMI shall display to the driver all the data needed for the train speed control or supervision after the Onboard CCS processing.
Some of the main data to be shown are:
- the extension of MA and the distance to the updated EoA;
- the permitted speed curve;
- the current operating mode;
- any speed restriction and/or speed profile;
- any relevant text message triggering a driver's action;
- etc.

SPP-23982: On-board CCS updates Permitted Speed and braking curves:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

DRAFT

SPP-23981: Trackside CCS sends MA extension to On-board CCS:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23980: Trackside CCS creates or extends a safe path for the train:

SPP-21338: Void Concept Aspect
This Concept Aspect has to be used in case, after the Analysis of the Operational Activity, no need towards the CCS system has been identified and no functional description of the Operational Activity from the CCS system perspective has been deemed necessary.

SPP-23977: Trackside CCS checks for proper conditions to extend the safe path:

SPP-29800: Analysis of OA SPP-23977
The Trackside CCS must be able to check a list of conditions to be satisfied for allowing the extension of a safe path to be later allocated to the train requesting for it.
Between such conditions should be considered:
- presence of an MA Request
- length of current MA available
- train's position
- occupation of the TVP section planned as starting point
- train's characteristics
- signalling conditions / availability of infrastructure
- Operational Plan available
- prevention of deadlocks
- actual time in relation to planned time (being within or outside of a planning window)
- avoidance of stopping on locations that are unsafe or unpractical (such as a steep upward slope)
- trainlength in relation to infrastructure being used (matching platform length, avoid blocking level crossing)
- changing order of trains moving to a corridor
- presence of a radio connection between train and trackside
- planned entry into occupied track / change to OS mode

DRAFT

11 Appendix

11.1 References

Id	Description	Reference
[SPP-18362 - EET_Requirements Management Plan Version_1.0]	For System Pillar the plan describes a strategy for traceability between requirements levels, architecture elements and application conditions. Further the type of requirements and their related workflows are defined.	Link
[SPP-19164 - OD_Operational Requirements Specification CCS System_V0.2]	Operational Requirements Specification	Link
[SPP-19162 - OD_Operational Vision Breakdown Alignment CCS System_V0.3]	Operational Vision Breakdown Alignment	Link
[SPP-19402 - Operational Vision (Nov. 2022)]	This document sketches a compressed operational picture of the CCS and TMS/CM future.	Link
[SPP-19283 - Release Note ESPR1.0]	This Release Note describes the scope of the ESPR1.0.	Link
[SPP-8684 - System Pillar Common Business Objectives (May 2022)]	Common Business Objectives (CBO) – targets and improvements - to guide the development of the outputs of the System Pillar within Europe's Rail	Link

DRAFT

Id	Description	Reference
	Joint Undertaking.	

11.2 Open points

The following summarizes the most important open issues that remain to be addressed across the subtopics of this release.

Harmonization of standstill definition
Harmonization of standstill definition
There is a misaligment between the definition of standstill in TSI LOC&PAS and TSI CCS.
According to LOC&PAS:

- Door release control allows doors to be opened at standstill (section 4.2.5.5.6)
- Standstill is defined as a speed of 3km/h or less (section4.2.5.5.2).

According to TSI CCS:

- Standstill is determined by the onboard based on the detection of no movement,
- However, the criteria for this detection are not harmonised, and a reported standstill does not guarantee a complete stop.

Comment from Giuseppe P: The TSI LOC& PAS, with regard of the door opening process, has a different definition of the Standstill.
For this reason the CR 1363 has defined the new item "Standstill, ETCS". By the way the same definition clearly states that "standstill" does not guarantee that there is no train movement at all". But this is not the main point here, the LOC&PAS defines standstill under 3 km/h and Subset-125 allows the door opening process at standstill (i.e. under 3 km/h)

Concern int he context of the operational concept proposed by SBB in the X2R4 project, where SS-125 was consolidated: if door operation is limited to exactly 0 km/h, there is a risk to lose capacity.

DRAFT