

D1 CONEMP for CCS

Abstract	Deliverable 1 (D1) defines the Concept of Employment (CONEMP) for CCS across Tracksides and On-board, covering the relevant operational lifecycle processes from commissioning through decommissioning. It identifies the proposed harmonisation scope and defines the target operational processes.
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1 Preamble

1.1 Purpose

SPT2TS-131909 - Purpose

Deliverable 1 (D1) named “Concept of Employment (CONEMP) for CCS” defines the Operational Target Concept for CCS CONEMP processes across the full lifecycle including, installation, maintenance, change, incident management, and decommissioning and covering both Trackside and On-Board.

It consolidates and aligns the existing operational analysis (e.g., Traffic CS, OD, TACS) into one consistent operational concept, ensuring a shared understanding of how CONEMP-related CCS processes for configuration management and diagnostics are deployed, operated and supported.

The operational processes are developed as target processes at System Pillar level. They therefore focus on those process elements that are considered suitable for a common CCS approach, while national operational rules, organisation-specific procedures, and supplier- or implementation-specific solutions remain outside the direct harmonisation scope unless a common interface or operational behaviour is required.

The purpose of D1 is to translate business objectives into target operational processes and to establish a harmonized operational solution design that balances interoperability ambitions with legacy and freedom for innovative technological solutions by suppliers. D1 also serves as the baseline for standardised operational and stakeholder requirements, including requirements on external systems and processes (e.g., Data Preparation and Validation), and ensures operational consistency with transversal functions (configuration and diagnostics) and the computing environment.

In this context, harmonisation does not mean aligning a complete set of existing stakeholder-specific as-is processes. No single common as-is process baseline exists across the involved railway actors, countries, systems, and suppliers. Instead, the D1 CONEMP Scope Analysis identifies railway-relevant lifecycle activities and assesses which of these should be addressed through a common System Pillar target approach. The motivation for harmonisation is to reduce unnecessary diversity where differing responsibilities, prerequisites, or operational activities would otherwise hinder consistent operation. National, organisational, or implementation-specific variations may remain where they do not require System Pillar standardisation.

D1 enables and documents key decisions required to proceed with system analysis and subsequent specifications, including in particular:

- Harmonization scope and ambition level: which CONEMP processes will be harmonized (and to what extent), for Trackside and On-Board.
- Prioritization of harmonization candidates: evaluation and ranking of process areas to be standardised first, based on benefits, risks, and feasibility.
- Target operational process definitions: agreed end-to-end process descriptions, including roles, responsibilities, interfaces, and operational activities.
- Requirements baseline and traceability: derivation and maintenance of standardised operational and stakeholder requirements, with traceability to CBOs.
- Alignment needs for specifications and models: identification of required updates to SL3–SL5 specifications.

As such, D1 provides the proposed operational reference point for CCS CONEMP processes that guides downstream system analysis activities, specification updates, and stakeholder alignment.

This document first identifies in Chapter 2 the inputs used for the analysis, including relevant documents from other

domains and alignment activities within the System Pillar, and defines the relevant stakeholders, operational actors, assumptions, and operational requirements. Chapter 3 defines the harmonisation scope and prioritised candidates, providing the basis for the operational process definition. Chapter 4 describes the operational processes and their end-to-end flows. Chapter 5 captures the exported constraints and requirements on external systems and processes resulting from these operational processes.

1.2 Intended Audience

SPT2TS-131910 - Any EU-Rail System Pillar members and volunteers

Any EU-Rail System Pillar members and volunteers

1.3 Glossary

1.3.1 Terms

Title	Description
Application Configuration Data	The Application configuration refers to use case-specific data for the Consuming Systems for a specific application. These can be detailed as  SPT2TS-127776 - Infrastructure data i.e., Track edges, Track geometry, Track properties, Segment Profiles, etc. and  SPT2TS-127777 - Vehicle data i.e., Braking and Traction efforts, Rolling coefficients, etc.
Binary Executable File	A Binary Executable File is a platform-specific file that contains compiled code in a machine-readable binary format, which can be directly executed by a computer's processor
Black Box Data	SW configuration data content format that is supplier specific. The payload is not standardized for this case, therefore it is "black box" and being distributed as non transparent payload.
Configuration Data	The (CCS/TMS) Configuration Data refers to a conglomerate of different configuration data required for CCS/TMS systems. These can be broadly classified as  SPT2TS-127773 - Application Configuration Data ,  SPT2TS-127774 - System Configuration Data and  SPT2TS-127775 - Software Configuration Data . CCS/TMS Configuration Data is provided via the configuration interface to the CCS/TMS Systems. The configuration data is assumed static within a version and changes occur only when there is a version change or increase, opposite to dynamic data, which may change within a configuration version of the system.
Configuration Management	Configuration Management refers to the management of all Configuration Items of a physical instance of a System (e.g. trains or trackside CCS). From a process point of view, it covers activities along the complete chain, from the Building Block Supplier(s) to the Integrators, the Operator, and the actual Deployment being operational.

Title	Description
Configuration Management Process	The Configuration Management Process captures all concrete activities along the complete configuration management chain: from the Building Block realisation (by the Building Block Supplier(s)), to the integration into a specific System Instance (by the Integrator(s)), to the distribution to the field (by the Operator), and the actual activation (going into operation) in the field (it includes also on a train). The Configuration Management Process is a solution agnostic term that collects all activities needed for the Configuration Management.
Diagnostics	Diagnostics is the assessment of health and performance of an asset or a group of assets. Furthermore, the diagnostic system also provides all information of single components in the field like: software version, parametrisation file version, firmware version, hardware version, manufacturer part number, manufacturer serial number, ID in the field (e.g. NID_ENGINE), cumulated hours in operation, IP address, etc. All this data is being used for analysis purposes.
Infrastructure data	Infrastructure Data is a detailed digital representation of the railway network that contains all infrastructure related information necessary for planning and performing railway operations, such as infrastructure characteristics, location and details of Field Elements, etc. The Infrastructure Data is static and remains unchanged until intended infrastructure updates occur. Infrastructure data is provided by the RINF represented by ERA ontology to be extended.
Operational Data	Operational Data refers to real-time information generated from daily operations and activities related to the functioning of railway systems, reflecting the current status of operations (e.g. locked position of a switch). Operational data is exchanged between CCS/TMS systems via Standard Communication Interfaces (SCI-xx). <i>Note: while Operational Data can be related to infrastructure or vehicle configuration data, it is clearly separated from  SPT2TS-127779 - Configuration Data .</i>
Parameter Data	Parameter Data define the system configuration data required for national and supplier-specific operative environments. A notable example of such data are ETCS national values. ETCS national values may be required for migration purposes and shall be replaced by SERA standardised values in the target system.
Software Configuration Data	The Software Configuration data refers to executable binary files from suppliers which are usually required to install software on the systems. Software Configuration Data is provided via configuration interface to the CCS/TMS Systems.
System Configuration Data	The System Configuration data refers to the static data set required to configure systems with primary information before being put into operation. These data are elaborated as  SPT2TS-127829 - Parameter Data
Vehicle data	Vehicle Data is a detailed definition of the static train/vehicle characteristics used for the parametrisation of the CCS on-board. The parametrisation variables include but are not limited to train data, braking curves and coefficients, operation of service brake, unique ID (NID_ENGINE), operated ETCS levels, odometry system settings, network / bus settings, distance between balise antenna and front end, available traction systems, operated track condition functions, displayed information on DMI, etc. Vehicle data is provided by the ERATV/ RDV represented by ERA ontology to be extended.

13 items found 

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.

SPT2TS-133442 - Managed Entity (ME)

A Managed Entity (ME) represents a manageable system element within the railway infrastructure.

All managed entities implement the following capabilities:

- Configurable: Provides the configuration interface.
- Diagnosable: Provides the diagnostic interface.
- Secure Component: Provides cybersecurity-related services and identity information. The secure component capability enables authentication, authorisation, and secure communication between participating components.

1.3.2 Abbreviations

Abbreviation	Definition
CBO	Common Business Objectives
D1	Deliverable 1 "Concept of Employment (CONEMP) for CCS"
CONEMP	Concept of Employment
Op	Operational

2 Inputs and Stakeholders

2.1 Input documents

This section identifies the source artefacts and inputs documents used to derive the harmonisation scope and operational concept. These inputs provide the basis for the scope assessment in Chapter 3 and are subsequently used to define the stakeholders, operational processes, and requirements presented in the following chapters.

Input	Link	Source
CONEMP - Scope Analysis	 D1 CONEMP - Scope Analysis	CONEMP Domain
Operational analysis for "Activate Configuration Data"	 S2 t35 - 400 Activate Configuration Data	OD, Traffic CS, CONEMP
CONEMP - Configuration and diagnosis	 TCCS CONEMP - Configuration and Diagnostics	CONEMP Domain
Configuration Operational Epics	 TCCS Configuration - Operational Epics	CONEMP Domain
Configuration High Level Concept	 TCCS Configuration - High Level Concept	CONEMP Domain
Diagnostics Operational Analysis	 TCCS SD2 - Operational Analysis	CONEMP Domain
Diagnostics Operational Epics	 TCCS SD2 - Operational Epics	CONEMP Domain
Common Business Objectives	 Common Business Objectives	System Pillar Task1- Railway System
CCS System Operational Vision	 Operational Vision Breakdown Alignment CCS System	System Pillar Public
Operational Concept (alignment source)	  Operational Concept_Working Doc	OD & Traffic CS

2.2 Stakeholders and Operational roles

2.2.1 Stakeholders

This section identifies the stakeholders relevant to the CCS CONEMP across the operational lifecycle. Stakeholders represent the organisations or organisational groups that have responsibilities, interests, or dependencies related to the operational processes, even if they do not directly execute individual process activities. The stakeholder analysis establishes the organisational context and supports the identification of responsibilities, interfaces, and dependencies.

SPT2TS-125894 - Stakeholder

Stakeholder in this context is an individual, organisation or institution that can affect or be affected by the railway system.

Railway Undertaking

Railway undertaking (Directive (EU) 2016/798): means railway undertaking as defined in point (1) of Article 3 of Directive 2012/34/EU, and any other public or private undertaking, the activity of which is to provide transport of goods and/or passengers by rail on the basis that the undertaking must ensure traction; this also includes undertakings which provide traction only.

A RU can assume the roles Lead RU and/or Responsible Applicant and/or Responsible RU

Infrastructure manager

An authority responsible in particular for establishing, managing and maintaining railway infrastructure, including traffic management and control-command and signalling.

SPT2TS-122408 - Supplier

Supplier is a person or company that supplies another company with certain goods. The supplier will therefore provide the company with the inputs necessary for production. The company will use them to transform them into outputs. The final output can be provided directly by the supplier.

2.2.2 Operational Actors/Entities

This section identifies the operational actors and entities that directly participate in the execution of the operational processes in the context of this deliverable (configuration and diagnostics). In contrast to stakeholders, these represent the concrete roles, entities performing operational activities or exchanging information within a process. They are used in Chapter 4 to define process responsibilities, interactions, and information flows.

SPP-10102 - 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-10103 - 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-47484 - Data Preparation

Data Preparation is responsible to prepare and validate Configuration Data required by the CCS system.

This system encompasses the contributions of three types of stakeholders:

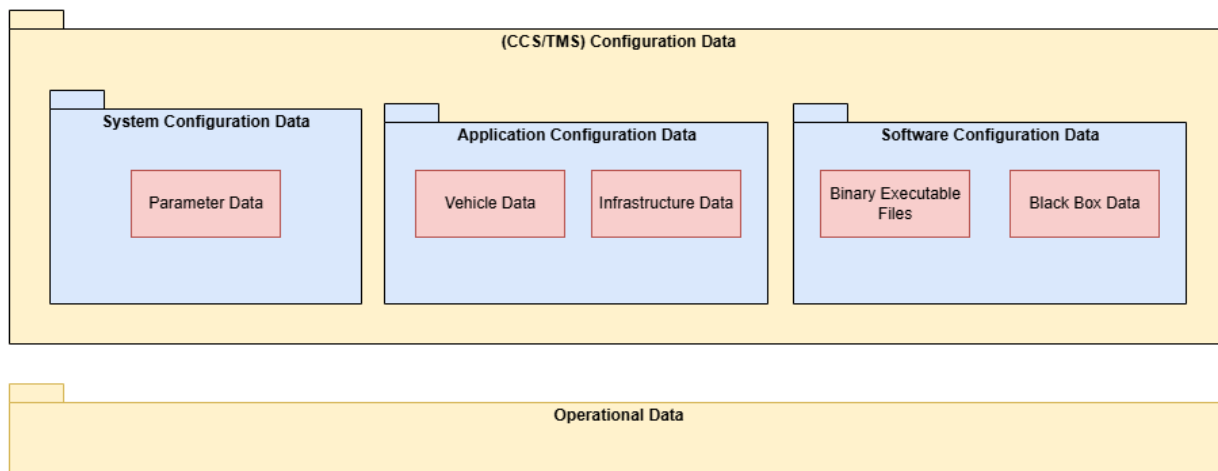
Infrastructure Manager: Provides infrastructure related Configuration Data, such as track topology.

Railway Undertaking: Provides Vehicle related Configuration Data, such as static train/vehicle characteristics used for the parametrisation of the CCS on-board.

Supplier: Delivers application specific Configuration Data, such as hardware configurations or software parameters for on-board or wayside components as well as software Configuration Data such as executable binary files.

SPT2TS-127887 - The illustration below explains the concept of Configuration Data and the applie...

The illustration below explains the concept of Configuration Data and the applied sub-categories.



SPP-47485 - Configuration Manager

Configuration Manager is responsible to manage and supervise the distribution of Configuration Data published by Integrators for CCS system. This role is also responsible for producing the distribution-job defining the target and when to preload and activate Configuration data. In this context it is usually an Infrastructure Manager or Train Operator/Owner

SPP-47486 - Planning Department

Planning Department is responsible for planning activities, including producing an initial operational plan and planning scheduled activities such as configuration updates and maintenance activities. Planning can cover the next minutes up to the next year and may include the definition of required time windows and operational restrictions for the planned activity.

SPP-37393 - Maintainer

The Maintainer performs works on or near the signalling devices. The Maintainer performs preventive and corrective maintenance on Trackside CCS and adjacent systems.

SPP-10101 - Signaller

Staff responsible for the operational allocation of infrastructure and for providing instructions to infrastructure users.

SPMS-6202 - Infrastructure Management Diagnostic System

Is responsible for analysing and interpreting the collected diagnostic and monitoring data from the infrastructure management assets. It focuses on advanced processing of the data.

SPMS-6527 - Railway Undertaking Diagnostic System

Is responsible for analysing and interpreting the collected diagnostic and monitoring data from the railway undertaking assets. It focuses on advanced processing of the data.

SPMS-6204 - Asset Management System

Is responsible to track the condition, lifecycle, and maintenance activities of railway assets, supporting informed decisions and optimised maintenance planning based on diagnostic and monitoring data.

2.3 Operational Assumptions

This section defines the operational assumptions applied to support the analysis and definition of the CONEMP processes and their associated operational activities. These assumptions establish common boundary conditions allowing the operational processes to be described consistently and at an appropriate level of abstraction.

For the resulting obligations and exported constraints derived from these assumptions and further processes definition, please refer to Chapter 5 - Requirements and Constraints for External Systems and Processes .

SPT2TS-132933 - Planned operational restrictions for changes/updates

Changes (including configuration updates, software updates, and other approved modifications) are assumed to be planned in advance with the required operational restrictions defined upfront (e.g., maintenance window, limited speed restriction, track closure, activation of a working area, for on-board, restrictions may include taking the vehicle temporarily out of commercial operation, scheduling the update during a depot/workshop stay, or restricting the vehicle from specific operations until the update is completed and activated, etc). A dedicated change slot (activation time) is assumed to be agreed to enable controlled implementation and to minimize impact on operations.

SPT2TS-133859 - Entire fleet rollout of on-board changes/updates

For changes or updates affecting multiple vehicles or an entire fleet, it is assumed that the rollout is planned and coordinated considering operational and resource constraints, such as vehicle availability, depot/workshop capacity and required update duration. The planning and coordination of such fleet rollouts are not covered by the CONEMP processes defined in this document.

SPT2TS-132934 - External processes executed in parallel or upfront

Activities belonging to external processes (e.g., construction, civil works, site preparation, or other infrastructure-related preparatory activities) are assumed to run in parallel or ahead of the CONEMP operational processes, under their own definitions and conditions. These activities are treated as prerequisites for the operational lifecycle steps covered in this deliverable.

SPT2TS-132935 - Non intrusive monitoring and diagnostics

Monitoring and diagnostics capabilities for determining the health and status of the system are assumed to be designed and operated such that they do not interfere with operational service (e.g., passive monitoring and diagnostics). Diagnostic and monitoring data collection is therefore treated as an operational support function that does not impact the operation directly. Diagnostic data collection shall not interfere with safe operation; evaluated results may trigger an operational response through the applicable process

2.4 Operational Requirements

This section identifies the operational requirements relevant to the CONEMP analysis and process definition. The requirements referenced in this chapter are taken from the  [Operational Vision Breakdown Alignment CCS System](#) and are used as an input to ensure that the operational processes and activities defined in this document remain aligned with the established operational vision. Only requirements relevant to the scope of this deliverable are referenced; no new operational requirements are derived in this section.

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.

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.

SPP-9296 - CCS shall enable updates of Configuration Data on runtime

The CCS shall enable updates of  SPT2TS-127779 - [Configuration Data](#) on runtime.

SPT2TS-133962 - Note :

“On runtime” means that Configuration Data can be transferred and prepared while the CCS remains operational.

Activation of a new configuration version is not intended to imply unrestricted change during live operation; it shall follow the defined update process, including an agreed activation slot and any required operational restrictions. Where an update affects only a specific Managed Entity, only the impacted part is expected to be taken out of service or restricted as necessary. A shutdown of the complete CCS system is not intended unless technically required by the update. Rollback shall remain possible in accordance with the applicable update procedure.

3 Harmonisation scope proposal

This chapter translates the results of the D1 CONEMP - Scope Analysis into a decision-ready proposal for what to harmonise across CCS for Tracksides and On-board, to support the System Pillar and the sector in taking the corresponding harmonisation decision by the end of the current remit phase.

Harmonisation is structured along the operational lifecycle from Installation to decommissioning to ensure coverage of end-to-end operational responsibilities. In addition, the scoping is shaped by CONEMP domain scope activities that cut across multiple lifecycle steps which is :

- Data Standardisation,
- Configuration Management, and
- Diagnostics/Monitoring.

3.1 Lifecycle definition (Installation - Decommissioning)

SPT2TS-132128 - Lifecycle phases

For the purpose of this CONEMP deliverable, the operational lifecycle is defined as the following sequence of steps. Each step is understood as an operational phase that can contain multiple sub-processes and interfaces.

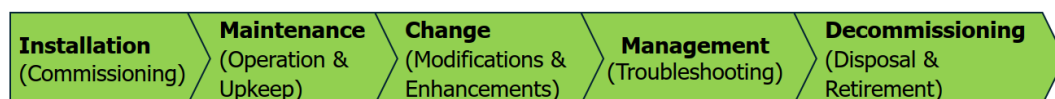


Figure 1 EU CONEMP process (lifecycle based on IEC 62278)

The lifecycle illustration is not intended to represent a strictly sequential flow. While commissioning establishes the system for operation and decommissioning concludes its lifecycle, activities related to maintenance, change, and incident management may occur repeatedly, in parallel, or in different orders throughout the operational lifetime of the system.

3.2 Analysis basis and method

SPT2TS-132133 - Analysis Method

The harmonisation candidates in this chapter are derived from the scope analysis method defined in [D1 CONEMP - Scope Analysis](#). The evaluation follows a consistent three-step approach, applied to each sub-activity within the lifecycle phases:

1.Relevancy for Railway :

For each sub-activity from the generic standard (EU CONEMP process), it is assessed whether the topic is relevant for CCS railway operations in general. Non-relevant items are excluded from further harmonisation consideration.

2.Scope of System Pillar:

For sub-activities deemed relevant for railways, it is assessed whether the topic is in scope or out of scope for System Pillar standardisation. Out-of-scope items are documented explicitly as excluded and do not become harmonisation candidates.

3.Mapping to CONEMP domain (with intentional references to later design phases):

For sub-activities that are both relevant and within System Pillar scope, a mapping is established to the appropriate CONEMP activity. By intention, the mapping may refer to concrete elements of later design phases (e.g., **SL5**) to provide implementable examples and ensure that scope proposals remain technically actionable and traceable into existing work activities.

To keep the scope realistic and useful, the harmonisation candidates are assessed and prioritised based on criteria covering the expected operational benefit, criticality and the readiness of prerequisites (e.g. availability of input from Stakeholders).

The resulting prioritisation supports a realistic standardisation goal and scope: items with high benefit and available prerequisites are addressed first, while items with high benefit but significant dependencies on other Stakeholders inputs are planned for later phases or marked as conditional until required inputs are in place.

SPT2TS-132674 - Prioritisation method

Harmonisation items are prioritised based on their expected operational benefit, criticality for safe and reliable railway operations, and the readiness of prerequisites required. This includes consideration of whether the necessary inputs, dependencies, and supporting conditions are already sufficiently available or whether further alignment is still needed.

- Priority 1: Items with high operational benefit and/or high criticality, for which the main prerequisites are already available or can be established with manageable effort.
- Priority 2: Items that are relevant for harmonisation but have lower immediate urgency and/or require additional prerequisites, external dependencies, or further maturation.

3.3 Scope Analysis Result

This section provides a high level overview and a summary of [D1 CONEMP - Scope Analysis](#) result. For detailed analysis and the complete assessment per activity, please refer to the Scope Analysis document.

In this chapter, “IN” and “OUT” refer to the proposed harmonisation scope: “IN” indicates that the activity is considered within the scope of System Pillar harmonisation, while “OUT” indicates that the activity is not proposed for harmonisation within this deliverable.

3.3.1 Installation (Commissioning)

SPT2TS-132375 - Installation (Commissioning):

Activities	IN/OUT	Priority
Planning and Requirements Analysis	OUT	--
Procurement and Environment Preparation	OUT	--
Physical Installation and Base Configuration	IN Physical installation activities are treated as external prerequisites, while only the base configuration activities are considered within the harmonisation scope.	Prio 1
Integration, Testing, and Acceptance	OUT	--
Documentation and Operational Handover	OUT	--

3.3.2 Maintenance (Operation & Upkeep)

SPT2TS-132377 - Maintenance (Operation & Upkeep)

Activities	IN/OUT	Priority
Monitoring and Operations Management	IN	Prio1
Software Updates and Patch Management	IN	Prio1
Hardware Maintenance and Preventive Upkeep	OUT	--
Backup and Recovery Management	OUT	--
Security Management in Operations	OUT	--
Contract and License Management	OUT	--

Activities	IN/OUT	Priority
Documentation and Logging	OUT	--

3.3.3 Change (Modifications and Enhancements)

SPT2TS-132379 - Change (Modifications and Enhancements)

Activities	IN/OUT	Priority
Request for Change (RfC) and Assessment	OUT	--
Planning and Approval	OUT	--
Change Execution	IN: Implement the approved change (hardware add-on, software installation, configuration)	Prio1
Testing and Verification	IN: If problems occur, activate rollback.	Prio 2
Closure, Documentation, and Review	OUT	--
Security considerations	OUT	--

3.3.4 Incident Management (Troubleshooting)

SPT2TS-132382 - Incident Management (Troubleshooting)

Activities	IN/OUT	Priority
Detection and Logging	IN	Prio1
Prioritisation and Categorisation	OUT	--
Assignment and Diagnosis	OUT	--
Resolution and Recovery:	IN: Apply corrective actions (e.g. patching, restarts, hardware swap, config fixes).	Prio1
Validation and Closure:	OUT	--

3.3.5 Decommissioning (Disposal and Retirement)

SPT2TS-132383 - Decommissioning (Disposal and Retirement)

Activities	IN/OUT	Priority
Decommissioning Planning	OUT	--
Backup and Data Migration	OUT	--
Shutdown and Removal	IN: Uninstall software, decommission virtual machines, and remove configurations	Prio2
Secure Data Erasure	IN: Delete data using certified methods (e.g. wiping tools, physical destruction):n : factory reset and certificate deleting (configuration + security)	Prio2
Disposal or Return	OUT	--
Closure and Documentation	OUT	--

3.4 Proposed Scope for Harmonisation

This section outlines the prioritised list of harmonisation items. It consolidates the candidates identified from the scope analysis across the lifecycle based on the agreed evaluation.

3.4.1 Installation (Commissioning)

SPT2TS-132137 - Physical Installation and Base Configuration

The first standardisation candidate covers "Physical Installation and Base Configuration" as part of Installation and establishes a common operational baseline for bringing CCS equipment into service.

For the purpose of the standardisation candidate in D1, the focus is on the sub-activities "Install operating systems and baseline software" and "Configure key parameters (IP settings, domain integration, user accounts, and security measures such as firewalls and antivirus)", as these define the minimum technical baseline that must be achieved in a consistent way before a CCS device/system can be integrated and commissioned.

The activity "Set up and connect hardware" is treated as a prerequisite: it is assumed to be completed first and is handled as a separate preceding process (not harmonized in D1 scope), since the operational target process described here starts once the equipment is physically installed and available for configuration.

In addition, security commissioning is included as part of the commissioning process. This includes the required activities to register and authorise the system for operation, enable the necessary network access, and provision the required operational security material (e.g., certificates/keys) before configuration and activation are completed.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.2 - First Commissioning of a Managed Entity for Trackside ,

4.3 - First Commissioning of a Managed Entity for On-Board

including preconditions, postconditions and the end-to-end flow.

3.4.2 Maintenance (Operation & Upkeep)

SPT2TS-132686 - Monitoring and Operations Management

For "Monitoring and Operations Management", the standardisation candidate focuses on establishing the diagnostic capability to continuously monitor performance, availability and overall system health across the relevant assets (e.g., systems, servers, clients, network devices, process control units and telecom systems) and to detect anomalies.

These activity focuses defining what information must be available to ensure early detection of faults and timely reaction.

The activity "perform capacity and performance management to pre-empt bottlenecks" is not addressed as a direct standardisation target in the context of D1 instead, the diagnostics capability is considered to support it indirectly by providing the required diagnostic and monitoring information. The diagnostic information provided shall be restricted to a level of granularity sufficient to support the early identification of failures and the replacement of components at the lowest replaceable assembly level (smallest replaceable unit, SRU).

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.12 - Perform System Asset Diagnosis for Trackside

4.13 - Perform System Asset Diagnosis for On-Board

including preconditions, postconditions and the end-to-end flow.

SPT2TS-132687 - Software Updates and Patch Management

For "Software Updates and Patch Management" the scope analysis confirms that all listed sub-activities are relevant for standardisation scope. The focus includes maintaining system and application software, applying security updates, and scheduling updates and major upgrades to minimize downtime, preferably within defined maintenance windows.

Planning and approval activities themselves are treated as external preconditions and interfaces to the CONEMP process. The Standardisation target defines a harmonised update process with clear roles and steps, required prerequisites and approvals, and the necessary operational restrictions (e.g. activation of working area by signaller).

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.4 - Update of an existing Managed Entity for Trackside

4.5 - Update of an existing Managed Entity for On-Board

including preconditions, postconditions and the end-to-end flow.

3.4.3 Change (Modifications and Enhancements)

SPT2TS-132699 - Change Execution

For "Change Execution" the standardisation candidate focuses on the sub-activity "Implement the approved change (hardware add-on, software installation, configuration)" as the operational step where an authorised change is executed in the field and brought into service under Configuration Update responsibility. This covers changes affecting infrastructure related modifications such as topology updates (e.g., adapting configuration and engineering data following a topology change) and extensions of an existing track where additional CCS elements or interfaces must be installed and configured consistently. As well as On-board changes such as installation or replacement of On-board CCS equipment,

deployment of an approved software or configuration version to a target vehicle. Activities such as testing in a staging environment and general notifications/documentation are treated as out of scope in this context; the standardisation target is the controlled execution of an already approved change, including the necessary configuration updates and operational restrictions.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.4 - Update of an existing Managed Entity for Trackside

4.5 - Update of an existing Managed Entity for On-Board

4.6 - Generic process for physical modification of existing track (Trackside)

4.7 - Update Topology Data (Trackside)

including preconditions, postconditions and the end-to-end flow.

SPT2TS-132700 - Testing and Verification

For "Testing and Verification", the standardisation focus is limited to the sub-activity "If problems occur, activate rollback". Here Rollback is the controlled return to the previously valid Configuration Data version when an issue occurs during or after an update

In the operational target concept, a rollback does not represent a separate operational process; it is effectively the execution of an alternative, authorised update to restore the previously valid configuration data. The decision to trigger rollback, including its timing and conditions, remains with the responsible Configuration Manager/Operator based on the observed issues. The rollback itself follows the same controlled update process.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.4 - Update of an existing Managed Entity for Trackside

4.5 - Update of an existing Managed Entity for On-Board

4.6 - Generic process for physical modification of existing track (Trackside)

including preconditions, postconditions and the end-to-end flow.

3.4.4 Incident Management (Troubleshooting)

SPT2TS-132696 - Detection and Logging

For "Detection and Logging", the standardisation candidate is limited to capability to collect diagnostic and monitoring data that reflects the health, status, and state of the CCS system and its assets. This includes the detection of incidents based on monitoring data.

The intent is to standardise what operational state and health information must be captured and made available so it can be reused across different operational scenarios (e.g., troubleshooting, maintenance actions, or operational decision making). Activities such as creating incident tickets with detailed descriptions and classifying tickets as incident/service request or security incident are not standardised within this candidate context of D1, as they are primarily part of service management and security monitoring processes and depend on organisational and tool-specific practices; they are therefore treated as out of scope for this standardisation focus.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.12 - Perform System Asset Diagnosis for Trackside

4.13 - Perform System Asset Diagnosis for On-Board

including preconditions, postconditions and the end-to-end flow.

SPT2TS-132698 - Resolution and Recovery

For "Resolution and Recovery", the standardisation candidate focuses on sub-activity "Apply corrective actions (e.g., patching, restarts, hardware swap, configuration fixes)" as the operational mechanism to restore the CCS service to a consistent and operationally safe state. From the D1 perspective this is primarily treated as a controlled configuration/update Process.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.4 - Update of an existing Managed Entity for Trackside

4.5 - Update of an existing Managed Entity for On-Board

4.8 - Replacement of a broken Managed Entity (Trackside)

4.9 - Replacement of a broken Managed Entity (On-Board)

including preconditions, postconditions and the end-to-end flow.

3.4.5 Decommissioning (Disposal and Retirement)

SPT2TS-132701 - Shutdown and Removal

For "Shutdown and Removal" the proposed standardisation scope is limited to the operational steps that ensure the CCS system is taken out of service from a configuration and security perspective (in this deliverable we focus on the process for configuration perspective for security perspective will be covered by security domain) . In scope is the activity to uninstall software, decommission virtual machines, and remove configurations, as this defines a controlled transition to a non-operational state and prevents residual operational configurations from remaining active or reusable. Activities such as powering down/disconnecting the system, physically removing hardware from racks/sites, and segregating reusable components are considered out of scope for System Pillar standardisation, since they are largely driven by local procedures, logistics, and organisation-specific handling.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.10 - Decommissioning of a Managed Entity (Trackside)

4.11 - Decommissioning of a Managed Entity (On-Board)

including preconditions, postconditions and the end-to-end flow.

SPT2TS-132702 - Secure Data Erasure

For "Secure Data Erasure", the proposed standardisation scope focuses on ensuring that CCS system do not retain operationally sensitive information or security material. In scope is the activity to delete data using certified methods (e.g., factory reset, wiping tools, or physical destruction where applicable), including the secure removal of operational certificates/keys and other security-relevant configuration artifacts. Broader organisational compliance activities such as ensuring GDPR compliance and the general requirement to log all destruction activities are treated as out of scope for System Pillar standardisation in this context, as they depend on organisational governance and local compliance processes.

The operational implementation of this candidate is detailed in the next chapter through the corresponding:

4.10 - Decommissioning of a Managed Entity (Trackside)

4.11 - Decommissioning of a Managed Entity (On-Board)

including preconditions, postconditions and the end-to-end flow.

4 Operational Process Definition

4.1 Data Scope

SPT2TS-129336 - The Configuration Process covers only the distribution of static Configuration D...

The Configuration Process covers only the distribution of static Configuration Data through the configuration interface as defined in the Data Terms, including [SPT2TS-127779 - Configuration Data](#). The dynamic or semi-dynamic data, in addition to operational data, are out of the scope of the CONEMP Configuration Process and are considered to be fully distributed through the communication (SCI) interfaces. The reason is that the sharing mechanism of dynamic data is an open point: Digital registers are not specified yet, in contrast to the config repositories. This restriction applies specifically to the data distributed through the configuration interface and does not limit the other information exchanges required by the CONEMP operational processes. These processes may also exchange operational information such as the Operational Plan / agreed time slot, operational restriction status, through the relevant interfaces. The only dynamic interface data considered (with regard to specification) in the CONEMP scope is the diagnostic data collected from the assets.

Note: this restriction is not valid for the data model (CCS/TMS Ontology) defined by CONEMP, which will be applied for all communication interfaces exchanging dynamic data, regardless of which process distributes them.

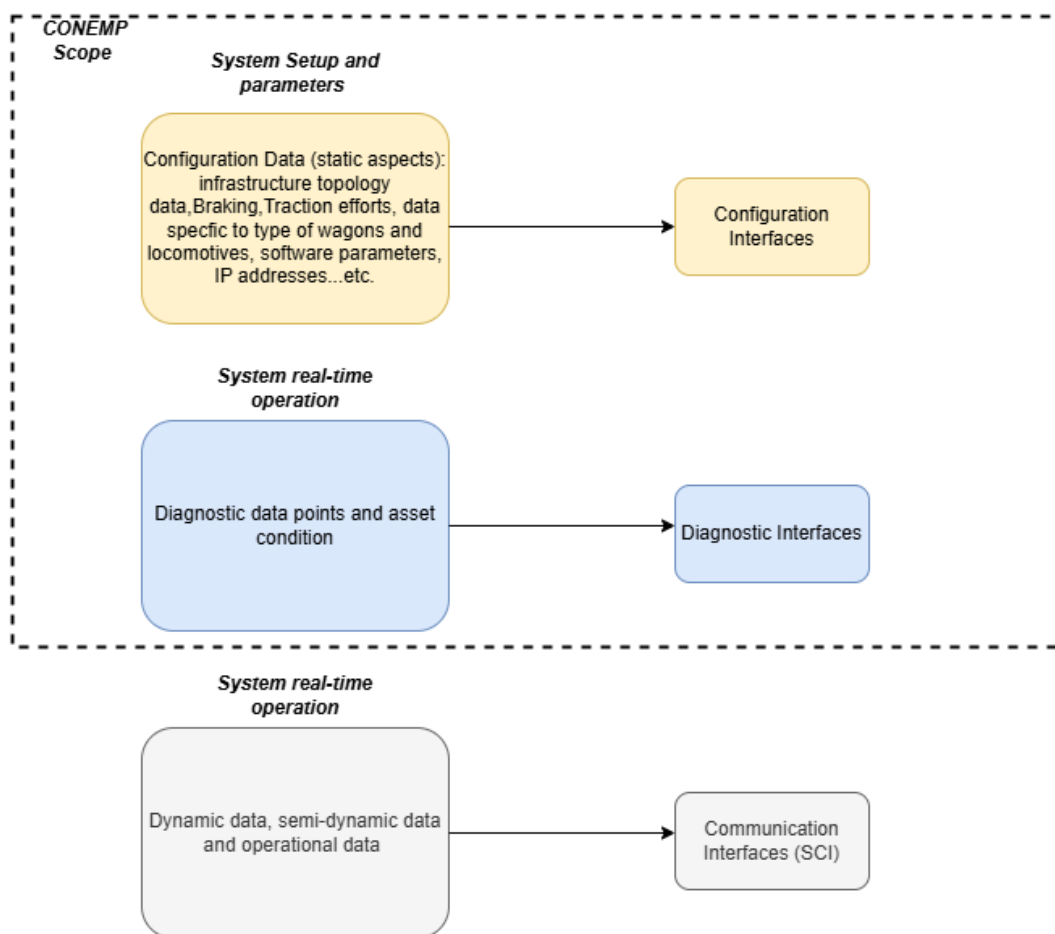


Figure 2 CONEMP data scope

4.2 First Commissioning of a Managed Entity for Trackside

First Commissioning of a Managed Entity

Op.Postcondition	- Configuration Data has been activated and is used by the Managed Entity. - Managed Entity is available for production.
Op.Precondition	- Configuration Data is available. - Configuration Data has been authorised by the responsible authority for use in the respective Managed Entity. - Managed Entity is already physically installed in the needed location and switched "ON". - Initial Configuration Data is available for the Managed Entity (basic data identifier (e.g. IP addresses, identifiers, etc)).
Op.Rationale	- Installing a new Managed Entity for the first time.

diagram of process activate Configuration Data (Trackside) for use case : First Commissioning of Managed Entity

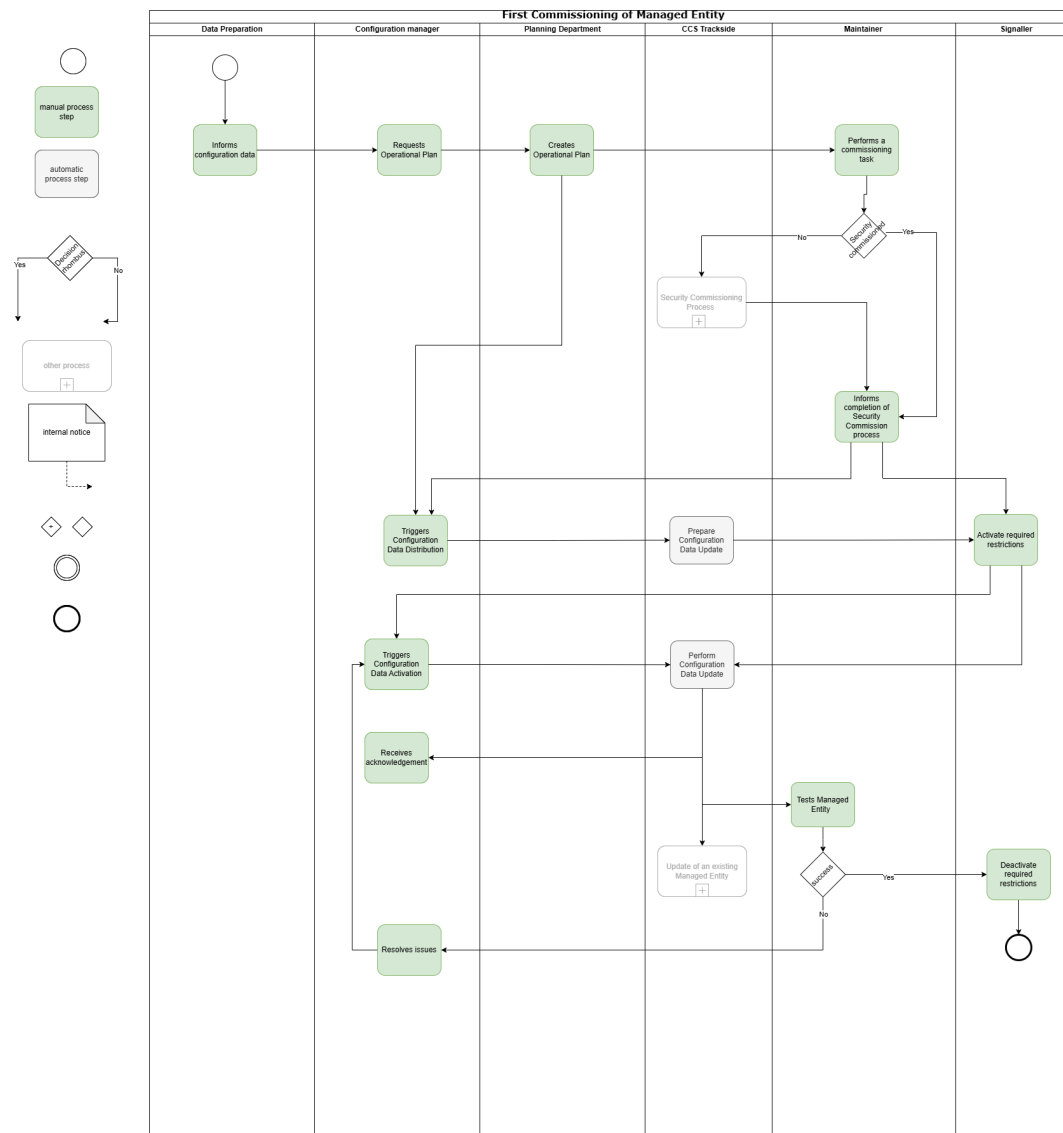


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPP-35389]

4.2.1 Operational activities

SPP-27724 - Informs Configuration Data

The Data Preparation informs about new Configuration Data to be used in the CCS system. The Configuration Data is validated and authorized by the Data Preparation and ready to be used in the CCS system (the data preparation process respect the CENELEC standards, notably EN50716).

SPP-47954 - Perform a commissioning task

The Maintainer performs the commissioning task for the affected Managed Entity and coordinates the required on-site activities before the commissioning including the Configuration Data update can start.

SPP-54693 - Informs completion of security commissioning process

The Mainatiner informs the Signaller and the Configuration Manager about the completion of the security commissioning process. This step is one of the prerequisites for setting up restriction for activation of the Configuration Data according to the following security commissioning procedure [SPPRAMSS-4950 - Commissioning Procedure](#).

SPP-54694 - Triggers Configuration Data Distribution

The Configuration Manager triggers distribution of the Configuration Data when the defined time has been reached.

SPP-34346 - Triggers Configuration Data Activation

The Configuration Manager triggers activation of the Configuration Data when the defined time has been reached and needed restrictions are activated.

SPP-27728 - Requests Operational Plan

The Configuration Manger requests the Planning Department for an operational plan for performing the update of the Configuration Data.

SPP-28309 - Creates Operational Plan

The Planning Department creates based on the needs CCS System the operational plan for the Configuration Data.

SPP-54699 - Prepare Configuration Data Update

On receiving the Configuration Data from the Configuration Manager, the CCS Trackside prepares the update by performing necessary steps like preloading.

SPP-34542 - Performs configuration update

On having all the required triggers and safety measures in place to perform the update, the CCS Trackside performs the update. This includes activation and deactivation of the Configuration Data.

SPP-47784 - Activates required restrictions

The Signaller activates the required operational restrictions (e.g. planned temporary speed restriction/ working area) based on the Operational Plan and current operational situation, to secure the affected Managed Entity before the configuration update activities is performed.

See,

[S2 t07 403 Activate Planned Temporary Speed Restriction](#)

[S2 t09 403B_on Activate working area with handheld terminal](#)

[S2 T17 403E_Activate working area without handheld terminal](#)

SPP-47955 - Tests Managed Entity

The Maintainer tests the Managed Entity after the configuration update/commissioning activity to verify that it works correctly before the required restrictions are deactivated.

SPP-47785 - Deactivates required restrictions

The Signaller deactivates the required operational restrictions after the Managed Entity has been successfully tested and the Configuration Data update activity is completed.

See,

 [S2 t18 403E_Deactivate working area without handheld terminal](#)

 [S2 t10 403B_off Deactivate working area with handheld terminal](#)

 [S2 t08 403 Deactivate Temporary Speed Restriction](#)

SPP-48022 - Receives acknowledgement

The Configuration Manager receives a status acknowledgement of the Configuration Data update process, indicating the current status, including any failures that may occur.

SPP-47786 - Resolves issues

The Configuration Manager resolves issues identified during the configuration update or testing and coordinates the necessary corrections and if a rollback or new Configuration update is needed.

4.3 First Commissioning of a Managed Entity for On-Board

First Commissioning of a Managed Entity for On-Board

First Commissioning of a Managed Entity for On-Board

Op.Postcondition	- Configuration Data has been activated and is used by the Managed Entity - Managed Entity is available for production
Op.Precondition	- Configuration Data is available - Configuration Data has been authorised by the responsible authority for use in the respective Managed Entity - Managed Entity is already physically installed and switched "ON" - initial Configuration Data is available to the Managed Entity (basic data identifier (e.g. IP addresses, identifiers)
Op.Rationale	- installing a new Managed Entity for the first time

diagram of process activate Configuration Data (On-Board) for use case : First Commissioning of Managed Entity

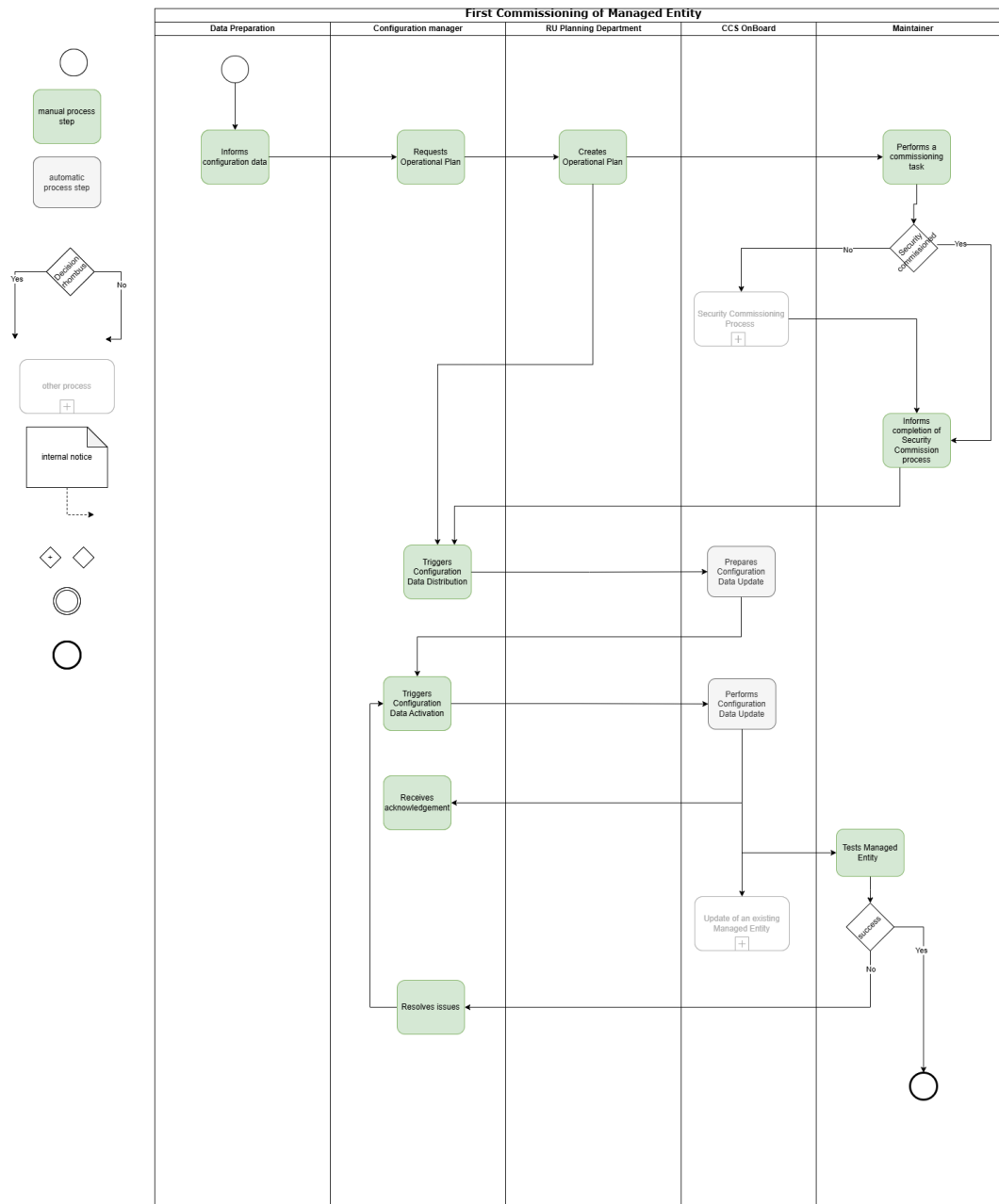


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPT2TS-132684]

4.3.1 Operational activities

SPT2TS-133590 - Informs Configuration Data

The Data Preparation informs about new Configuration Data to be used in the CCS system. The Configuration Data is validated and authorized by the Data Preparation and ready to be used in the CCS system (the data preparation process respect the CENELEC standards, notably EN50716).

SPT2TS-133591 - Performs a commissioning task

The Maintainer performs the commissioning task for the affected Managed Entity and coordinates the required on-site activities before the commissioning including the Configuration Data update can start.

SPT2TS-133966 - Informs completion of security commissioning process

The Maintainer informs the Configuration Manager about the completion of the security commissioning process. This step is one of the prerequisites for setting up restriction for activation of the Configuration Data according to the following security commissioning procedure [SPPRAMSS-4950 - Commissioning Procedure](#).

SPT2TS-133585 - Triggers Configuration Data Activation

The Configuration Manager triggers activation of the Configuration Data when the defined time has been reached and needed restrictions are activated.

SPT2TS-133963 - Triggers Configuration Data Distribution

The Configuration Manager triggers distribution of the Configuration Data when the defined time has been reached.

SPT2TS-133586 - Requestes Operational Plan

The Configuration Manager requests the RU planning department for an appropriate time slot for performing the update of the Configuration Data.

SPT2TS-133964 - Prepare Configuration Data Update

On receiving the Configuration Data from the Configuration Manager, the CCS On-board prepares the update by performing necessary steps like preloading.

SPT2TS-133587 - Performs Configuration Data Update

On having all the required triggers and safety measures in place to perform the update, the CCS On-board performs the update. This includes activation and deactivation of the Configuration Data.

SPT2TS-133588 - Tests Managed Entity

The Maintainer tests the Managed Entity after the configuration update/commissioning activity to verify that it works correctly before the required restrictions are deactivated.

SPT2TS-133589 - Receives a status acknowledgement

The Configuration Manager receives a status acknowledgement of the Configuration Data update process, indicating the current status, including any failures that may occur.

SPT2TS-133965 - Resolves issues

The Configuration Manager resolves issues identified during the configuration update or testing and coordinates the necessary corrections and if a rollback or new Configuration update is needed.

4.4 Update of an existing Managed Entity for Trackside

Update of an existing Managed Entity

Op.Postcondition	- New version configuration data has been activated and is used by the Managed Entity. - Managed Entity is available for production.
Op.Precondition	- New version configuration data is available for the Managed Entity and compatible to the Managed Entity in operation. - New version configuration data has been authorised by the responsible authority for use in the Managed Entity. - The Managed Entity is working "OK".
Op.Rationale	- Updating configuration data for an existing Managed Entity.

diagram of process activate Configuration Data (Trackside) for use case : Update of an existing Managed Entity

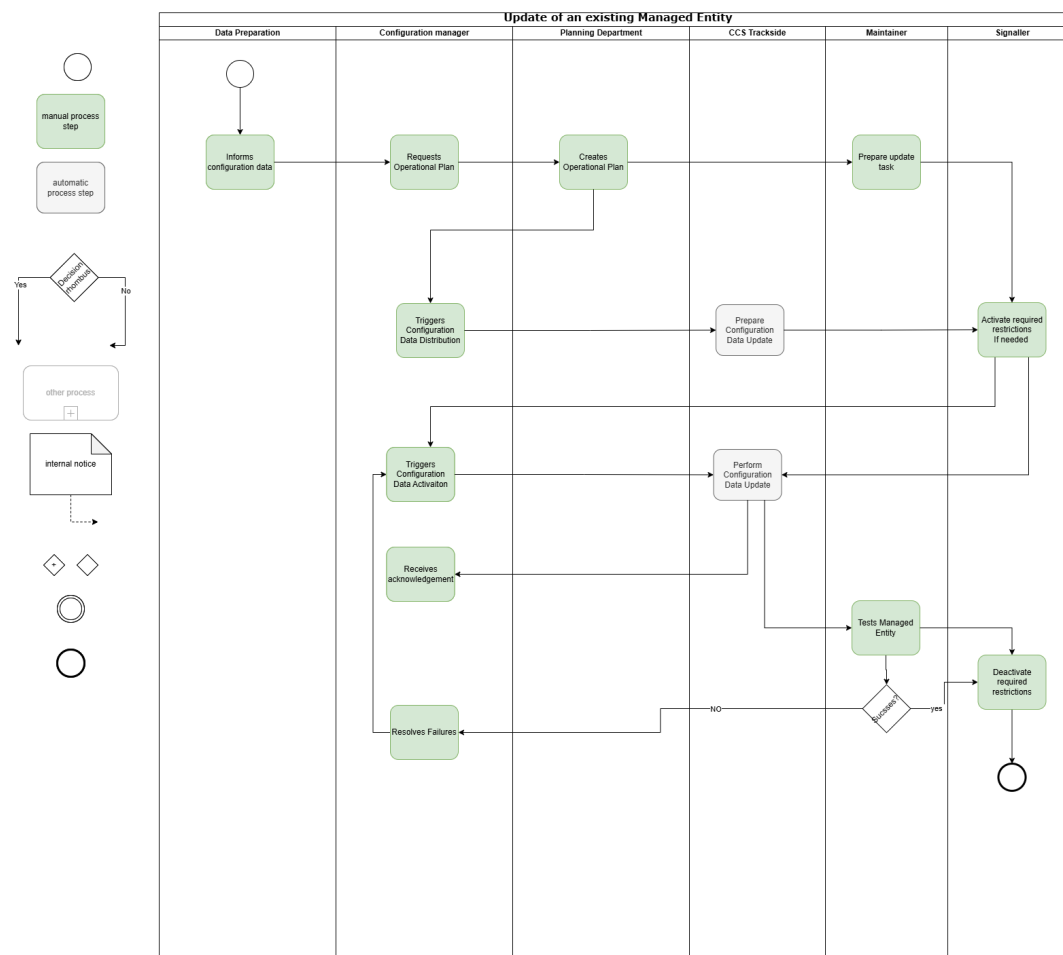


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPP-37545]

4.4.1 Operational activities

SPP-48044 - Informs Configuration Data

The Data Preparation informs about new Configuration Data to be used in the CCS system. The Configuration Data is validated and authorized by the Data Preparation and ready to be used in the CCS system (the data preparation process respect the CENELEC standards, notably EN50716).

SPP-48050 - Prepare update task

The Maintainer performs if needed the update task for the affected Managed Entity/System and coordinates the required on-site activities before the update.

SPP-54707 - Triggers Configuration Data Activation

The Configuration Manager triggers activation of the Configuration Data when the defined time has been reached.

SPP-54708 - Triggers Configuration Data Distribution

The Configuration Manager triggers distribution of the Configuration Data when the defined time has been reached.

SPP-54704 - Requests Operational Plan

The Configuration Manager requests the planning department for an operational plan for performing the update of the Configuration Data.

SPP-54706 - Creates Operational Plan

The Planning Department creates based on the needs CCS System the operational plan for the Configuration Data.

SPP-54709 - Prepare Configuration Data Update

On receiving the Configuration Data from the Configuration Manager, the CCS Trackside prepares the update by performing necessary steps like preloading.

SPP-48046 - Performs configuration update

On having all the required triggers and safety measures in place to perform the update, the CCS Trackside performs the update. This includes activation and deactivation of the Configuration Data.

SPP-48047 - Activates required restrictions

The Signaller activates the required operational restrictions (e.g. planned temporary speed restriction/ working area) based on the Operational Plan and current operational situation, to secure the affected Managed Entity/System before the configuration update activities is performed.

See,

 [S2 t07 403 Activate Planned Temporary Speed Restriction](#)

 [S2 t09 403B_on Activate working area with handheld terminal](#)

 [S2 T17 403E_Activate working area without handheld terminal](#)

SPP-48048 - Tests Managed Entity

The Maintainer tests the System after the configuration update activity to verify that it works correctly before the required restrictions are deactivated.

SPP-48049 - Receives acknowledgement

The Configuration Manager receives a status acknowledgement of the configuration data update process, indicating the current status, including any failures that may occur.

SPP-48045 - Deactivates required restrictions

The Signaller deactivates the required operational restrictions after the Managed Entity/System has been successfully

tested and the Configuration Data update activity is completed.

See,

[S2 t18 403E_Deactivate working area without handheld terminal](#)

[S2 t10 403B_off Deactivate working area with handheld terminal](#)

[S2 t08 403 Deactivate Temporary Speed Restriction](#)

SPP-57597 - Resolves failures

The Configuration Manager resolves issues identified during the configuration update or testing and coordinates the necessary corrections and if a rollback or new Configuration update is needed.

4.5 Update of an existing Managed Entity for On-Board

Update of an existing System for On-Board

Update of an existing System for On-Board

Op.Postcondition	- New version configuration data has been activated and is used by the Managed Entity. - Managed Entity is available for production.
Op.Precondition	- New version configuration data is available for the Managed Entity and compatible to the Managed Entity in operation. - New version configuration data has been authorised by the responsible authority for use in the Managed Entity. - The Managed Entity is working "OK".
Op.Rationale	- Updating configuration data for an existing Managed Entity.

diagram of process activate Configuration Data (On-Board) for use case : Update of an existing Managed Entity

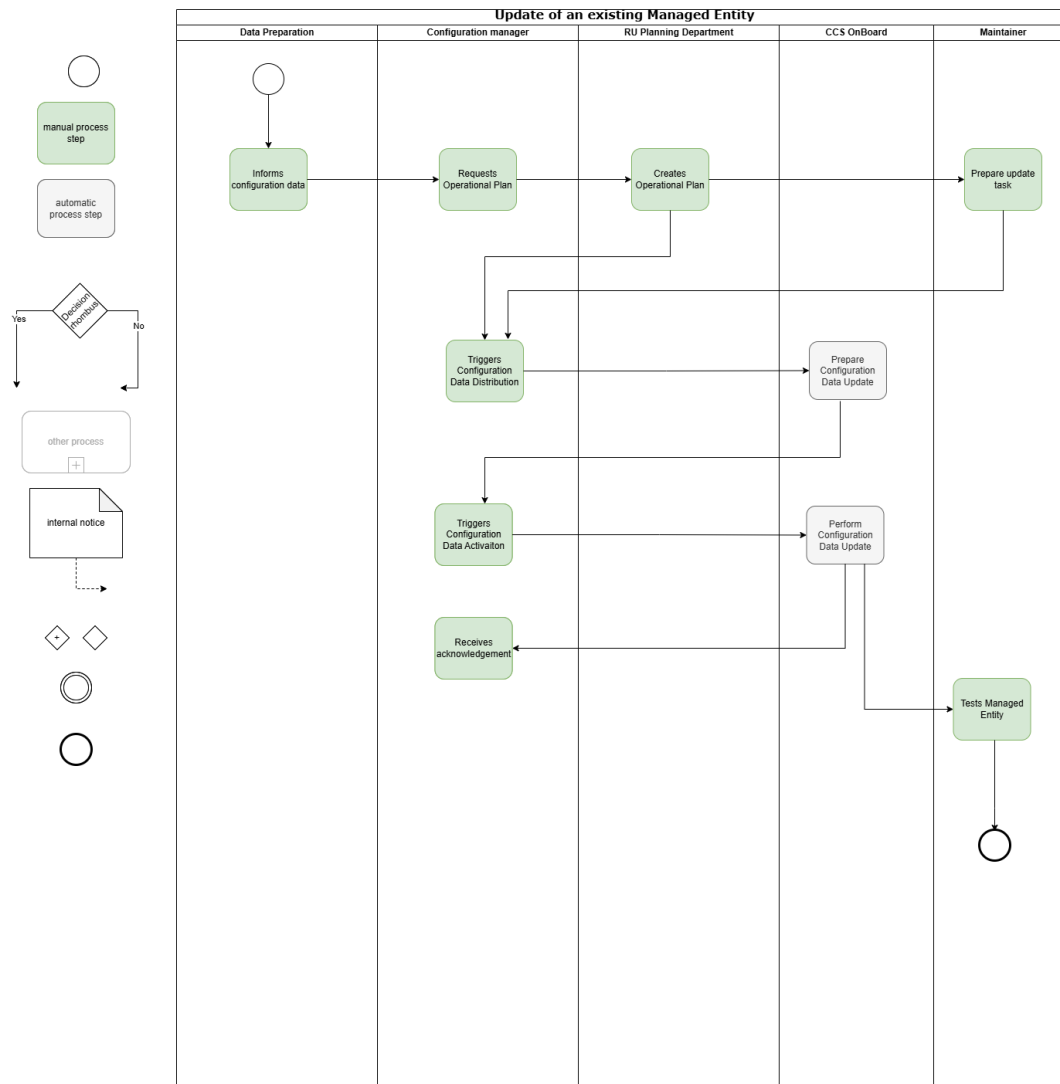


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPT2TS-133594]

4.5.1 Operational activities

SPT2TS-133600 - Informs Configuration Data

The Data Preparation informs about new Configuration Data to be used in the CCS system. The Configuration Data is validated and authorized by the Data Preparation and ready to be used in the CCS system (the data preparation process respect the CENELEC standards, notably EN50716). .

SPT2TS-133601 - Prepare update task

The Maintainer performs the update task for the affected Managed Entity/System and coordinates the required on-site activities before the update.

SPT2TS-133967 - Triggers Configuration Data Distribution

The Configuration Manager triggers distribution of the Configuration Data when the defined time has been reached.

SPT2TS-133602 - Triggers Configuration Data Activation

If not done automatically, the Configuration Manager manually triggers activation of the Configuration Data when the defined time has been reached.

SPT2TS-133595 - Requests Operational Plan

The Configuration Manager requests the RU planning department for an appropriate time slot for performing the update of the Configuration Data

SPT2TS-133596 - Creates Operational Plan

The RU Planning Department defines based on the needs CCS System the update Time for the Configuration Data.

SPT2TS-133968 - Prepare Configuration Data Update

On receiving the Configuration Data from the Configuration Manager, the CCS On-Board prepares the update by performing necessary steps like preloading

SPT2TS-133597 - Performs configuration update

On having all the required triggers and safety measures in place to perform the update, the CCS On-Board performs the update. This includes activation and deactivation of the Configuration Data.

SPT2TS-133598 - Tests Managed Entity

The Maintainer tests the Managed Entity after the configuration update activity to verify that it works correctly.

SPT2TS-133599 - Resolves failures

The Configuration Manager receives a status acknowledgement of the configuration data update process, indicating the current status, including any failures that may occur.

4.6 Generic process for physical modification of existing track (Trackside)

Generic process for physical modification of existing track

Op.Postcondition	- New version of Application Configuration Data (Topology Data) has been activated and is used as the only version throughout all CCS systems - CCS system is ready for production.
Op.Precondition	- Application Configuration Data (Topology Data) is validated and ready to use in the system. - The Data Preparation prepares all required versions of the configuration data for each construction level, including intermediate configuration states that reflect the temporary construction status of the Managed Entity until the final planned state is reached. - The data with different level of construction and configuration states is provided to TMS.
Op.Rationale	Update of the Application Configuration Data (Topology Data) for an existing track

Generic process for physical modification of existing track

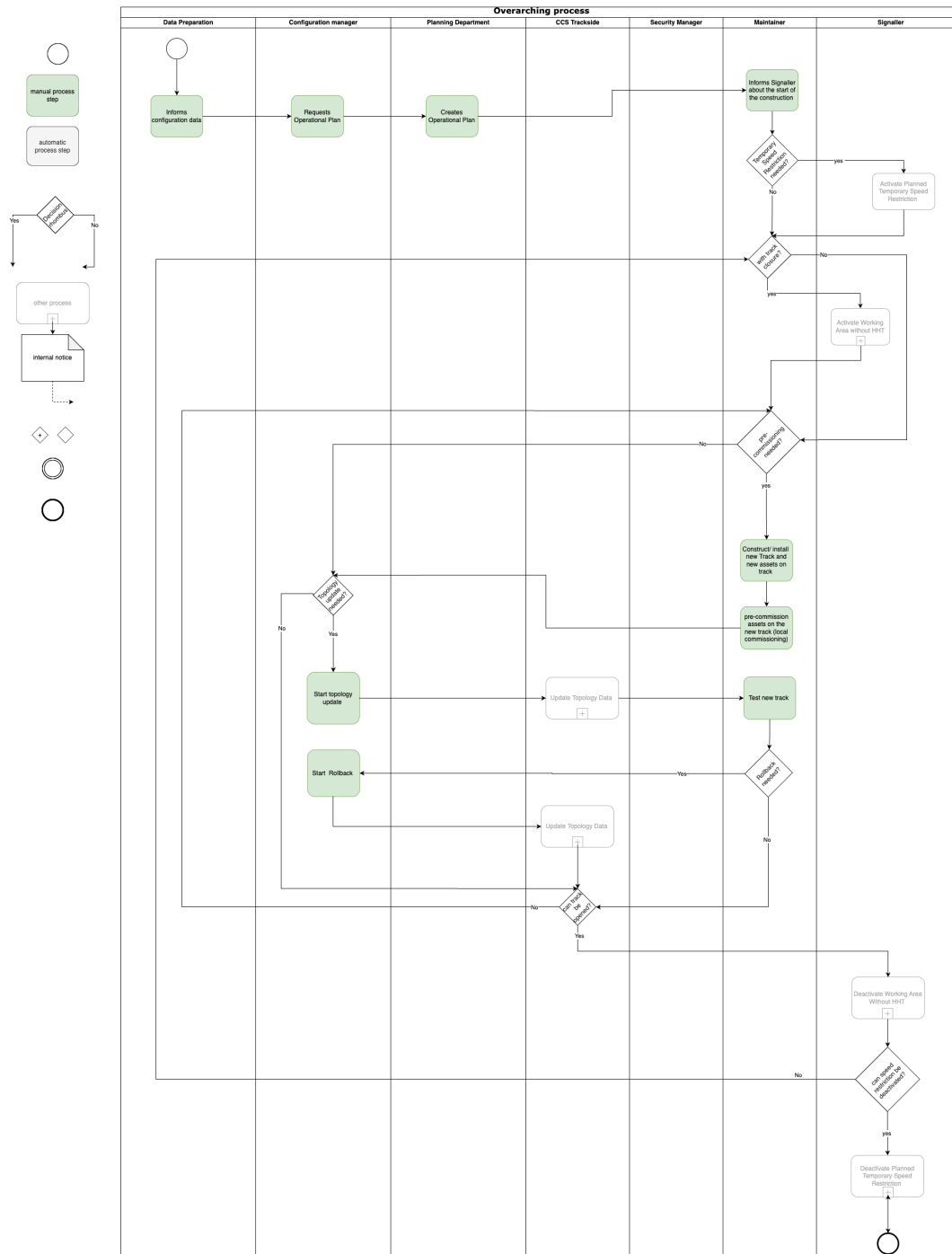


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPP-45151]

4.6.1 Operational activities

SPP-55389 - Informs Configuration Data

The Data Preparation informs about new Configuration Data (Topology Data) to be used in the CCS system. The Configuration Data is validated and authorized by the Data Preparation and ready to be used in the CCS system.

SPP-55390 - Creates Operational Plan

The Planning Department creates based on the needs CCS System the operational plan for the Configuration Data.

SPP-54673 - Informs Signaller about Start of Construction

The Maintainer informs signaller about the start of the construction activities on the track.

SPP-45627 - Construct/Install New Track and New Assets on Track

The Maintainer performs the physical construction (building) and installation of the new track and the related track assets, including setting up and connecting the necessary hardware in the field.

SPP-45628 - Pre-Commission Assets on New Track (Local Commissioning)

The Maintainer performs local pre-commissioning of the new track assets in the field by installing the operating system and baseline software, configuring key technical parameters such as IP settings and domain integration, and loading preliminary certificates and security settings, for example staging certificates, using local means such as a service computer or USB stick before the final configuration is applied.

SPP-45629 - Test New Track

The Maintainer tests the new track to ensure it meets operational and safety requirements.

SPP-45630 - Start Topology Update

The Configuration Manager initiates the topology update to reflect the planned changes in the system according to the planned Configuration Data version.

SPP-45632 - Start Rollback

The Configuration Manager triggers a rollback to restore the previous system state if required. it is understood as rollback to the previous Configuration Data version.

SPP-56735 - See,

See,

 [S2 t07 403 Activate Planned Temporary Speed Restriction](#)

 [S2 t09 403B_on Activate working area with handheld terminal](#)

 [S2 T17 403E_Activate working area without handheld terminal](#)

 [S2 t18 403E_Deactivate working area without handheld terminal](#)

 [S2 t10 403B_off Deactivate working area with handheld terminal](#)

 [S2 t08 403 Deactivate Temporary Speed Restriction](#)

Update Topology Data

Op.Postcondition	- New version of Topology Data has been activated and is used as the only version throughout all CCS systems. - CCS system is ready for production
Op.Precondition	- New version of Topology Data has been created, validated and is ready to be used in the CCS system. - CCS system is in normal mode of operation.
Op.Rationale	Topology has changed, the new topology shall be used on all CCS systems and the old topology shall not be used anymore.

```

graph TD
    subgraph Data_Preparation [Data Preparation]
        Start(( )) --> Informs[Informs configuration data]
    end

    subgraph Configuration_manager [Configuration manager]
        Informs --> Requests[Requests Operational Plan]
        Requests --> TriggersDist[Triggers Configuration Data Distribution]
        TriggersDist --> TriggersAct[Triggers Configuration Data Activation]
        TriggersAct --> Resolves[Resolves issues]
        Resolves --> Requests
    end

    subgraph Planning_Department [Planning Department]
        Requests --> Creates[Creates Operational Plan]
    end

    subgraph CCS_Trackside [CCS Trackside]
        TriggersDist --> PrepUpdate[Prepare Configuration Data Update]
        PrepUpdate --> PerformUpdate[Perform Configuration Data Update]
        TriggersAct --> PerformUpdate
        PerformUpdate --> ReceivesAck[Receives acknowledgement]
    end

    subgraph Maintainer [Maintainer]
        Creates --> PrepTask[Prepare update task]
        PrepTask --> ActivateRestr[Activate required restrictions]
        PerformUpdate --> TestsEntity[Tests Managed Entity]
        TestsEntity --> IsProblem{Is problem}
        IsProblem -- No --> Resolves
        IsProblem -- Yes --> DeactivateRestr[Deactivate required restrictions]
    end

    subgraph Signaller [Signaller]
        ActivateRestr --> DeactivateRestr
        DeactivateRestr --> End(( ))
    end
  
```

diagram template inside -> SPP-9268 - S2: Diagram template and best practices

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPP-47590]

4.7.1 Operational activities

SPP-48056 - Informs Configuration Data

The Data Preparation informs about new Configuration Data (Topology Data) to be used in the CCS system. The Configuration Data is validated and authorized by the Data Preparation and ready to be used in the CCS system.

SPP-48062 - Performs an update task

The Maintainer performs the update task for the affected System and coordinates the required on-site activities before the update.

SPP-54713 - Triggers Configuration Data Distribution

The Configuration Manager triggers distribution of the Configuration Data when the defined time has been reached.

SPP-54711 - Triggers Configuration Data Activation

The Configuration Manager triggers activation of the Configuration Data when the defined time has been reached.

SPP-54714 - Requests Operational Plan

The Configuration Manager requests the planning department for an operational plan for performing the update of the Configuration Data.

SPP-54715 - Creates Operational Plan

The Planning Department creates based on the needs CCS System the operational plan for the Configuration Data.

SPP-54716 - Prepare Configuration Data Update

On receiving the Configuration Data from the Configuration Manager, the CCS Trackside prepares the update by performing necessary steps like preloading.

SPP-54712 - Performs configuration update

On having all the required triggers and safety measures in place to perform the update, the CCS Trackside performs the update. This includes activation and deactivation of the Configuration Data.

SPP-48059 - Activates required restrictions

The Signaller activates the required operational restrictions (e.g. planned temporary speed restriction/ working area) based on the Operational Plan and current operational situation, to secure the affected System before the configuration update activities is performed.

See,

 [S2 t07 403 Activate Planned Temporary Speed Restriction](#)

 [S2 t09 403B_on Activate working area with handheld terminal](#)

 [S2 T17 403E_Activate working area without handheld terminal](#)

SPP-48060 - Tests Managed Entity

The Maintainer tests the System after the configuration update activity to verify that it works correctly before the required restrictions are deactivated. [The Maintainer adds/restores necessary Usage Restrictions that cannot be created automatically.](#)

SPP-48061 - Receives acknowledgement

The Configuration Manager receives a status acknowledgement of the configuration data update process, indicating the current status, including any failures that may occur.

SPP-48057 - Deactivates required restrictions

The Signaller deactivates the required operational restrictions after the Managed Entity/System has been successfully

tested, **all necessary Usage Restrictions have been created**, and the Configuration Data update activity is completed.

See,

[S2 t18 403E_Deactivate working area without handheld terminal](#)

[S2 t10 403B_off Deactivate working area with handheld terminal](#)

[S2 t08 403 Deactivate Temporary Speed Restriction](#)

SPP-57682 - Resolves issues

The Configuration Manager resolves issues identified during the configuration update or testing and coordinates the necessary corrections and if a rollback or new Configuration update is needed

4.8 Replacement of a broken Managed Entity (Trackside)

Replacement of a broken Managed Entity

Op.Postcondition	- Configuration data has been activated in the replaced Managed Entity and is used by the Managed Entity. - Managed Entity is available for production.
Op.Precondition	- Initial configuration data is available for Managed Entity (basic data identifier (e.g. IP addresses, identifiers). - Commissioning process from security perspective is done (registered in asset inventory, keys / certificates loaded, access to network granted). - Configuration data is available in the CCS system (same data from broken Managed Entity/no new Configuration data is prepared).
Op.Rationale	Replacement of a broken Managed Entity.

diagram of process activate Configuration Data (Trackside) for use case : Replacement of a broken Managed Entity

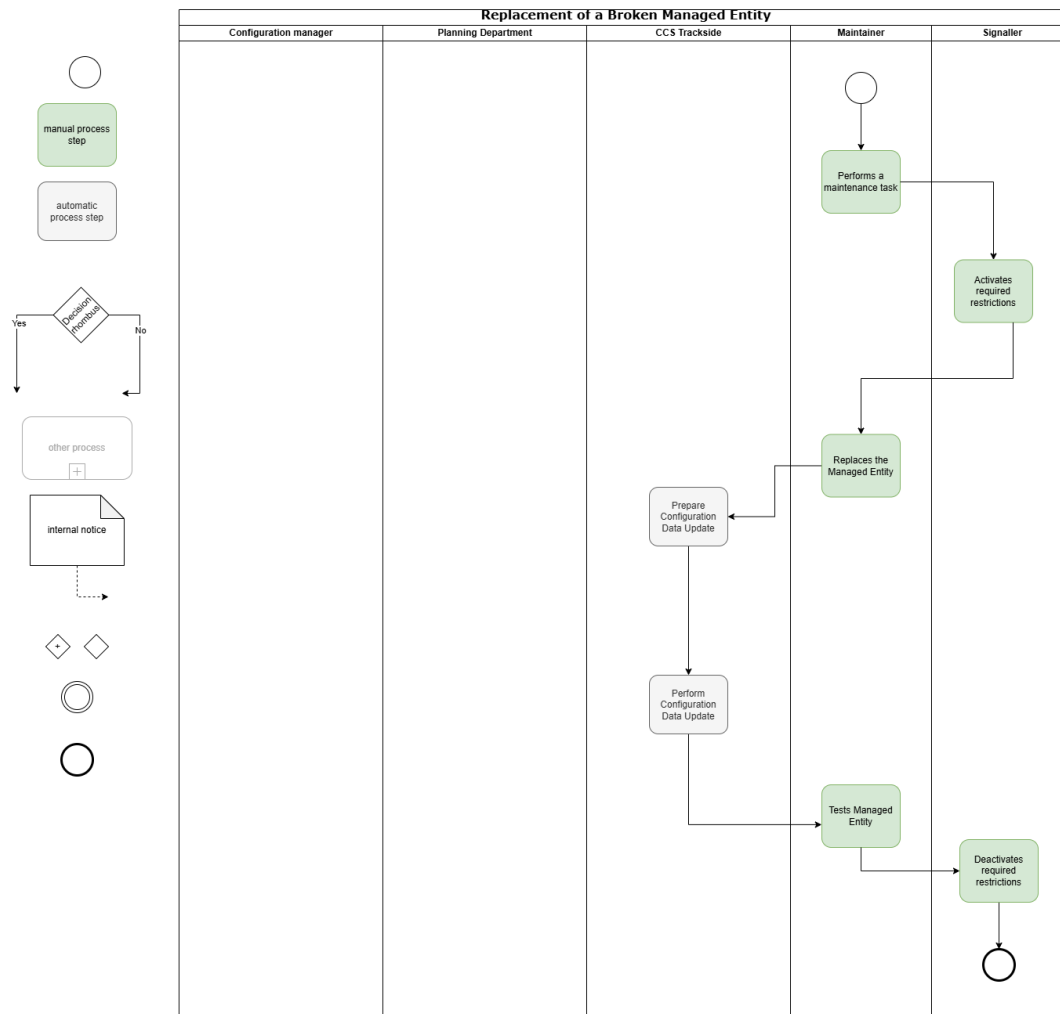


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPP-36205]

4.8.1 Operational activities

SPP-48019 - Perform a maintenance task

The Maintainer performs the maintenance task for replacing the broken Managed Entity and coordinates the required on-site activities.

SPP-54675 - Replaces the Managed Entity

The Maintainer replaces the old Managed Entity with the new one.

SPP-54700 - Prepare Configuration Data Update

On receiving the Configuration Data, the CCS Trackside prepares the update by performing necessary steps like preloading.

SPP-48015 - Performs configuration update

On having all the required triggers and safety measures in place to perform the update, the CCS Trackside performs the update. This includes activation and deactivation of the Configuration Data.

SPP-48016 - Activates required restrictions

The Signaller activates the required operational restrictions (e.g. planned temporary speed restriction/ working area) based on the Operational Plan and current operational situation, to secure the affected Managed Entity before the configuration update activities is performed.

See,

 [S2 t07 403 Activate Planned Temporary Speed Restriction](#)

 [S2 t09 403B_on Activate working area with handheld terminal](#)

 [S2 T17 403E_Activate working area without handheld terminal](#)

SPP-48017 - Tests Managed Entity

The Maintainer tests the Managed Entity after the configuration update activity to verify that it works correctly before the required restrictions are deactivated.

SPP-48012 - Deactivates required restrictions

The Signaller deactivates the required operational restrictions after the Managed Entity has been successfully tested and the Configuration Data update activity is completed.

See,

 [S2 t18 403E_Deactivate working area without handheld terminal](#)

 [S2 t10 403B_off Deactivate working area with handheld terminal](#)

 [S2 t08 403 Deactivate Temporary Speed Restriction](#)

4.9 Replacement of a broken Managed Entity (On-Board)

Replacement of a broken Managed Entity (On-Board)

Replacement of a broken Managed Entity (On-Board)

Op.Postcondition	- Configuration data has been activated in the replaced Managed Entity and is used by the Managed Entity. - Managed Entity is available for production.
Op.Precondition	- Initial configuration data is available for Managed Entity (basic data identifier (e.g. IP addresses, identifiers). - Commissioning process from security perspective is done (registered in asset inventory, keys / certificates loaded, access to network granted). - Configuration data is available in the CCS system (same data from broken Managed Entity /no new Configuration data is prepared).
Op.Rationale	Replacement of a broken Managed Entity.

diagram of process activate Configuration Data (On-Board) for use case : Replacement of a broken Managed Entity

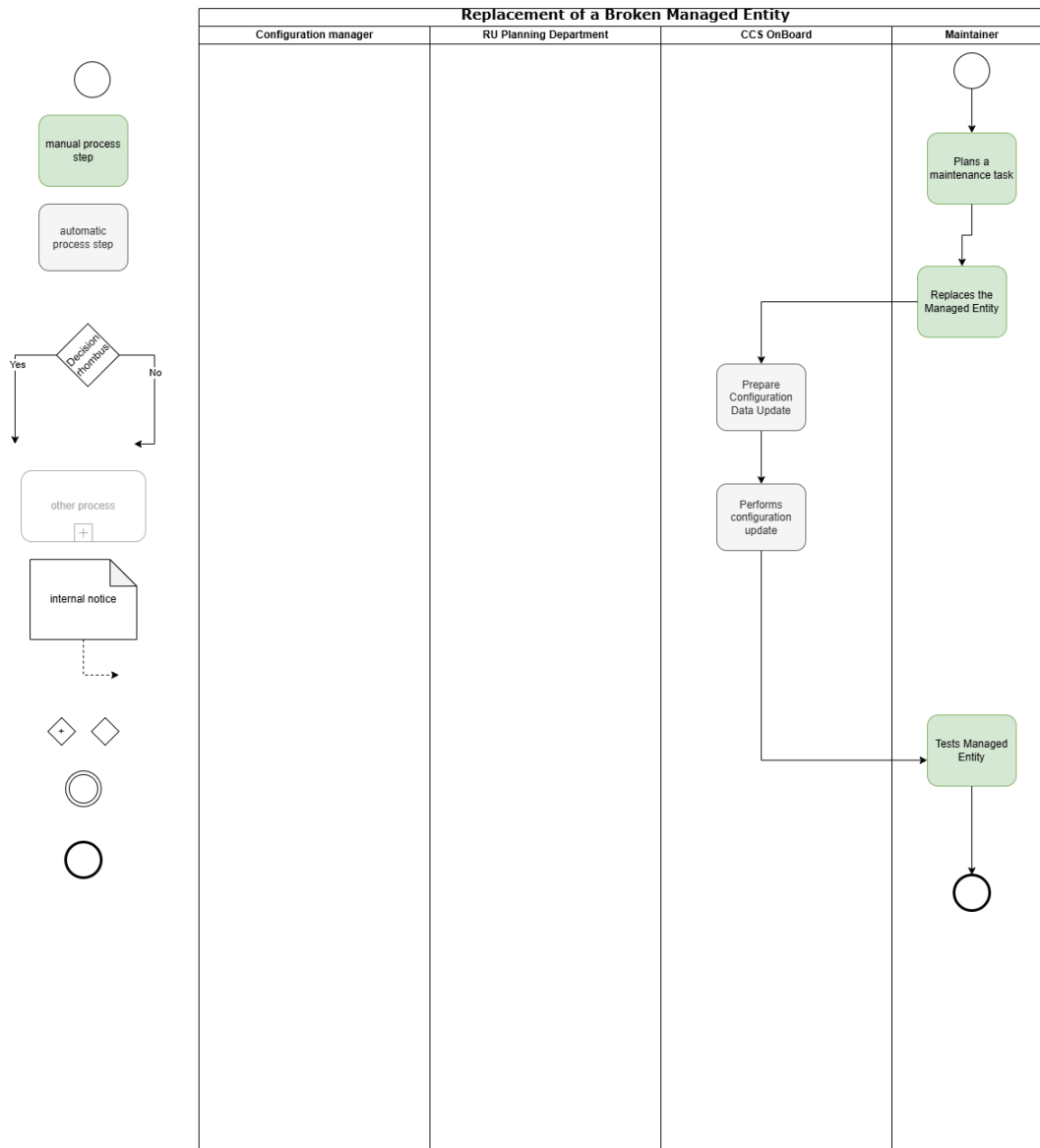


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPT2TS-133605]

4.9.1 Operational activities

SPT2TS-133610 - Plan a maintenance task

The Maintainer plans the maintenance task for replacing the broken Managed Entity and coordinates the required on-site activities.

SPT2TS-133969 - Replaces the Managed Entity

The Maintainer replaces the old Managed Entity with the new one.

SPT2TS-133970 - Prepare Configuration Data Update

On receiving the Configuration Data, the CCS On-Board prepares the update by performing necessary steps like

preloading

SPT2TS-133607 - Performs configuration update

On having all the required triggers and safety measures in place to perform the update, the CCS On-Board performs the update. This includes activation and deactivation of the Configuration Data.

SPT2TS-133608 - Tests Managed Entity

The Maintainer tests the Managed Entity after the configuration update activity to verify that it works correctly.

4.10 Decommissioning of a Managed Entity (Trackside)

Decommissioning of a Managed Entity

Op.Postcondition	- Active version of Configuration data is deactivated. - Managed Entity is decommissioned.
Op.Precondition	- Managed Entity is running. - Managed Entity has active version of configuration data.
Op.Rationale	- Decommission Managed Entity

diagram of process activate Configuration Data (Trackside) for use case : Decommissioning of a Managed Entity

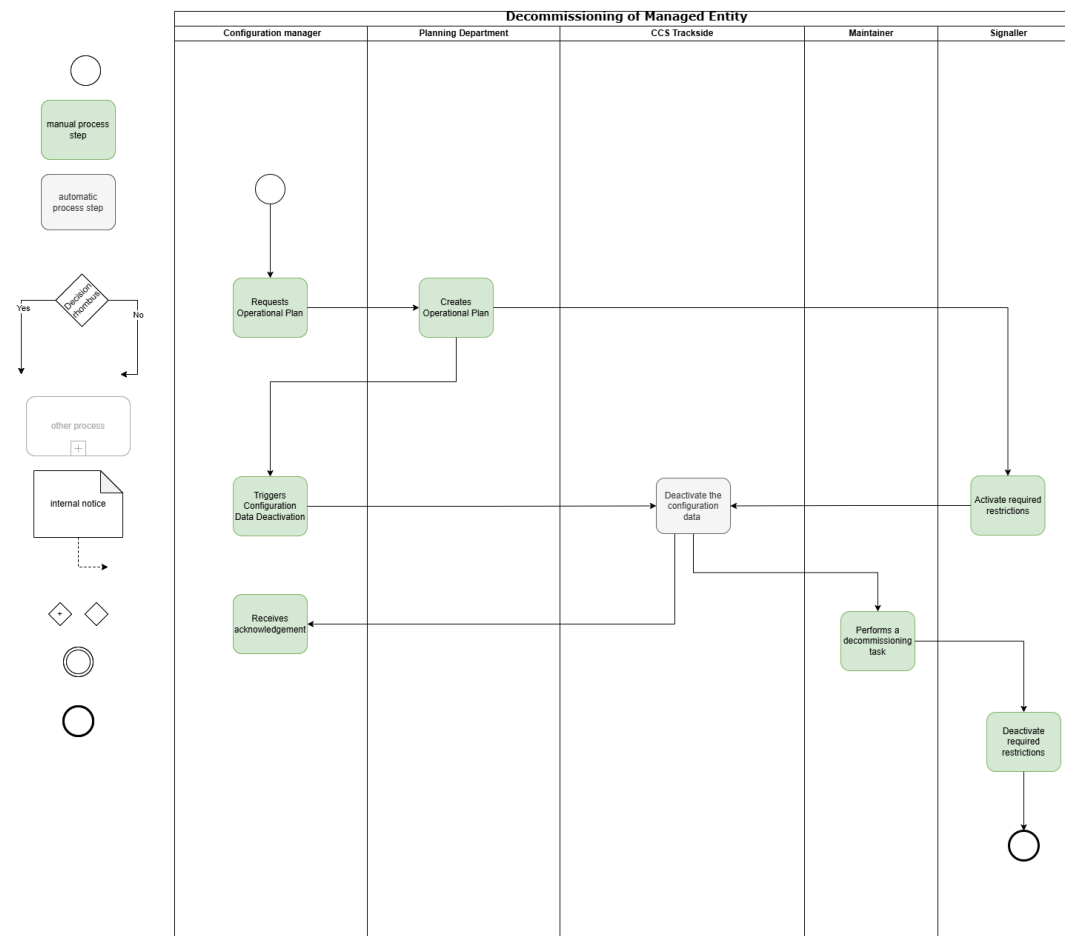


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPP-37551]

4.10.1 Operational activities

SPP-48025 - Performs a decommissioning task

The Maintainer performs the decommissioning task (e.g., preparing the equipment for physical removal or disposal) for the affected Managed Entity and coordinates the required on-site activities.

SPP-48026 - Activates required restrictions

The Signaller activates the required operational restrictions (e.g. planned temporary speed restriction/ working area) to secure the affected Managed Entity before the configuration deactivation activities are performed.

See,

 [S2 t07 403 Activate Planned Temporary Speed Restriction](#)

 [S2 t09 403B_on Activate working area with handheld terminal](#)

 [S2 T17 403E_Activate working area without handheld terminal](#)

SPP-54701 - Requests Operational Plan

The Configuration Manager requests the planning department for an operational plan for performing the deactivation of the Configuration Data.

SPP-54702 - Creates Operational Plan

The Planning Department creates based on the needs CCS System the operational plan for the deactivation of Configuration Data.

SPP-54703 - Triggers Configuration Data Deactivation

The Configuration Manager triggers deactivation of the Configuration Data when the defined time has been reached.

SPP-48031 - Deactivates the configuration data

The CCS Trackside deactivates the configuration data related to the Managed Entity as part of the decommissioning process.

SPP-48032 - Receives acknowledgement

The Configuration Manager receives an acknowledgement indicating the current status of the deactivation process, including any failures that occurred.

SPP-48033 - Deactivates required restrictions

The Signaller deactivates the required operational restrictions after the configuration data of the Managed Entity has been successfully deactivated.

See,

 [S2 t18 403E_Deactivate working area without handheld terminal](#)

 [S2 t10 403B_off Deactivate working area with handheld terminal](#)

 [S2 t08 403 Deactivate Temporary Speed Restriction](#)

4.11 Decommissioning of a Managed Entity (On-Board)

Decommissioning of a Managed Entity (On-Board)

Decommissioning of a Managed Entity (On-Board)

Op.Postcondition	- Active version of Configuration data is deactivated. - Managed Entity is decommissioned.
Op.Precondition	- Managed Entity is running. - Managed Entity has active version of configuration data.
Op.Rationale	- Decommission Managed Entity

diagram template inside ->

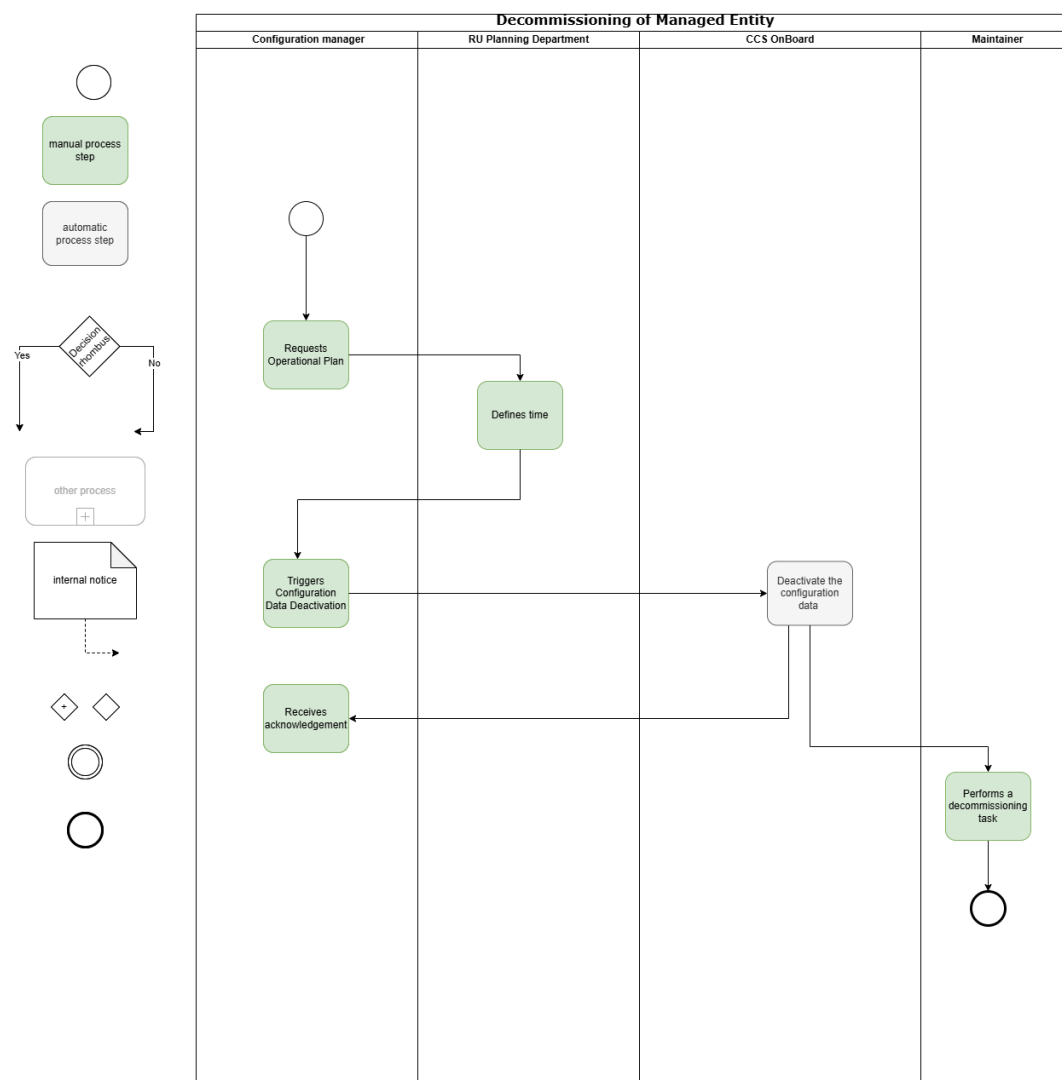


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPT2TS-133615]

4.11.1 Operational activities

SPT2TS-133619 - Performs a decommissioning task

The Maintainer performs the decommissioning task (e.g., preparing the equipment for physical removal or disposal) for the affected Managed Entity and coordinates the required on-site activities

SPT2TS-133973 - Requests Operational Plan

The Configuration Manager requests the RU planning department for an operational plan for performing the deactivation of the Configuration Data.

SPT2TS-133974 - Define Time

The RU Planning Department defines based on the needs CCS System the time for the deactivation of Configuration Data.

SPT2TS-133975 - Triggers Configuration Data Deactivation

The Configuration Manager triggers deactivation of the Configuration Data when the defined time has been reached.

SPT2TS-133971 - Deactivates the configuration data

The CCS On-Board deactivates the configuration data related to the Managed Entity as part of the decommissioning process.

SPT2TS-133972 - Receives acknowledgement

The Configuration Manager receives an acknowledgement indicating the current status of the deactivation process, including any failures that occurred.

4.12 Perform System Asset Diagnosis for Trackside

Perform System Asset Diagnosis for Trackside

Perform System Asset Diagnosis for Trackside

Op.Postcondition	The CCS Trackside asset state has been evaluated and, where required, the corresponding maintenance task has been planned and carried out.
Op.Precondition	The CCS Trackside asset is in operation and the diagnostic/monitoring capability is available.
Op.Rationale	Assess the CCS Trackside asset state and, where a maintenance need is identified, support the planning and execution of the required maintenance task.

diagram of process for Perform System Asset Diagnosis for Trackside

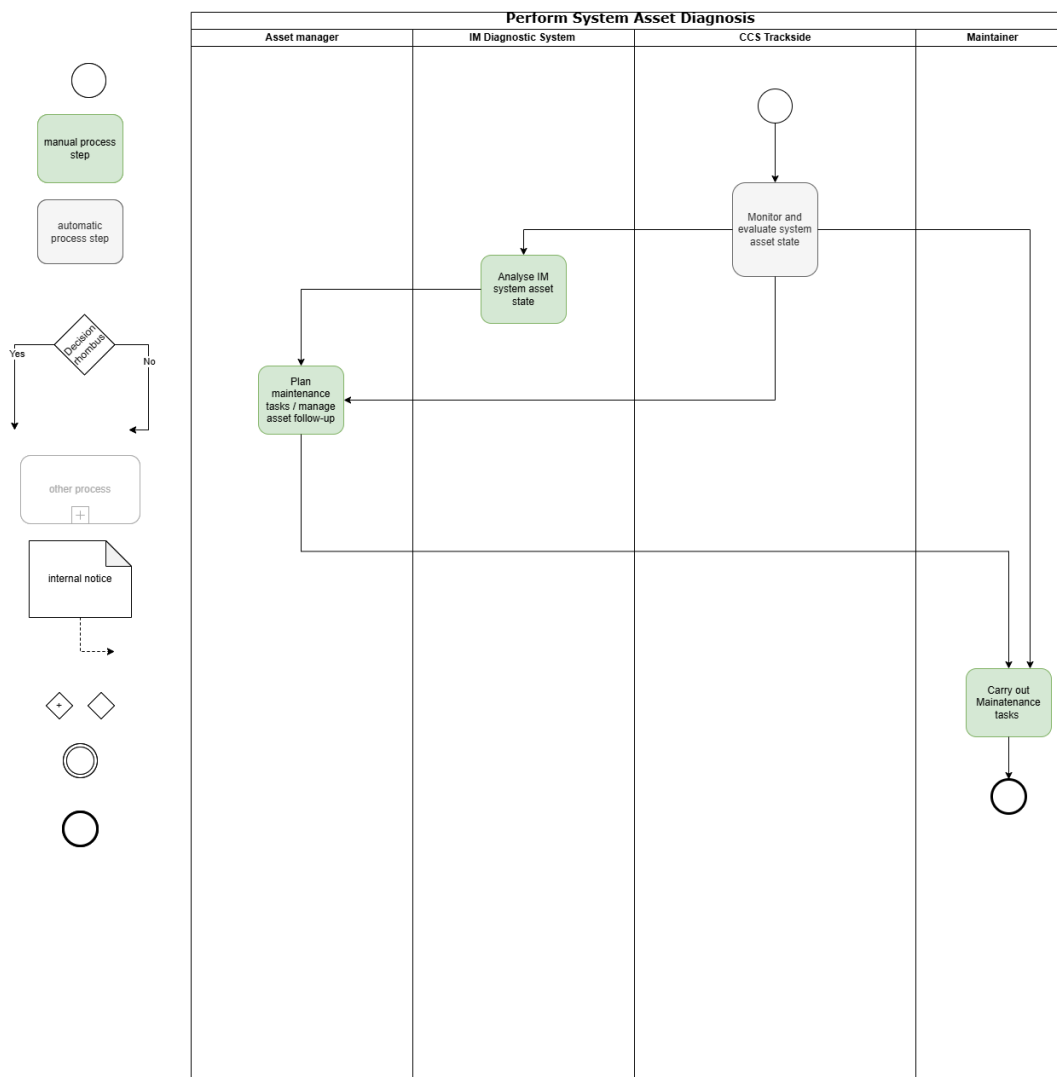


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPT2TS-133629]

4.12.1 Operational activities

SPT2TS-133637 - Monitor and evaluate system asset state

The CCS Trackside monitors and evaluates the system asset state based on internally available diagnostic and monitoring data. The evaluated asset state is made available to the relevant operational actors for further analysis and maintenance planning.

SPT2TS-133638 - Analyse IM asset state

The IM Diagnostic System receives the system asset state information and analyses the infrastructure-related asset state. The analysis provides diagnostic information that supports the identification of potential issues, degraded asset conditions, or maintenance needs.

SPT2TS-133634 - Carry out Maintenance tasks

The Maintainer carries out the maintenance task on the affected CCS Trackside asset. After the maintenance task is completed, the result is reflected back into the diagnostic and asset state information through the available diagnostic or monitoring data.

SPT2TS-133635 - Plan maintenance tasks / manage asset follow-up

The Asset Manager uses the evaluated asset state and maintenance result to plan maintenance tasks and manage asset-related follow-up activities. This ensures that the asset condition is tracked and that further actions can be planned if required.

4.13 Perform System Asset Diagnosis for On-Board

Perform System Asset Diagnosis for On-Board

Perform System Asset Diagnosis for On-Board

Op.Postcondition	The CCS On-Board asset state has been evaluated and, where required, the corresponding maintenance task has been planned and carried out.
Op.Precondition	The CCS On-Board asset is in operation and the diagnostic/monitoring capability is available.
Op.Rationale	Assess the CCS On-Board asset state and, where a maintenance need is identified, support the planning and execution of the required maintenance task.

diagram template inside ->

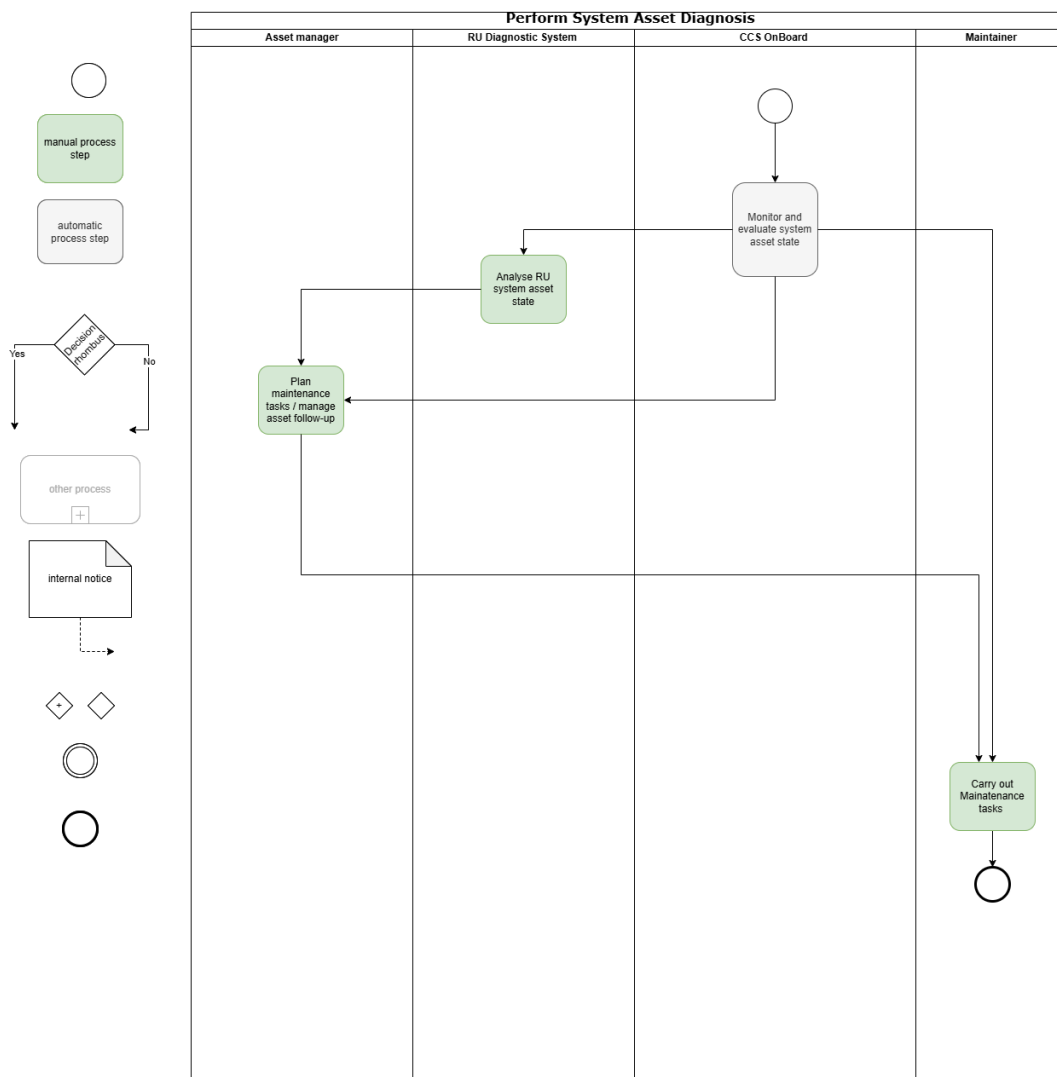


diagram template inside -> [SPP-9268 - S2: Diagram template and best practices](#)

Note for reviewers: the diagram is for visual support, the full description and main reference shall be the "operational activity" work items. [SPT2TS-133632]

4.13.1 Operational activities

SPT2TS-133644 - Monitor and evaluate system asset state

The CCS On-board monitors and evaluates the system asset state based on internally available diagnostic and monitoring data. The evaluated asset state is made available to the relevant operational actors for further analysis and maintenance planning.

SPT2TS-133645 - Analyse RU asset state

The RU Diagnostic System receives the system asset state information and analyses the On-board related asset state. The analysis provides diagnostic information that supports the identification of potential issues, degraded asset conditions, or maintenance needs.

SPT2TS-133641 - Carry out Maintenance tasks

The Maintainer carries out the maintenance task on the affected CCS On-board asset. After the maintenance task is

completed, the result is reflected back into the diagnostic and asset state information.

SPT2TS-133642 - Plan maintenance tasks / manage asset follow-up

The Asset Manager uses the evaluated asset state and maintenance result to plan maintenance tasks and manage asset-related follow-up activities. This ensures that the asset condition is tracked and that further actions can be planned if required.

5 Requirements and Constraints for External Systems and Processes

SPT2TS-133647 - Purpose of this chapter

This chapter defines the constraints and requirements that are identified by the CONEMP operational processes but need to be fulfilled by external processes, actors, or systems. These items are not fully implemented within the CONEMP processes themselves; however, they are required as inputs, preconditions, or supporting conditions to execute the operational processes described in Chapter 4.

Validated and authorised configuration data by Data Preparation shall be availab...

Validated and authorised configuration data by Data Preparation shall be available before commissioning, configuration update, or change execution is triggered.

Configuration data prepared by Data Preparation shall be versioned, traceable, a...

Configuration data prepared by Data Preparation shall be versioned, traceable, and linked to the affected system, or managed entity according to EN50716.

Physical installation, site readiness, and required hardware connectivity shall...

Physical installation, site readiness, and required hardware connectivity shall be completed by Maintainer according to dedicated processes before base configuration or commissioning starts.

Security commissioning process shall provide the required operational prerequisi...

Security commissioning process shall provide the required operational prerequisites such as network access, certificates/keys, authorised accounts, and minimum security baseline.

A defined update or change time shall be agreed before executing configuration u...

A defined update or change time shall be agreed before executing configuration updates that may affect safe railway operation according to the process defined by PRAMS in [PRAMS Plan - Evolution management of safety-related modular systems - Process and organisation](#).

Required operational restrictions shall be planned and activated before maintena...

Required operational restrictions shall be planned and activated before maintenance or Configuration update activities are executed, where these activities may affect safe operation.

Diagnostic and monitoring data shall be provided in a way that supports evaluati...

Diagnostic and monitoring data shall be provided in a way that supports evaluation of the health and status of CCS assets without interfering with safe railway operations.

6 Appendix

6.1 Standards and references

EN 50716:2023 — Railway Applications — Requirements for software development.