EU-RAIL SYSTEM PILLAR

Release note

Release note

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Abstract	This document describes the content and all the necessary informations of the SP Release ESPR1.0
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Document History

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1 Preamble

1.1 Confidentiality classification

This System Pillar Release is "external" in the sense that it is provided in the frame of the EU-RAIL Innovation Pillar Wave 2 call for tender but it is not a public release: the link to this SP release will not be explicitly published on the EU-RAIL website ; the link will only be provided to the actors implied in the Innovation Pillar Wave 2 call for tender. **[**SPP-22580 **]**

1.2 Purpose of the release

The main goal of this release is to provide the System Pillar (SP) deliverables at the progress status reached at the end of SC2.4. This release answers to the request of Innovation Pillar (IP) to get as many input as possible to prepare the call of tender for the Innovation Pillar Wave 2.
[SPP-22581 **]**

The type of the release is : external. **[**SPP-22586 **]**

1.3 Scope of the release

This Release Note describes an external delivery from System Pillar covering all the tasks from 1 to 5. The System Pillar is the “generic system integrator” for the Europe’s Rail Joint Undertaking (EU-Rail), and the architect of the future EU’s railway system. For more information, see EU-RAIL website: https://rail-research.europa.eu/ **[**SPP-22583 **]**

This release includes updates of previously released documents and several new documents.
[SPP-22584 **]**

The list of deviverables is specified in the sections dedicated to each domain or task. In addition, the release contains a .xls file named *SPCoregroupPublic_Release note_Appendix_Deliverable_List* which gives the list of all the deliverables of the release referenced both with the title of the document and with the name of the file. **[**SPP-30101 **]**

This release specifies the STIP items that are addressed. The STIP version that has been used is STIP V2. **[**SPP-22585 **]**

1.4 Disclaimer

From a temporal perspective, this SP release corresponds approximately to the midpoint of the SP contract. Consequently, several deliverables are still in draft form and, despite the synchronisation efforts of the ARC domain, there may still be some inconsistencies between deliverables produced by different tasks or domains. **[**SPP-28105 **]**

For this first SP release, the hyperlinks contained in the documents have been disabled, as they may refer to internal SP documents. However, this should not affect the comprehension of the documents.
[SPP-28106 **]**

2 CoreGroup

2.1 Release content

The "Common Business Objectives" and the "Operational Vision" are documents that were decided in the System Pillar Steering Group in November 2022. They gave the direction and task for all specification work in the System Pillar. Specfication in this release is directly or indirectly derived from these main policies. **[**SPP-30506 **]**

2.2 Restrictions of use and Application conditions

none **[**SPP-30508 **]**

2.3 Capabilities addressed by the release

none **[**SPP-30509 **]**

2.4 STIP items addressed by the release

none **[**SPP-30510 **]**

2.5 Main enhancements from the previous release

Unchanged. **[**SPP-30511 **]**

2.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released	CBO-branch	Common Business Objectives	724218 - ESPR1.0
Released	Operational Vision CMS_TMS Part	Operational Vision CMS_TMS Part	724221 - ESPR1.0
Published	Operational Vision CCS Part	Operational Vision CCS Part	724219 - ESPR1.0

[SPP-30507 **]**

2.7 More information

none **[**SPP-30512 **]**

2.8 Problems Fixed

Documents are freezed since November 2022. **[**SPP-30513 **]**

2.9 Known open problems, issues

none. **[**SPP-30514 **]**

3 EET

3.1 Release content

This release contains the documents produced by *System Pillar Engineering Environment Team (EET):*

- the System Engineering Management Plan, including modelling guidelines
- the Requirements Management Plan
- the Quality Management Plan
- the Configuration Management Plan
- References and Glossary Guidelines

with their annexes and appendix, and

- list of documents types with their templates that need to be used in System Pillar documents.

These documents outline the processes and methods to be used within System Pillar for the creation of models and deliverables. **[**SPP-29515 **]**

3.2 Restrictions of use and Application conditions

Not applicable.

3.3 Capabilities addressed by the release

Not applicable.

3.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP Item	Coverage (full|partial)	Comment
STIP_141	partial	SP-Glossary

[SPP-29852 **]**

3.5 Main enhancements from the previous release

- Enhanced project plans.
- Definition of Document Review and Approval Process.
- Definition of Change Management Process that will have to be applied from now.
- Refinement of MBSE Guidelines.
- Refinement of glossary and references guidelines.
- Templates

For more information see SPPR-5942 - Main changes between SEMP V1 and V2 in Systems Engineering Management Plan - 01 Main and more in the document itself. **[**SPP-29516 **]**

3.6 Deliverables

Document Status	Document ID	Document name	Name of Document Baseline in Polarion
In review by SP	Definitions - Publish	Definitions - Publish	ESPR1.0

[SPP-30251 **]**

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released	Configuration Management Plan	Configuration Management Plan	720152 - Version 2.0 - Released
Released	Configuration Management Plan - Annex A System Pillar Release Creation Process	Configuration Management Plan - Annex A System Pillar Release Creation Process	722273 - Version 2.0 - Released
Released	Configuration Management Plan - Annex B Change Control Management Process	Configuration Management Plan - Annex B Change Control Management Process	722277 - Version 2.0 - Released
Released	SEMP Process 0945-Review and Approval Process	Configuration Management Plan - Annex C Document Management Plan, Review and Approval Process	722284 - Version 2.0 - Released
Released	Glossary Usage Guidelines	Glossary Usage Guidelines	722287 - Version 2.0 - Released
Released	References Usage Guidelines	References Usage Guidelines	722290 - Version 2.0 - Released
Released	Requirements Management Plan	Requirements Management Plan	723395 - Version 1.0 - Released
Released	SEMP Annex R1 - Requirements Rules	Requirements Management Plan - Annex R1 Requirements Rules	722327 - Version 2.0 - Released
Released	SEMP Systems Engineering Management Plan	Systems Engineering Management Plan - 01 Main	722590 - Version 4.0 - Released
Released	System Pillar MBSE Methodology Handbook	Systems Engineering Management Plan - 02 MBSE Methodology Handbook	722568 - Version 1.0 - Released
Released	SEMP process 01-Team Management	Systems Engineering Management Plan - Annex 01 Team Management Process	722562 - Version 3.0 - Released
Released	SEMP process 03 Requirements Definition Process	Systems Engineering Management Plan - Annex 03 Requirements Definition Process	722555 - Version 1.0 - Released
Released	SEMP process 04-Architecture	Systems Engineering Management Plan - Annex 04 Architecture Definition Process	722539 - Version 2.0 - Released
Released	List of System Pillar deliverables	Systems Engineering Management Plan - Annex L List of System Pillar Deliverables	722512 - Version 1.0 - Released
Released	SEMP Annex M1 Capella element rules		722475 - Version 2.0 - Released

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
		Systems Engineering Management Plan - Annex M1 Capella Model Element Rules	
Released	SEMP Annex M2 Viewpoint guidelines	Systems Engineering Management Plan - Annex M2 Viewpoint Guidelines	722433 - Version 1.0 - Released
Released	Mirror Group Guideline	Systems Engineering Management Plan - Annex MG Mirror Group Guideline	722698 - Version 1.0 - Released
Released	Annex T Trade-off Analysis	Systems Engineering Management Plan - Annex T Trade-Off Analysis	723403 - Version 1.0 - Released
Released	Template - System Architecture Description	Template - System Architecture Description	722401 - Version 1.0 - Released
Released	Template - System Concept	Template - System Concept	722384 - Version 1.0 - Released
Released	Template - System Definition	Template - System Definition	722377 - Version 1.0 - Released
Released	Template - System Interface Description	Template - System Interface Description	722351 - Version 1.0 - Released
Released	Template - System Requirements Specification	Template - System Requirements Specification	722341 - Version 1.0 - Released
In Review by System Pillar	Quality Management Plan	Quality Management Plan	714939 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	System Pillar Engineering Tools	Systems Engineering Management Plan - 03 Engineering Tools	723585 - Version 1.0 - In Review by System Pillar

[SPP-29511 **]**

3.7 More information

None.

3.8 Problems Fixed

Improvements of structure and readability in order to better support the work of the domains.
[SPP-29627 **]**

3.9 Known open problems, issues

Some domains still not follow the SEMP or need further support to establish a common way of working. In the next year contract EET wants to work more together with these domains and help and support them to achieve their goals inline with the SEMP documentation. **[**SPP-29626 **]**

4 PRAMS

4.1 Release content

This release contains different types of documents from the System Pillar PRAMS Domain. The first set of documents, defined as "internal", refers to artefacts that are defined by the PRAMS and intended to be used within System Pillar Domains activities. The second set of documents, defined as "external", refers to artefacts which aim at enabling an efficient deployment of the System Pillar Reference Architecture. They will be used by stakeholders developing the building block or integrating systems developed according to the System Pillar set of specifications. This release includes new versions of documents produced during SC2.3 contract with extended scope as well as new documents during SC2.4. **[**SPP-27744 **]**

4.2 Restrictions of use and Application conditions

The PRAMS team has identified the following restrictions of use and application conditions for their related documents:

- **EU-RAIL Hazard Database**: the current version of the database integrates a large list of accidents and hazards at different levels. However, the formal traceability between them is under consolidation in SC2.4 and will be finalised in SC2.6. This document is intended "internal".
  Note: the Hazard Database is divided in four documents
- **PRAM KPI**: this document defines the Performance KPIs and Performance Targets for a modular railway architecture and analyses the RAM Performance needed to reach overall Performance Targets. This version focuses on high level KPI to be used by Infrastructure Managers (IM) and Railway Undertakings (RU). They do not cover the CCS system and its related building blocks. This document is intended "external".
- **Requirements for CBM**: this document specifies a set of CBM requirements and related inputs for STIP (including examples and use cases), taking into consideration the scope, the concept and the limitations of CBM. The present version does not cover the safety aspects of CBM (i.e. conditions to replace Safety Integrity Level (SILx) Safety Related Application Conditions (SRAC) by diagnostics data). This document is intended "external".

[SPP-27745 **]**

4.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified| unchanged)	Comment
SPT1RS-232 - simplified standard safety components	unchanged	Used as basis for PRAMS documents
SPT1RS-230 - safety logic with generic safety approval	unchanged	Used as basis for PRAMS documents
SPT1RS-229 - seamless and selective exchange of components under production	unchanged	Used as basis for PRAMS documents
SPT1RS-192 - reusable right first time work	unchanged	Used as basis for PRAMS documents
SPT1RS-154 - availability, robustness, reliability	unchanged	Used as basis for PRAMS documents
SPT1RS-251 - rapid return of experience	unchanged	Used as basis for PRAMS documents

[SPP-22622 **]**

4.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full| partial)	Comment
STIP_80	partial	All activities are not addressed up to SC2.4. Last activities to be developed in SC2.6. Current version available here: ERJU Hazard Database
STIP_82	partial	Partial coverage only. Activities stopped in SC2.4 due to budget reallocation. System Concept - Performance KPI definition
STIP_83	partial	Partial coverage only. Activities stopped in SC2.4 due to budget reallocation. System Concept - Performance KPI definition
STIP_84	partial	Partial coverage only. Activities stopped in SC2.4 due to budget reallocation. System Requirements Specification - Condition Based Maintenance Deployment

[SPP-22624 **]**

4.5 Main enhancements from the previous release

N/A (first release). **[**SPP-22625 **]**

4.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Progress	PRAMS_Log_Main_Hazard_Database	PRAMS Log - Main ERJU Hazard Database	725208 - PRAMS_ESPR1.0
In Progress	PRAMS_Log_Part-1_Accidents	PRAMS Log - Part 1 Accidents	725206 - PRAMS_ESPR1.0
In Progress	PRAMS_Log_Part-2_Operational_Hazards	PRAMS Log - Part 2 Operational Hazards	725190 - PRAMS_ESPR1.0
In Progress	PRAMS_Log_Part-3_System_Hazards	PRAMS Log - Part 3 System Hazards	725187 - PRAMS_ESPR1.0
In Progress	System_Concept_Performance_KPI_definition	System Concept - Performance KPI definition	725211 - PRAMS_ESPR1.0
In Progress	System_Requirements_Specification_Condition_Based_Maintenance_Deployment	System Requirements Specification - Condition Based Maintenance Deployment	725212 - PRAMS_ESPR1.0

[SPP-25217 **]**

4.7 More information

None.

4.8 Problems Fixed

N/A (first release). **[**SPP-22623 **]**

4.9 Known open problems, issues

See the open points in the appendix SPP-28691 - PRAMS open points
[SPP-28692 **]**

5 Security

5.1 Release content

The release is implementing the requirements from EU regulations and directives (NIS2, CSA, CRA, RED) and international standards (ISO 27001, IEC 62443, CENELEC TS 50701 / IEC PT 63452). This simplifies achieving compliance to these standards significantly. The requirements are implemented by four main specifications (Secure Component Specification, Secure Communication Specification, Shared Cybersecurity Services Specification, Secure Program Requirements) and seven supporting documents. **[**SPP-22628 **]**

5.2 Restrictions of use and Application conditions

The Cybersecurity specification have following restrictions: **[**SPP-23521 **]**

- Compliance tracing to IEC PT 63452 uses an intermediate draft version from Jan 2025. The final standard is expected later in 2025. The Cybersecurity specification will be updated once the standard is finalised.
- For EU CRA regulation (Cyber Resilience Act), harmonised standards are being developed. Once draft and final version will be available, an update of the Cyberseucrity specification is foreseen.
- Cybersecurity certification aspects and EU CE conformity requirements are not included in this version of
  the specifications. This aspect will be investigated in future work of the Cybersecurity domain.

5.3 Capabilities addressed by the release

See § Release content. **[**SPP-30663 **]**

5.4 STIP items addressed by the release

The STIP V1 items covered by this release are:

STIP item	Coverage (full|partial)	Comment
STIP_75	full	Shared Cybersecurity Servces Specification
STIP_76	full	Secure Communication Specification
STIP_77	full	Secure Program Requirements
STIP_78	full	Secure Component Specification

[SPP-22631 **]**

5.5 Main enhancements from the previous release

No previous release. **[**SPP-23522 **]**

5.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Open	SP-SEC-Taxonomy-References	10 Taxonomy and References	496756 - V1.0 Release
Open	SP-SEC-CompSpec	20 Secure Component Specification	496762 - V1.0 Release

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Open	SP-SEC-CommSpec	21 Secure Communication Specification	496771 - V1.0 Release
Open	SP-SEC-ServSpec	22 Shared Cybersecurity Services Specification	496783 - V1.0 Release
Open	SP-SEC-PrgmReq	23 Security Program Requirements	496788 - V1.0 Release
Open	SP-SEC-RegCompl	30 Regulatory Compliance	496799 - V1.0 Release
Open	SP-SEC-PrdDocTmpl	31 Product Documentation Template	496800 - V1.0 Release
Open	SP-SEC-SuppEssFunc	32 Support for Essential Functions	496805 - V1.0 Release
Open	SP-SEC-InitRiskAss	40 Initial Risk Assessment	496810 - V1.0 Release
Open	SP-SEC-ThreatCat	41 Threat Catalogue	496815 - V1.0 Release
Open	SP-SEC-SysDesc	42 System Description	496821 - V1.0 Release

[SPP-25225]

Although the document status in the table above is indicated as "open', the documents have been approved as part of the 1.0 release in March 2025. They have been published by Cybersecurity Domain as "EU-Rail Cybersecurity Specification V1.0" in March 2025 and are considered authoritative. [SPP-30244]

5.7 More information

5.7.1 Document Maintenance

After release, the released documents immediately enter the maintenance phase. Maintenance includes error corrections and general improvement of the documents. Please send your change requests to the following email address:
cybersecurity.review@ertms.be [SPP-23519]

5.7.2 Release by Cybersecurity Domain

This release has been previsouly published by Cybersecurity Domain as "Cybersecurity Specification V1.0" in March 2025 and is available publicy on the EU-RAIL website . The release contains known open problems (see 5.9 - Known open problems, issues). [SPP-23518]

5.8 Problems Fixed

No previous release. [SPP-23517]

5.9 Known open problems, issues

CR or Issue Id	Issue Severity	Change Request or Issue title	Scheduled release for correction	Comment
SPPRAMSS-13988	low	Avoid duplicate certification	Jan 2026	Certification discussion planned for 2025 in SP Cybersecurity domain
SPPRAMSS-13987	low	Align with upcoming CRA horizontal standard	Jan 2026	waiting for draft of horizontal standard (April / Mai 2025)
SPPRAMS-14792	critical	Errors in SCS-IAM interface	Jan 2026	errors solved internally, to be published in next release
multiple	normal	various improvements and clarifications (both technical and editorial)	Jan 2026	change management still in progress

[SPP-22630]

6 Task 1 (Railway system)

6.1 Release content

The goals assigned to the System Pillar Task 1 are:

- Conduct an as-is analysis of the railway system, considering operational, functional, logical & physical assets,

- Identify the pain points for selected operational interaction processes and derive a requirement set reflecting the Common Business Objectives,

- Specify the high-level Business Process Architecture and Operational Design (Organisational needs, Generic automation needs, …) for the (to-be) Railway System,

- Assess migration roadmap of the Tasks 2...n regarding overall Business Process Architecture and Operational Design consistency

- Assign high-level input requirements to lower-level tasks,

- Define requirements for reduction of total cost of ownership.

The Task 1 release is made of reports based on Architecture modeling with Arcadia methods and Capability analysis.

6.2 Restrictions of use and Application conditions

None

6.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified| unchanged)	Comment
Operate Train	new	
Manage Energy	new	
Maintain and Monitor Infrastructure (including Renew and Update Infrastructure)	new	

[SPP-22635 **]**

6.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full|partial)	Comment
STIP_2.0_192	partial	To be validated with STIP_2.0

[SPP-22643 **]**

6.5 Main enhancements from the previous release

N/A (first release). **[**SPP-22644 **]**

6.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Progress	Stakeholder Requirements Specification Appendix Pain points list	Stakeholder Requirements Specification Appendix : Pain points list	724168 - 1.0 - In Progress
In Progress	Stakeholder Requirements Specification Maintain and Monitor Infrastructure Capability	Stakeholder Requirements Specification : Maintain & Monitor Infrastructure Capability	724240 - 1.0 - In Progress
In Progress	Stakeholder Requirements Specification Maintain and Monitor Rolling Stock Capability	Stakeholder Requirements Specification : Maintain & Monitor Rolling Stock Capability	724236 - 1.0 - In Progress
In Progress	Stakeholder Requirements Specification Manage Energy Capability	Stakeholder Requirements Specification : Manage Energy Capability	724260 - 1.0 - In Progress
In Progress	Stakeholder Requirements Specification Operate Train Capability	Stakeholder Requirements Specification : Operate Train Capability	724230 - 1.0 - In Progress
In Progress	Railwail System Architecture Model Description	System Architecture Description- Railways_System_Architecture_ Model_Description - Main	724249 - 1.0 - In Progress
Open	Global Task 1 Architecture Report Methodology	System Architecture Description- Railways_System_Architecture_ Methodology	724248 - 1.0 - In Progress

[SPP-25226 **]**

6.7 More information

None.

6.8 Problems Fixed

N/A (first release). **[**SPP-22639 **]**

6.9 Known open problems, issues

The pain points list is presented in a deliverable of the Task 1 release : Stakeholder Requirements Specification Appendix : Pain points list .

7 Task 2 (CCS) - ARC domain

7.1 Release content

The ARC domain release is made of deliverables from two activities : architecture coordination and release coordination. **[**SPP-24080 **]**

7.1.1 Architecture coordination

System Concept CCS
This document provides the highest level of description of the CCS System. It addresses the following topics :

- Logical architecture (on System Level 3) of the CCS Reference: coherent overview on the CCS reference architecture identifying the TSI relevant parts.
- Specify the common CCS architecture including all interfaces relevant for: · interoperability, · functional allocation distributed across systems, overview on Level 3 interface standards and external interfaces , clarification of the scope and the system boundaries of the CCS system, high level control loops including high level hazards and allocation of risk acceptance for the logical components on System Level 3.
- Support of vertical PRAMS and Security design work.

[SPP-24082 **]**

Granularity Concepts and Principles
For defining an architecture the granularity has to be decided. That is to say, to which extent modularisation shall be performed in the system. This document provides criteria for defining sub-systems in an architecture and shall be a guideline to be used by the domains in defining their architecture. **[**SPP-24083 **]**

Granularity Concepts and Principles - Case study EAL
This document is an annex of System Concept_CCS Granularity Concepts and Principles and is an example how to use the template of Granularity Concepts and Principles document by means of the case study Execution & Adaptation Layer (EAL) also known as PES (Plan Execution System) in the Traffic CS architecture. **[**SPP-24084 **]**

7.1.2 Release coordination

Document and Release Plan (DRP)
The DRP shows all existing or future result documents, their current status, the release planning and packages, the publication dates , the links to the documents, the dependency analysis between the different topics and analysis on how other harmonisation topics are affected, the consistency with the released STIP work. **[**SPP-24085 **]**

Document and Release Plan - System milestones
This document is an annex of the Document and Release Plan (DRP). It aims at defining the architecture system milestones and checking them versus the STIP content. The document also includes a dependency analysis between the different topics and on how other harmonisation topics are affected. **[**SPP-24081 **]**

Release note
This document defines the content of a SP release and additional information allowing to precise the context. **[**SPP-24123 **]**

7.2 Restrictions of use and Application conditions

The CCS capabilities (system level 3) are not part of ARC release but of Traffic CS release. Therefore, there are no restrictions of use nor application conditions to state in this section (see 8 - Task 2 (CCS) - Traffic CS and Operational Design domains)

7.3 Capabilities addressed by the release

The CCS capabilities (system level 3) are not part of ARC release but of Traffic CS release. Therefore, there are no capabilities to state in this section (see 8 - Task 2 (CCS) - Traffic CS and Operational Design domains) **[**SPP-24076 **]**

7.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full|partial)	Comment
STIP_5	full	High level system description provided by the document System concept CCS

[SPP-28329 **]**

7.5 Main enhancements from the previous release

N/A (first release). **[**SPP-22642 **]**

7.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Decision by Steering Group	ARC-D2_3 Granularity Concepts and Principles - Case Study EAL	System Concept_CCS - Granularity Concepts and Principles - Case Study EAL	718837 - Version 1.1 - In Decision by Steering Group
In Progress	D04 System Pillar Document and Release Plan	Document and Release Plan - Main	714164 - 0.2 - In Progress
In Progress	SP_ARC_Roadmap_and_release_plan	Document and Release Plan - System milestones	714302 - 0.4 - In Progress
In Progress	D03 System Level 3 Architecture	System Concept_CCS - Main	714331 - 0.1 - In progress
Open	ARC-D2-3 Granularity Concepts and Principles	System Concept_CCS - Granularity Concepts and Principles - Main	389996 - ARC-D2.3 Granularity Concepts and Principles

[SPP-25227 **]**

Note : The above table is generated automatically. The document status (first column) for the main document related to Granularity should be considered as "approved by System Pillar". The difference with the value indicated is due to the fact that this document had already been made public before the version management process was implemented. **[**SPP-29525 **]**

7.7 More information

The TSI CR assessment is an activity lead by ARC domain, but the outputs of this activity (= mature TSI CR submitted to the ERA CCM process) are not part of the SP release. This activity is managed separately. **[**SPP-24077 **]**

7.8 Problems Fixed

N/A (first release). **[**SPP-22638 **]**

7.9 Known open problems, issues

Define System Releases after 2026
The current version of the DRP (Document and Release Plan) plans the last SP release in october 2026. Since the SP project will continue up to 2028, one or several additional SP releases will have to be specified in the next version of this document.
[SPP-24078 **]**

8 Task 2 (CCS) - Traffic CS and Operational Design domains

8.1 Release content

The documents included in this release are 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. **[**SPP-28710 **]**

For an introduction to Traffic CS, please refer to the SPP-28757 - Traffic CS - System Concept V1.5. **[**SPP-30256 **]**

8.1.1 Baseline Planning

The work of the OD and Traffic CS domain is organised along a consolidated list of operational scenarios, which are captured in subtopics defined in SPP-28769 - Subtopics OD and Traffic CS: Traceability Report.

The prioritisation of these topics follows a baseline approach, where each baseline represents an incremental expansion of functional scope. This means that every baseline ensures that the System Pillar outputs can already be applied to defined use cases, while progressively enabling broader applications over time.

Currently, three baselines have been defined, each marking a target application. The current release covers Baseline 0, which represents the Minimum Viable Product (MVP)

All subtopics addressed by this release are listed in 8.3 - Capabilities addressed by the release. All subtopics covered in this Release are part of Baseline 0 (SPP-30522 - Baseline 0 (MVP - Minimum Viable Product)).

Please refer to SPP-28769 - Subtopics OD and Traffic CS: Traceability Report for an overview of the topics assigned to Baseline 0 and for details on which of those are addressed in this release. **[**SPP-28726 **]**

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	

Target application	Simple lines
	Enable potential pilot line to show feasibility of harmonised SERA application with certain key new features and have return of experience

Baseline 1 (goal for 2027)

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

Baseline 2 (beyond 2027)

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

8.1.2 Design Constraints

Design constraints define the boundaries for the development of Operational Design and Traffic CS
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)

Support of ETCS System Version 2
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.

Support of ATO GoA 1+2
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.

Support of trains with and without train integrity monitoring
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.

Handling of process improvements
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.

8.2 Restrictions of use and Application conditions

Application conditions are documented within the respective deliverables included in this release of OD & Traffic CS. **[**SPP-30252 **]**

8.3 Capabilities addressed by the release

In OD and Traffic CS the work is organised around subtopics. The set of subtopics from the full scope (see 8.1 - Release content) that are covered by this release are as follows:

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.

ID	Subtopic	Change (new| modified| unchanged)	Purpose / Scope of subtopic
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.
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.

[SPP-22650 **]**

8.4 STIP items addressed by the release

The STIP items covered by this release of the OD & Traffic CS Factory are:

STIP item	Coverage (full| partial)	Comment
STIP_2: Guideline for harmonised CCS related operational processes for ETCS L2 and ATO GoA 1/2	partial	The list of subtopics, addressed by the Release of the OD & Traffic CS Factory are listed in 8.3 - Capabilities addressed by the release.
STIP_19: System requirements and interfaces ATO Trackside	partial	
STIP_101: Interface to adjacent TCS area	partial	
	partial	

STIP item	Coverage (full| partial)	Comment
STIP_102: System requirements and interfaces Advanced Protection System (APS)		
STIP_103: System requirements Execution layer and interfaces	partial	
STIP_104: Interface ATO-TS to Execution layer	partial	

Note: It is known that the subsystem names in the STIP items are not yet updated to the current Traffic CS subsystem names. **[**SPP-22666 **]**

8.5 Main enhancements from the previous release

N/A (first release). **[**SPP-22667 **]**

8.6 Deliverables

Document Status	Document ID	Document name	Name of Document Baseline in Polarion
In Review by System Pillar	Subtopics OD and Traffic CS: Traceability Report	Subtopics OD and Traffic CS: Traceability Report	ESPR1.0
In Review by System Pillar	Operational Vision Breakdown Alignment CCS System - Annex A Traceability Report	Operational Vision Breakdown Alignment CCS System - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	Stakeholder Requirements Specification CCS System - Annex A Traceability Report	Stakeholder Requirements Specification CCS System - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	System Definition CCS System - Annex A Traceability Report Operational Processes	20 System Definition CCS System - Annex A Traceability Report Operational Processes	ESPR1.0
In Review by System Pillar	Risk assessment report for the System Definition CCS System - Annex A Traceability Report	30 Risk assessment report for the System Definition CCS System - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	System Architecture Description CCS System - Annex A Traceability Report	50 System Architecture Description CCS System - Annex A Traceability Report	ESPR1.0

Document Status	Document ID	Document name	Name of Document Baseline in Polarion
In Review by System Pillar	System Architecture Description CCS System - Annex B Traceability Report Risk	50 System Architecture Description CCS System - Annex B Traceability Report Risk	ESPR1.0
In Review by System Pillar	Risk assessment report for the System Architecture Description CCS System - Annex A Traceability Report	51 Risk assessment report for the System Architecture Description CCS System - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	System Requirement Specification Traffic CS - Annex A Traceability Report	40 System Requirement Specification Traffic CS - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	System Architecture Description Traffic CS - Annex A Traceability Report	50 System Architecture Description Traffic CS - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	System Architecture Description Traffic CS - Annex B Traceability Report Risk	50 System Architecture Description Traffic CS - Annex B Traceability Report Risk	ESPR1.0
In Review by System Pillar	Risk assessment report for the System Architecture Traffic CS - Annex A Traceability Report	51 Risk assessment report for the System Architecture Traffic CS - Annex A Traceability Report	ESPR1.0
In Review by System Pillar	System Requirement Specification ETPS - Annex A Traceability Report	01 System Requirement Specification ETPS - Annex A Traceability Report	ESPR1.0

[SPP-31019 **]**

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released	Traffic CS - Major Design Decisions	Traffic CS - Major Design Decisions	725271 - Version 1.0 - Released
Released	Traffic CS System Concept	Traffic CS System Concept	725189 - Version 1.5 - Released
In Approval by System Pillar	D1 Recommendations for current rollouts	D1 Recommendations for current rollouts	725622 - Version 1.3 - In Approval by System Pillar

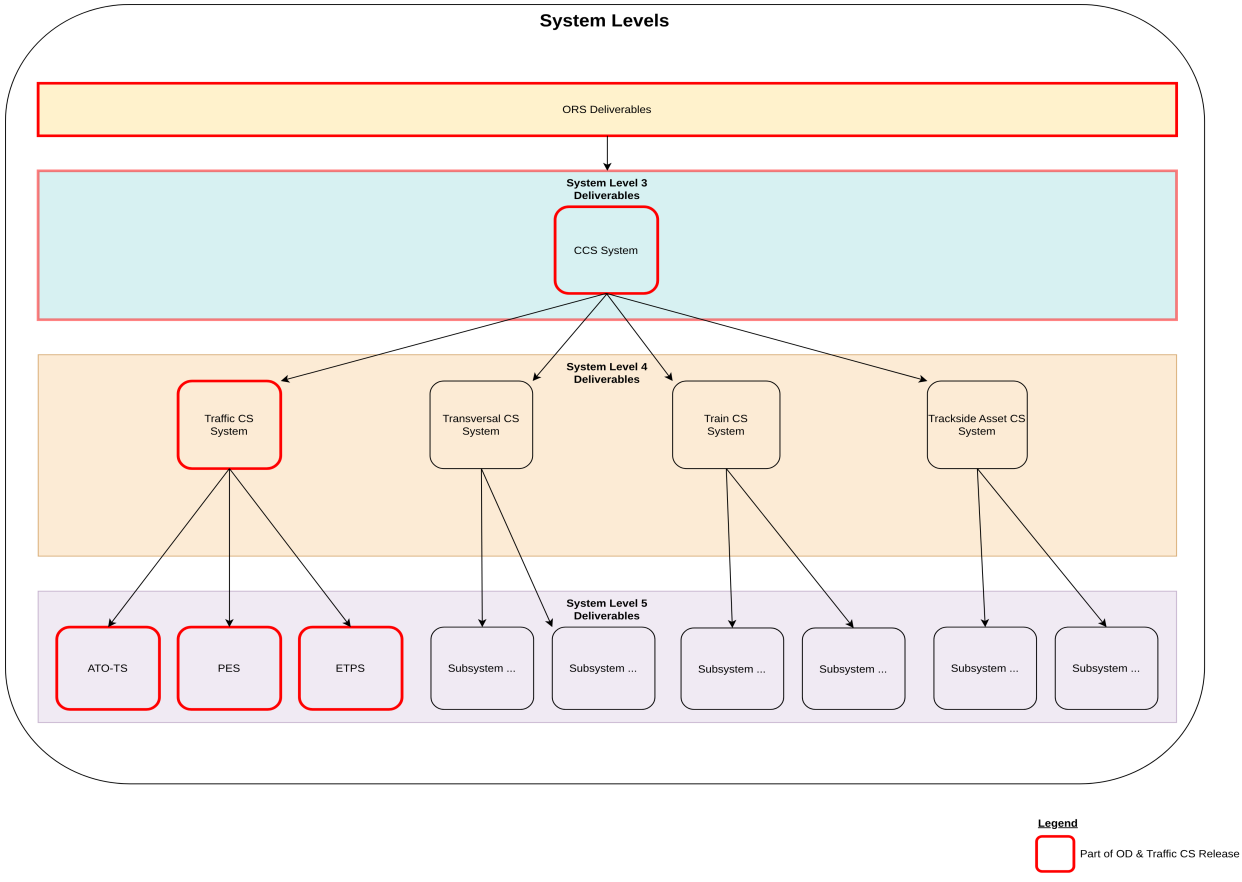
Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Review by System Pillar	System Requirement Specification TPS	01 System Requirement Specification ETPS	726182 - Version 0.4 - In Review by System Pillar
In Review by System Pillar	System Definition CCS System	20 System Definition CCS System	726093 - Version 0.3 - In Review by System Pillar
In Review by System Pillar	Traffic CS System Definition SC2_4	20 System Definition Traffic CS	726157 - Version 0.3 - In Review by System Pillar
In Review by System Pillar	30 Risk assessment report for the System Definition CCS	30 Risk assessment report for the System Definition CCS System	726035 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	System Requirement Specification Traffic CS	40 System Requirement Specification Traffic CS	726164 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	30 System Requirements Specification CCS-System	40 System Requirements Specification CCS System	726099 - Version 0.4 - In Review by System Pillar
In Review by System Pillar	System Architecture Description CCS System	50 System Architecture Description CCS System	726186 - Version 0.3 - In Review by System Pillar
In Review by System Pillar	System Architecture Description Traffic CS	50 System Architecture Description Traffic CS	726181 - Version 0.4 - In Review by System Pillar
In Review by System Pillar	51 Risk assessment report for the System Architecture Description CCS System	51 Risk assessment report for the System Architecture Description CCS System	726037 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	51 Risk assessment report for the System Architecture Traffic CS	51 Risk assessment report for the System Architecture Traffic CS	726038 - Version 0.1 - In Review by System Pillar
In Review by System Pillar	System Interface Description SCI-CMD	52 System Interface Description SCI-CMD	726185 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	D2 Migration Planning Guideline	D2 Migration Planning Guideline	725659 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	ETCS L2 Rulebook	ETCS L2 Rulebook	725941 - Version 0.3 - In Review by System Pillar
In Review by System Pillar	Operational Requirements Specification CCS System	Operational Requirements Specification CCS System	726084 - Version 0.2 - In Review by System Pillar

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Review by System Pillar	Operational Vision Breakdown Alignment CCS System	Operational Vision Breakdown Alignment CCS System	725933 - Version 0.3 - In Review by System Pillar
In Review by System Pillar	Risk Assessment report for the Operational Design	Risk Assessment report for the Operational Design CCS System	725951 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	Stakeholder System Requirements CCS System	Stakeholder Requirements Specification CCS System	726078 - Version 0.2 - In Review by System Pillar

[SPP-25228]

8.7 More information

SPP-28712 - System Levels shows the System Levels of the System Pillar and which of these System Levels (or part of it) are covered in this release. [SPP-28711]



[SPP-28712]

The illustration below (SPP-28755 - Dependencies between Configuration Items) explains in more detail the inputs and outputs of documents relating to the OD and Traffic CS factory work. [SPP-28713]

The Common Business Objectives (SPP-8684 - System Pillar Common Business Objectives (May 2022)) and the Operational Vision Part CCS (SPP-19402 - Operational Vision (Nov. 2022)) are

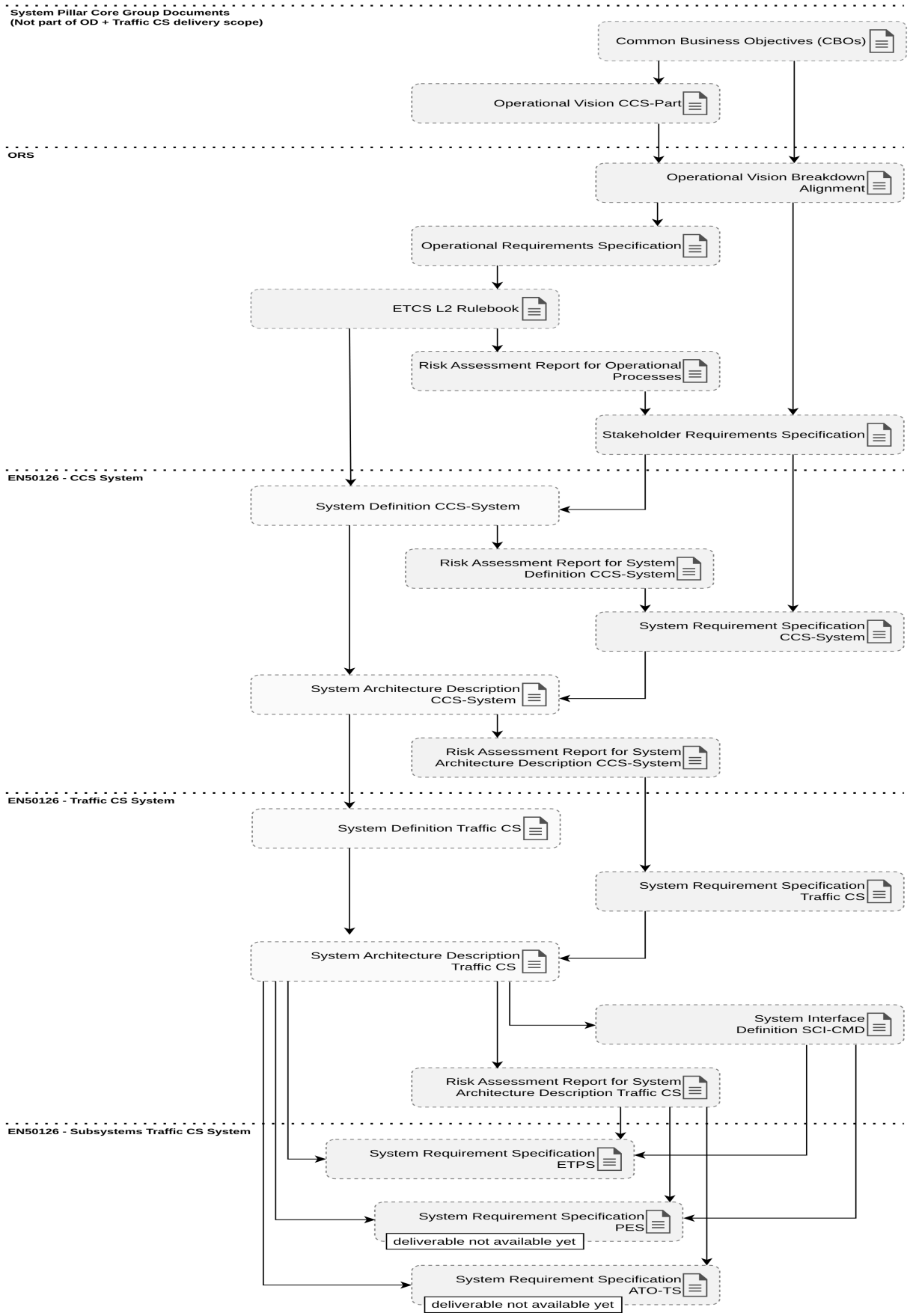
available deliverables in 2 - CoreGroup.
[SPP-30529]

The following design and migration documents are not available in the illustration below as they are not directly related OD and Traffic CS factory work driven by the subtopics:

- SPP-28757 - Traffic CS - System Concept V1.5
- SPP-18486 - Traffic CS - Major Design Decisions V1.0
- SPP-28772 - D1 Recommendations for current Rollout
- SPP-28773 - D2 Migration Planning Guideline

[SPP-30525]

This release also includes a number of reports related to deliverables. These reports are not shown in the illustration below. [SPP-30550]


System Pillar Core Group Documents
(Not part of OD + Traffic CS delivery scope)
Common Business Objectives (CBOs)
Operational Vision CCS-Part
ORS
Operational Vision Breakdown Alignment
Operational Requirements Specification
ETCS L2 Rulebook
Risk Assessment Report for Operational Processes
Stakeholder Requirements Specification
EN50126 - CCS System
System Definition CCS-System
Risk Assessment Report for System Definition CCS-System
System Requirement Specification CCS-System
System Architecture Description CCS-System
Risk Assessment Report for System Architecture Description CCS-System
EN50126 - Traffic CS System
System Definition Traffic CS
System Requirement Specification Traffic CS
System Architecture Description Traffic CS
System Interface Definition SCI-CMD
Risk Assessment Report for System Architecture Description Traffic CS
EN50126 - Subsystems Traffic CS System
System Requirement Specification ETPS
System Requirement Specification PES
deliverable not available yet
System Requirement Specification ATO-TS
deliverable not available yet

[SPP-28755]

In this release, not all content is available in all documents. The table below provides a detailed overview of how each subtopic is covered across the documents:

- **Green:** Subtopic is fully covered in the document
- **Yellow:** Subtopic is only partially covered (e.g., subsystem requirements available only as a draft).
- **Red:** Subtopic is not covered in the document
- **N/A:** Document is not applicable for the subtopic

Example:
For subtopic "t64 – Reducing Movement Permission by Signaller Action in Case of Imminent Danger", only the Operational Design and the Risk Assessment Report for Operational Processes are available. The System Definition of the CCS-System has not yet been started. **[**SPP-28714 **]**

The following configuration items from the diagram above are **not subtopic-specific** and therefore not included in the table below:

- SPP-19162 - OD_Operational Vision Breakdown Alignment CCS System_V0.3
- SPP-19164 - OD_Operational Requirements Specification CCS System_V0.2
- SPP-19163 - OD_Stakeholder Requirements Specification CCS System_V0.2
- SPP-18063 - TCS_System Requirement Specification CCS System_V0.4
- SPP-18108 - TCS_System Requirement Specification Traffic CS_V0.2

[SPP-30526 **]**

Legend:

t02 Next operational step unknown

t03 Observation while driving

t04 Resume driving after stopping short of scheduled stopping location

t05 Train departure

t06 Revoke Movement Permission

t07 Activate planned temporary speed restriction

t08 Deactivate temporary speed restriction

t11 Handling an unplanned speed restriction

t13 End of mission

t15 Arrival at scheduled stop

t16 Platform start

t62 Reducing Movement Permission by signaller action for a specific location in case of imminent danger

t64 Reducing Movement Permission by signaller action for an area in case of imminent danger

t68 Regular execution of planned train movement

Document ID /Subtopic	t02	t03	t04	t05	t06	t07	t08	t11	t13	t15	t16	t62	t64	t68
SPP-19161 - OD_ETCS L2 Rulebook_V0.3	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
SPP-19456 - OD_Risk assessment report for Operational Processes CCS System	🟢	🟢	🟢	🟡	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟡
SPP-18056 - TCS_System Definition CCS System_V0.3	N/A	🟢	🟢	🟡	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🔴	🟡
SPP-19167 - TCS_Risk assessment report for the System Definition CCS_V0.2	N/A	🟢	🟢	🔴	🟢	🟢	🟢	🟢	🔴	🔴	🔴	🔴	🔴	🟡

Document ID /Subtopic	t02	t03	t04	t05	t06	t07	t08	t11	t13	t15	t16	t62	t64	t68
SPP-18060 - TCS_System Architecture Description CCS System V0.3	N/A	🟢	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🔴	🟡
SPP-19169 - TCS_Risk assessment report for the System Architecture Description CCS System_V0.2	N/A	🟢	🟢	🔴	🟢	🟢	🟢	🔴	🔴	🔴	🔴	🔴	🔴	🟡
SPP-18107 - TCS_System Definition Traffic CS_V0.2	N/A	🟢	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🔴	🟡
SPP-18075 - TCS_System Architecture Description Traffic CS_V0.4	N/A	🟢	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🔴	N/A	🔴	🔴	🟡
SPP-18094 - System Interface Description SCI-CMD	N/A	🟢	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🔴	N/A	🔴	🔴	🟡
SPP-19171 - Risk assessment report for the System Architecture Traffic CS_V0.1	N/A	🟢	🟢	🔴	🟢	🔴	🔴	🔴	🔴	🔴	N/A	🔴	🔴	🟡
SPP-18102 - System Requirement Specification ETPS	N/A	🟡	🟡	🔴	🟡	🟡	🟡	🟡	🔴	🔴	N/A	🔴	🔴	🟡

🟢	included for subtopic
🟡	partially included for subtopic
🔴	not included for subtopic
N/A	not applicable for subtopic

[SPP-28715]

8.8 Problems Fixed

N/A (first release). [SPP-22662]

8.9 Known open problems, issues

Known open issues and outstanding problems are documented within the respective deliverables included in this release of the OD & Traffic CS Factory. [SPP-19065]

9 Task 2 (CCS) - Trackside Assets domain

9.1 Release content

This SP release contains EU-Rail Trackside Asset Specification, which are a subset of EULYNX Baseline Set 4 Release 4 (SP/EULYNX BL4R4). **[**SPP-28330 **]**

EU-Rail and EULYNX have published a common documentation release EU-Rail Trackside Asset Specification (SP/EULYNX BL4R4). This release has been prepared in close collaboration with the European rail control-command and signalling (CCS) sector under the organisation of EU-Rail System Pillar, bringing the Trackside Assets part of the EULYNX development under technical authority of the EU-Rail System Pillar.

The EU-Rail Trackside Asset Specification is a documentation update release within the EULYNX Baseline Set 4, continuing the development based on previous releases. The primary focus of this release is to incorporate remaining feedback from the industry and reach a stable maturity level on those limited topics were this was not yet fully reached in the previous releases. The release is fully integrated into the EU-Rail System Pillar. All specifications related to trackside assets and transversal functions are applicable for both the current EULYNX architecture and the future rail target architecture, agreed in the framework of the EU-Rail System Pillar, therefore published as a single set of specifications under a common publication by EULYNX and EU-Rail, delivering in total 25 specification documents. The EU-Rail System Pillar takes the role of the technical authority for the documents of the common publication and will ensure their maintenance.
[SPP-28332 **]**

9.2 Restrictions of use and Application conditions

No restrictions. **[**SPP-28333 **]**

9.3 Capabilities addressed by the release

This release covers the full capabilities of the Trackside Assets subsystems. **[**SPP-28335 **]**

9.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full|partial)	Comment
STIP_2.0_176	Full	Eu.Doc.20 Generic interface and subsystem requirements. Eu.Doc.119 Generic interface and subsystem requirements for SCI. Eu.Doc.120 Generic interface and subsystem requirements for SMI. Eu.Doc.92 Interface definition SCI. Eu.Doc.93 Interface specification SCI Generic. Eu.Doc.32 Requirements specification for subsystem Light Signal. Eu.Doc.33 Interface specification SCI-LS. Eu.Doc.36 Requirements specification for subsystem Point. Eu.Doc.38 Interface specification SCI-P. Eu.Doc.45 Requirements specification for subsystem Generic IO.

STIP item	Coverage (full|partial)	Comment
		Eu.Doc.46 Interface specification SCI-IO. Eu.Doc.43 Requirements specification for subsystem TDS. Eu.Doc.44 Interface specification SCI-TDS. Eu.Doc.108 Requirements specification for subsystem Level Crossing. Eu.Doc.109 Interface specification SCI-LC. Eu.Doc.18 Maintenance and data management specification. Eu.Doc.76 Interface definition and specification SMI. Eu.Doc.77 Interface definition SDI. Eu.Doc.78 Interface specification SDI-LS. Eu.Doc.94 Interface specification SDI Generic. Eu.Doc.80 Interface specification SDI-P. Eu.Doc.82 Interface specification SDI-IO. Eu.Doc.81 Interface specification SDI-TDS. Eu.Doc.110 Interface specification SDI-LC. Eu.Doc.100 Specification of Point of Service - Signalling.

[SPP-22664]

9.5 Main enhancements from the previous release

The enhancements are traced through Change Requests. Only the tickets with attribute 'Planned in' = 'Baseline 4 Release 4 (2025-12-31)' or 'Error correction after BL4R3' are part of this Release :

- Reference Architecture-Board
- LS-Board
- TDS-Board
- P-Board
- IO-Board
- LX-Board

[SPP-28667]

9.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released	Generic interface and subsystem requirements	Generic interface and subsystem requirements	711639 - Version 4.0 (7.A) - Released
Released	Generic interface and subsystem requirements for SCI	Generic interface and subsystem requirements for SCI	711652 - Version 1.1 (2.A) - Released
Released	Generic interface and subsystem requirements for SMI	Generic interface and subsystem requirements for SMI	711660 - Version 1.2 (1.A) - Released
Released	Interface definition and specification SMI	Interface definition and specification SMI	712568 - Version 2.3 (1.A) - Released
	Interface definition SCI		

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released		Interface definition SCI	712573 - Version 4.3 (1.A) - Released
Released	Interface definition SDI	Interface definition SDI	712578 - Version 3.3 (1.A) - Released
Released	Interface specification SCI Generic	Interface specification SCI Generic	712583 - Version 3.3 (1.A) - Released
Released	Interface specification SCI-IO	Interface specification SCI-IO	712595 - Version 4.0 (4.A) - Released
Released	Interface specification SCI-LC	Interface specification SCI-LC	712609 - Version 2.2 (1.A) - Released
Released	Interface specification SCI-LS	Interface specification SCI-LS	712620 - Version 4.3 (1.A) - Released
Released	Interface specification SCI-P	Interface specification SCI-P	712630 - Version 4.2 (2.A) - Released
Released	Interface specification SCI-TDS	Interface specification SCI-TDS	712639 - Version 4.1 (1.A) - Released
Released	Interface specification SDI Generic	Interface specification SDI Generic	712646 - Version 4.3 (1.A) - Released
Released	Interface specification SDI-IO	Interface specification SDI-IO	712651 - Version 4.2 (1.A) - Released
Released	Interface specification SDI-LC	Interface specification SDI-LC	712662 - Version 3.3 (1.A) - Released
Released	Interface specification SDI-LS	Interface specification SDI-LS	712674 - Version 4.3 (1.A) - Released
Released	Interface specification SDI-P	Interface specification SDI-P	712685 - Version 4.3 (1.A) - Released
Released	Interface specification SDI-TDS	Interface specification SDI-TDS	712699 - Version 4.2 (1.A) - Released
Released	Maintenance and data management specification	Maintenance and data management specification	711667 - Version 4.1 (1.A) - Released
Released	Requirements specification for subsystem Generic IO	Requirements specification for subsystem Generic IO	711676 - Version 4.3 (1.A) - Released
Released	Requirements specification for subsystem Level Crossing	Requirements specification for subsystem Level Crossing	711682 - Version 2.3 (2.A) - Released
Released	Requirements specification for subsystem Light Signal	Requirements specification for subsystem Light Signal	708757 - Version 4.3 (1.A) - Released
Released	Requirements specification for subsystem Point	Requirements specification for subsystem Point	711688 - Version 4.5 (1.A) - Released

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released	Requirements specification for subsystem TDS	Requirements specification for subsystem TDS	711697 - Version 4.2 (1.A) - Released
Released	Specification of Point of Service-Signalling	Specification of Point of Service-Signalling	711705 - Version 2.2 (2.A) - Released

[SPP-25221]

The documents in this section have been previously published by Trackside Assets Domain as "EU-Rail Trackside Assets Specification (SP/EULYNX BL4R4)" in June 2025 and are considered authoritative.

- Specifically SCI and SDI specifications are authoritative.
- Specifically SMI specifications shall be analysed as option for projects which are setup in the SERA pre-phase - until SMI SP Standard interface specifications for Configuration Management (see SPP-20956 - Task 2 (CCS) - Transversal CCS Components Domain) are finalised and published.

[SPP-30668]

9.7 More information

In addition to the common documentation release, EULYNX published also additional specifications and supporting documents for the current EULYNX architecture, which are integrated in the EULYNX part of Baseline Set 4 Release 4, delivering additional 24 documents. [SPP-28336]

9.8 Problems Fixed

The error corrections are traced through Change Requests. Only the tickets with attribute 'Planned in' = 'Baseline 4 Release 4 (2025-12-31)' or 'Error correction after BL4R3' are part of this Release :

- Reference Architecture-Board
- LS-Board
- TDS-Board
- P-Board
- IO-Board
- LX-Board

[SPP-28668]

9.9 Known open problems, issues

No known problems and issues.
With this release, the specification documents of Baseline Set 4 have reached a stable maturity level. The current baseline set is closed for changes in functionality or new functions. Individual specifications may receive further updates due to error corrections or change requests. [SPP-28334]

10 Task 2 (CCS) - Train CS domain

10.1 Release content

According to the remits for phase 2.4 the Train CS domain has been working to the following topics:

1. Multiple Display Concept
2. On board modularity and upgradability
3. Basic advanced safe train positioning: General system requirements and architecture

[SPP-29971 **]**

10.1.1 Multiple Display Concept

In today's cab architecture, there are at least three main screens in a cab supporting three systems: European Train Protection (ETP), Train Control and Management System (TCMS) and Cabin Voice Radio (CVR). Each screen is
usually dedicated to one system. The screen embeds only one business logic to enable data exchange with the
appropriate system and elaborates the associated view. **[**SPP-29972 **]**

If every additional application which is integrated into the cab is having its own screen, space will quickly become very tight.
As space in the cab of trains is limited, we want to limit the number of displays in the train. That causes the problem that there are at least four applications (ETP, TCMS, CVR and other Systems) and only three displays. That's the reason why we want to concentrate the amount of screens to a minimum.
[SPP-29973 **]**

To solve these problems, **Train CS is proposing the introduction of a new building block: the Multi Display System (MDS)**. **[**SPP-29974 **]**

The MDS Concept is a document that aims to standardise the displays installed in trains. Furthermore, Train CS presents a solution that includes the characteristics of modularity, exchangeability, and redundancy, while also limiting the number of displays in the driver's cab. It is aiming to:

- Provide a more flexible way to add new applications to the limited set of display devices in the cabin,
- Provide fail-over functionalities in case of display failures, and
- Standardise the display devices for easier maintenance and upgrades

[SPP-29975 **]**

10.1.2 On board modularity and upgradability

The System Architecture Definition for Train Control & Supervison (Train CS) is structured around the targets 1, 2 and A as given by the System Pillar Core Group. These three targets are elaborated in three steps:

1. **Train CS Architecture elaboration for Target 1, based on the results of the remits for phase 2.4.**
   In this step the current architecture will be extended with the latest results of the Train CS remits for phase 2.4. The main goal of this step is integration and delivering of an updated Logical and Physical Architecture view for the Train CS domain. The primary focus of these architecture views is target 1, but there are also some results coming from the remits for phase 2.4 that give a lookout to future targets (Cybersecurity for Train CS, Computing Environment for Train CS, Multi Display System, GNSS/EGNOS).

2. **Train CS Logical Architecture for Targets 2 and A.**
   This step is mainly a consolidation of architecture views previously published and integrating the latest assumptions from the Innovation Pillar.
3. **Train CS Migration**.
   In this step the evolution of the Train CS architecture, based on the Targets 1, 2 and A, is evaluated against the contribution to the main benefits for the users. In this step also the dependencies with the key functionalities coming from Traffic CS and others domains are introduced when needed to achieve the Main Benefits mentioned.
   Given the facts that costs for upgrades and retrofits are increasing and budgets are decreasing, recommendations for the migration to the Command Control & Signalling (CCS) Target A architecture are formulated.
   These recommendations are based on the following priorities:
   1) Limit the number of upgrades, especially for the existing fleet.
   2) Focus the next and future upgrades primarily on:

      a. Business continuity:

         i. FRMCS, and
         ii. Cybersecurity.

      b. Achieving the main benefits for the users:

         i. ERTMS/ETCS Level 2 with hybrid train detection and fixed virtual blocks -> more trains on the same infrastructure and less trackside assets,
         ii. Remote Driving (independent from ERTMS/ATO) -> Higher productivity (in shunting areas, mostly not equipped with ERTMS/ETCS Trackside), and
         iii. ATO up to GoA4 -> more trains on the same infrastructure and higher productivity.

10.1.3 Basic advanced safe train positioning: General system requirements and architecture

The first main goal of this task is to find the best architecture option for ASTP, in relation with the BTM functions and ETCS core functions. In order to achieve this goal, the following strategy was adopted:

1. A document describing different logical architectures was created (ref. Architecture Variants - Description and evaluation).

   - The document presents background concepts, which are important for the discussion, namely the definition of interoperability constituents and the concept of grouping as defined in the TSI and the Ethernet CCS Consist Network (CCN) which is introduced in the current TSI CCS 2023 and intended to be updated in the next version of the TSI CCS.

   - The document then presents six architecture variants for the basic ASTP step and how they will migrate to full ASTP.

1. An initial selection of several architectures was made in order to limit the comparative study, focusing mainly on the grade of modularity to be adopted.
2. A comparative technical study of the variants selected was performed
3. A comparative economic study of the variants was also performed

The main conclusions of these studies were:

- Introducing a new ASTP Interoperability Constituent at the Basic ASTP stage is not deemed beneficial considering that all major suppliers already have existing certified EVCs. Introducing new IC would mean to modify existing EVCs without improvement of performance or major technical benefit.
- The permission to use grouping does not alleviate the impact of creating new Interoperability Constituents (e.g. ASTP) from existing ones (e.g. ETCS-OB).
- The transition from a monolithic approach to distributed approach will also raise the question of integration responsibility that may be transferred to the integrator

It has been concluded that the logical architecture identified as Variant 2 (on the basic ASTP step) is preferred from a technical standpoint regarding the Basic ASTP step (STIP-29) in the next TSI release.

For Full ASTP, no decision on the architecture variant is made, which means that all Full ASTP architecture variants are still open for further investigation.

Concerning full ASTP functions allocation, the requirements document reflecting the current status of analysis is “Functional Requirements specification – ASTP”

10.2 Restrictions of use and Application conditions

See the section Release content.
[SPP-28694 **]**

10.3 Capabilities addressed by the release

See the section Release content for the identification of the capabilities. **[**SPP-28693 **]**

10.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full|partial)	Comment
STIP_69	Full	
STIP_72	Full	
STIP_29	Full	

[SPP-22649 **]**

10.5 Main enhancements from the previous release

N/A (first release). **[**SPP-22651 **]**

10.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Approval by System Pillar	System Architecture Description Train CS v0_9	Train CS Baseline 2	HEAD
In Progress	ASTP FRS	Functional Requirement Specification - ASTP	HEAD
In Review by System Pillar	ASTP ARC	System architecture description - Basic ASTP	HEAD
In Review by System Pillar	System_Concept_TrainCS_MultiDisplay_v02	System_Concept_TrainCS_MultiDisplay_v02	HEAD

[SPP-25223 **]**

10.7 More information

N/A (first release). **[**SPP-29610 **]**

10.8 Problems Fixed

N/A (first release). **[**SPP-22661 **]**

10.9 Known open problems, issues

N/A (first release). **[**SPP-29609 **]**

11 Task 2 (CCS) - Transversal CCS Components Domain

11.1 Release content

The present release establishes a coherent technical baseline for the Transversal CCS System (TCCS) under Europe's Rail, aligned with EN 50126-1 and the SEMP process. It anchors on the ERA CCS/TMS Ontology and the TCCS System Definition, then specifies system requirements for Service Function Diagnostics (SFD), the Configuration Repository, and Service Function Configuration (SFC), complemented by SMI v2→v3 change requests.

A suite of interface specifications—including SDI (Standard Diagnostics Interface) models (XX/DS/GEN/P), SMI v3 (Standard Maintenance Interface), and the REPO interface formalises data models, protocols, and cryptographic/traceability mechanisms, enabling secure, orchestrated configuration and semantically harmonised diagnostics (OPC UA). The E2E data process (Phases 1–4: preparation, supplier configuration, integration, distribution) operationalises these specifications within CONEMP's lifecycle asset management concept; the Catalogue of Symbols contains UI visualisation on the same semantic backbone. Together, the deliverables provide sector-ready foundations for interoperable configuration/diagnostics and support staged uptake towards EU-RAIL internal publication (2025) and broader standardisation maturity beyond 2027.

11.2 Restrictions of use and Application conditions

Disclaimer: Documents in this section include non-authoritative and non-final versions of transversal protocols contained in the EU-Rail Trackside Assets Specification. For the current authoritative versions of those documents refer to SPP-21035 - Task 2 (CCS) - Trackside Assets domain. **[**SPP-30727 **]**

11.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified|unchanged)	Comment
Activate Configuration Data	new	no comments
Perform System Asset Diagnosis	new	no comments

[SPP-22652 **]**

11.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full| partial)	Comment
STIP_11	full	**D-02:** ERA-ontology extension for enabling the CCS/TMS Data Model **Definition of Done:** CCS/TMS Data model updated and derived from ERA-ontology, Planning data validation reviewed and amended **Documents in ESPR1.0 collection:** Release Note_TCCS-CCS/TMS Data Model enabled by ERA Ontology - Cover Document
	partial	**D-03:** Service Function Diagnosis Specification **Definition of Done:** All CRs are properly managed and full traceability between SP/

STIP item	Coverage (full| partial)	Comment
STIP _10		EULYNX BL4R4 version of the documents and the new BL5 documents is ensured. Service Function Diagnosis Specification (SL3-SL5) updated according to the feedback received from other SP system design domains or IP reference implementations. ERA-ontology extended for the needs of diagnosis. Backwards compatibility clarified and migration strategy defined if necessary **Documents in ESPR1.0 collection: System Requirements Specification_TCCS - Part 1 Service Function Diagnostics and Diagnosable BuildingBlock (SERA Version) System Interface Description_SDI-XX Base (SERA Version) System Interface Description SDI-DS information model (SERA Version) System Interface Description_SDI-GEN information model (SERA Version) System Interface Description_SDI-P information model_toolchain_demo (SERA Version)**
STIP _8	partial	**D-04:** Service Function Configuration Specification **Definition of Done:** All CRs are properly managed and full traceability between SP/ EULYNX BL4R4 version of the document and the new BL5 documents is ensured. Service Function Configuration Specification (SL3-SL5) updated according to the feedback received from other SP system design domains or IP reference implementations. Backwards compatibility clarified and migration strategy defined if necessary. **D-05:** Service Function Configuration Safety analysis **Definition of Done:** PRAMS risk analysis decided on SP STG level as EU-RAIL internal release **Documents in ESPR1.0 collection: System Interface Description_TCCS-System Interface SMI (v3) (SERA Version) System Requirements Specification_TCCS-System Interface SMI (v2) to SMI (v3) Change Requests System Requirements Specification_TCCS - Part 2 Configuration Repository (SERA Version) System Requirements Specification_TCCS - Part 3 Service Function Configuration and Configurable BuildingBlock (SERA Version) System Interface Description_TCCS-System Interface REPO (SERA Version)**

[SPP-22654 **]**

11.5 Main enhancements from the previous release

N/A (first release) **[**SPP-29472 **]**

11.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
Released	TCCS_E2E Data Process for the Digital Railway- Cover Document	TCCS_E2E Data Process for the Digital Railway- Cover Document	726315 - Version 1.0 - Released
In Review by System Pillar	TCCS - Cover Document CCS_TMS ERA Extension	Release Note_TCCS-CCS/TMS Data Model enabled by ERA Ontology - Cover Document	723530 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	Catalogue of Symbols	System Concept_TCCS-Catalogue of Symbols	723902 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS System Interface SDI-DS information model_SERA Version	System Interface Description SDI-DS information model (SERA Version)	723864 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS System Interface SDI-GEN information model_SERA Version	System Interface Description_SDI-GEN information model (SERA Version)	723869 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS System Interface SDI-P information model_toolchain_demo_SERA Version	System Interface Description_SDI-P information model_toolchain_demo (SERA Version)	723877 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS System Interface SDI-XX Base_SERA_Version	System Interface Description_SDI-XX Base (SERA Version)	723882 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS System Interface REPO	System Interface Description_TCCS-System Interface REPO (SERA Version)	723726 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS System Interface SMI_v3	System Interface Description_TCCS-System Interface SMI (v3) (SERA Version)	723837 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS SRS Service Function Diagnostics and Diagnosable BuildingBlock_SERA Version	System Requirements Specification_TCCS - Part 1 Service Function Diagnostics and Diagnosable BuildingBlock (SERA Version)	723889 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS SRS Configuration Repository	System Requirements Specification_TCCS - Part 2 Configuration Repository (SERA Version)	723841 - Version 1.0 - In Review by System Pillar

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Review by System Pillar	TCCS SRS ServiceFunctionConfiguration and Configurable BuildingBlock	System Requirements Specification_TCCS - Part 3 Service Function Configuration and Configurable BuildingBlock (SERA Version)	723853 -
In Review by System Pillar	TCCS System Interface SMI _v2_ to SMI _v3_ Change Requests	System Requirements Specification_TCCS-System Interface SMI (v2) to SMI (v3) Change Requests	723858 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_00_Guide	TCCS - Data Model_00_Guide	712601 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_00_Release Notes	TCCS - Data Model_00_Release Notes	712615 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_02_Methodology	TCCS - Data Model_02_Methodology	712560 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_02_Schema	TCCS - Data Model_02_Schema	712628 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_10_INFRA	TCCS - Data Model_10_INFRA	712641 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_11_ENG	TCCS - Data Model_11_ENG	712671 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_11_MAP	TCCS - Data Model_11_MAP	712679 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_11_OI	TCCS - Data Model_11_OI	712659 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_11_OPP	TCCS - Data Model_11_OPP	712688 - Version 1.2 - In Review by System Pillar

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Review by System Pillar	TCCS - Data Model_11_TP	TCCS - Data Model_11_TP	712698 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_12_SS026	TCCS - Data Model_12_SS026	712705 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS - Data Model_20_Equipment	TCCS - Data Model_20_SDI_Generic	713023 - Version 1.2 - In Review by System Pillar
In Review by System Pillar	TCCS_System_Definition	TCCS System Definition	723561 - Version 1.0 - In Review by System Pillar
In Review by System Pillar	Transversal CCS - System definition - SL4 - Risk Analysis	Transversal CCS - System definition - SL4 - Risk Analysis	724057 - Version 1.0 - In Review by System Pillar

[SPP-25222]

11.7 More information

N/A

11.8 Problems Fixed

We have created a change log for existing Eulynx documents.
[SPP-22658]

11.9 Known open problems, issues

- Lack on return experience: specifications must be verified;
- Engineering requirements: top down requirements derivation process is not finalised yet.

[SPP-29473]

12 Task 2 (CCS) - Computing Environment Domain

12.1 Release content

This release provides the system analysis of the Computing Environment. The analysis aims at understanding the system under consideration and its objectives comprehensively. The document will also discuss the scope of the system, including its objectives and the actors or entities involved. **[**SPP-28339 **]**

12.2 Restrictions of use and Application conditions

None **[**SPP-28350 **]**

12.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified| unchanged)	Comment
Hosting of the safety critical functional railway application onto modular Computing Platform	new	--
Sharing of HW among multiple Functional System	new	--
Maintenance and diagnostic of the Computing Platform	new	--

[SPP-22673 **]**

12.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full| partial)	Comment
#STIP_4 Standardisation of Computing Environment	partial	Standardisation of interfaces I1/I2/I3 are agreed by the domain

[SPP-22687 **]**

12.5 Main enhancements from the previous release

N/A (first release).

12.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
✓ In Decision by Steering Group	Recommendation on Interfaces to be standardised	Recommendation on Interfaces to be standardised	723553 - Task2_ComputingEnvironment_ISP R0.0_Recommendation on Interfaces to be standardised
✓ In Decision by Steering Group	System Analysis	System Analysis	723630 - Task2_ComputingEnvironment_ISP R0.0_SystemAnalysis
	OAS		

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Decision by Steering Group		System Concept including operational analysis	696776 - Task2_ComputingEnvironment_ISP R0.0_System Concept

[SPP-25224]

12.7 More information

For better understanding of the System Analysis, it is recommended to review the Recommendation on Interfaces to be standardised and System Concept including operational analysis documents. .
[SPP-28348]

12.8 Problems Fixed

N/A (first release). [SPP-22690]

12.9 Known open problems, issues

For open points and issues, please refer to the chapter 9 Open Points in the deliverable System Analysis.
[SPP-28349]

13 Task 3 (TMS and CMS)

13.1 Release content

The content of the release of the task 3 CMS/TMS domain for the period 2024-2025 consists of six documents, which are consistent with all the other deliverables submitted from the starting of SP initiative and approach some specific topics with a deeper detail. **[**SPP-23772 **]**

These documents are listed here below, with a short description of their goal: **[**SPP-23773 **]**

- **T3-Interface Specification TMSCCS**: This document is a functional specification of the set of data to be exchanged between TMS and CCS (more precisely, TraffiCS system) and how they are organised in structures and messages. A complete alignment with the data model specified by the Task 2 transversal team is kept. Some examples are provided as a guideline, to show how data can be represented.
- **T3-System Concept_CMS-TMS_HarmScope**: This document aims to elaborate a proposal for the harmonisation of the interface between CMS and TMS and the standardisation of a kernel of data which shall be exchanged in all contexts of application of an interface between these two systems. The goal of the analysis is to identify and recommend how the CMS and TMS functional distribution and interface specification should be harmonised.
- **T3-DCM Messages Specification**: The goal of this document is describing the needs for messages in relation to the Timetable Redesign (TTR) – focusing of the Digital Capacity Management (DCM) as designed in TTR – as well as the requirements of the Capacity Regulation, of which a draft was published by the European Commission in July 2023.
- **T3-CMS TMS Variant Analysis Version 2**: This document outlines the relevant scenarios (referred to as variants) that illustrate how governance in the business area of “Capacity Management and “Traffic Management” on European level can be conceptually organised and how the IT systems are set up to support these processes. This analysis improves the previous one delivered as part of the 2023-2024 Remit Plan and integrates comments, suggestions, outcomes of discussion with other stakeholders.
- **T3-System Concept_CMS-TMS_Federated Model**: on top of the above deliverable, this document refines those variants which have been selected as preferred ones, identified as “Federated Traffic Management” and “Federated Capacity Management”. These two variants are further elaborated in this document: the relevant process are described, the IT systems which support the execution of the processes are described, and the roles of a federated governance body is described
- **T3 - Federated model - GAP Analysis**: This analysis must be read with the T3-System Concept_CMS-TMS_Federated Model document, of which it perform a GAP analysis comparing the principles of the Federated Model with the regulatory framework. The GAP analysis checks which processes are part of the "Federated" model and are mentioned in the legal framework "Capacity Regulation".

[SPP-23775 **]**

The following documents have been delivered (along with other ones) by Task 3 CMS/TMS domain team, and can be used to have a wider picture of the context of CMS/TMS and retrieve more information about the Domain scope. These documents support a deeper understanding of the deliverables described above. **[**SPP-23818 **]**

- **T3-SystemArchitectureDescription:** defines the top-level functional breakdown structure of the CMS and TMS subsystems according to the general principles given in the Annex 1 CCS/TMS Architecture Principles
- **T3-CMSRequirements**: The document contains the high-level functional requirements which the Capacity Management System (CMS) is responsible for.
- **T3-TMSRequirements**: The document focuses on TMS functional requirements, which are the core functionalities of the system. Main building blocks of the TMS are also dealt with, along with the interface specification between TMS and the other systems in order to fulfil the core functionalities.

- **T3-OperationalEntitiesActorsRole**: The document sketches an exhaustive list of all CMS/TMS actors and entities (system actors) involved in those processes that the functions allocated to CMS/TMS are devoted to support. This complements the functions apportionment to CMS and TMS with a consistent proposal of CMS and TMS user roles.
- **T3-OperationalProcesses**: The document draws a high-level overview and description of the capacity planning and capacity production processes that are to be performed by an infrastructure manager (IM) (and/or an Allocation Body (AB) in the phase of capacity planning). These processes are harmonised as to make the coordination between the IM possible.
- **T3-SystemConcept**: This document describes an overall view of the intended scope of cutting-edge European CMS & TMS systems.
- **T3-SystemDefinition**: This document describes an high-level functional description of the CMS & TMS.

[SPP-23819 **]**

13.2 Restrictions of use and Application conditions

No specific Restrictions or Application conditions are applicable to these documents.
[SPP-28435 **]**

13.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified| unchanged)	Comment
Import the railway topological model from the Asset Management Data system.	new	CMS
Handle the coexistence of more versions of the topological model.	new	CMS
Build a Capacity Plan for the controlled area.	new	CMS
Build a Capacity Model for the controlled area.	new	CMS
Build the yearly capacity plan for the controlled area	new	CMS
Build variants of the Capacity Plan to apply in case of needs (“emergency timetables”)	new	CMS
Calculate the optimal path for every train of the Capacity Plan	new	CMS
Maximize the exploitation of the railway infrastructure of the controlled area, in terms of availability of the time-space slots of the network resources	new	CMS
Handle availability/unavailability of the infrastructure resources	new	CMS
Build a strategic and tactical plan for the possessions and speed restrictions (“negative capacity”)	new	CMS
Support the simulation processes to perform the studies aiming to determine how train paths and infrastructure planning fit inside a feasible timetable	new	CMS
Handle late paths and ad-hoc requests and integrate them into the yearly timetable	new	CMS
Detect and solve Planning conflicts	new	CMS

Capability name	Change (new|modified| unchanged)	Comment
Handle requests for timetable and TCR modifications (adding new paths, modifying or deleting an existing path)	new	CMS
Implement a Human Machine Interface with a full set of Graphical and Tabular views, suitable for performing all planning activities and displaying/processing stored data.	new	CMS
Interface the Traffic Management system to deliver and update the Capacity Plan	new	CMS
Interface other planning and timetable publishing systems to deliver and update the Capacity Plan	new	CMS
Interface ROC owned systems to handle path requests, import vehicle and other types of functional data and export and update the Capacity Plan	new	CMS
Interface an external secure Identity and Access Management system for managing digital identities (human users and assets) and roles for authorisation and single-sign on	new	CMS
Interface an external secure Public Key Infrastructure system for receiving certificates and their status and thus ensure secure communication	new	CMS
Interface an external Secure Time Synchronisation system, to guarantee a secure time synchronisation necessary to validate certificates.	new	CMS
Interface an external Domain Name System, for name resolution to map domain names to IP addresses	new	CMS
Interface an external Network Access Control system, for identifying, authenticating, and authorising network access	new	CMS
Achieve field data and train position updates	new	TMS
Organise and display a wide set of train and infrastructure information necessary to support TMS actors in managing the execution of the production plan	new	TMS
Represent trains position and status of infrastructure on a time-space diagram (Tirain Graph, TG)	new	TMS
Provide a wide set of views where all data necessary to monitor and control the execution of apportioned capabilities are grouped into homogeneous sets	new	TMS
Perform all necessary variations to the Production Plan, according to the current traffic situation, in terms of replanning	new	TMS
Performing all necessary variations to the Production Plan, according to the current traffic situation, in terms of decision	new	TMS
Evaluate a precise traffic forecasting for every train, including sectional run time calculation to update the operational plan based on current positions of trains, availability of assets and mutual influence of trains.	new	TMS
Dynamically update the availability status of infrastructure resources	new	TMS
Set / Reset / Update the status of Infrastructure Restrictions	new	TMS

Capability name	Change (new|modified| unchanged)	Comment
Detect conflicts for future traffic situations	new	TMS
Solve detected conflicts according to a specific objective function	new	TMS
Manage the impact of incidents and deviations with respect the Capacity Production Plan	new	TMS
Interface an external secure Identity and Access Management system for managing digital identities (human users and assets) and roles for authorisation and single-sign on	new	TMS
Interface an external secure Public Key Infrastructure system for receiving certificates and their status and thus ensure secure communication	new	TMS
Interface an external secure Time Synchronisation system, to guarantee a secure time synchronisation necessary to validate certificates.	new	TMS
Interface an external Domain Name System, for name resolution to map domain names to IP addresses.	new	TMS
Interface an external Security Logging system, for collecting log messages	new	TMS
Interface an external Network Access Control system, for identifying, authenticating, and authorising network access	new	TMS
Interface the Traffic Control and Supervision system	new	TMS
Interface the Incident Management system	new	TMS
Interface the Capacity Management system	new	TMS
Interface neighbouring Traffic Management Systems	new	TMS
Manages a telephonic connection with the train driver	new	TMS

[SPP-22683 **]**

13.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full|partial)	Comment
STIP_16 - Integration of TTR Messages	Partial: T3-DCM Messages Specification.	The document deals with messages related to the Timetable Redesign (TTR), focusing on the Digital Capacity Management as here designed.
STIP 17 - Function distribution and Interface between TMS/ CMS	Partial: T3-System Concept_CMS-TMS_HarmScope	The document recommends a functional allocation for TMS and CMS systems and proposes an harmonisation scope for the interface between them. Next step is to define a functional specification of the interface along with a set of messages to be exchanged.
STIP 18 - Function		The document describes the context of application and the design principles of the interface between TMS and CCS, its

STIP item	Coverage (full|partial)	Comment
distribution and Interface between TMS/ TrafficCS	Full: T3-Interface Specification TMSCCS	general structure and the data model. It provides a functional specification of the interface, suitable to be applied for the development of a demonstrator by FA1 teams.

[SPP-22684]

13.5 Main enhancements from the previous release

N/A (first release). [SPP-22685]

13.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Progress	T3-SystemArchitectureDescription	T3-SystemArchitectureDescription	714338 - Version 1.0 - In Progress
In Progress	TMS-TMSFR-ES-017_03	T3-TMSRequirements	714367 - Version 1.0 - In Progress
Open	T3-CMSRequirements	T3-CMSRequirements	714378 - Version 1.0 - Open
In Review by System Pillar	CMS TMS Variant Analysis Version 2	T3-CMS TMS Variant Analysis Version 2	717098 - Version 2.3 - In Review by System Pillar
In Review by System Pillar	T3-DCM Messages Specification	T3-DCM Messages Specification	717100 - Version 0.2 - In Review by System Pillar
In Review by System Pillar	Federated TMS - GAP Analysis	T3 - Federated model - GAP Analysis	717096 - Version 1.4 - In Review by System Pillar
In Review by System Pillar	T3-Interface Specification_TMS_CCS	T3-Interface Specification TMSCCS	717104 - Version 1.6 - In Review by System Pillar
Open	T3-OperationalEntitiesActors Roles	T3-OperationalEntitiesActors Roles	714381 - Version 2.04 - Open
Open	TMS-OPPRO-ES-00904	T3-OperationalProcesses	714385 - Version 1.1 - Open
Open	TMS_SYCON_ES_014_00	T3-SystemConcept	714346 - Version 1.7 - Open
In Review by System Pillar	T3 - System Concept_CMS-TMS_Federated Model	T3-System Concept_CMS-TMS_Federated Model	713834 - Version 3.2 - In Review by System Pillar
In Review by System Pillar	T3-System Concept_CMS-TMS_HarmScope	T3-System Concept_CMS-TMS_HarmScope	717111 - Version 1.2 - In Review by System Pillar
Open	TMS-SYDEF-ES-007_00	T3-SystemDefinition	

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
			714359 - Version 1.0 - Open
Open	T3-TopologyInterfaceSpecification	T3-TopologyInterfaceSpecification	714371 - Version 2.01 - Open

[SPP-25218]

13.7 More information

None [SPP-28696]

13.8 Problems Fixed

N/A (first release). [SPP-22678]

13.9 Known open problems, issues

No specific issues to highlight. [SPP-28436]

14 Task 4 (DAC/FDFTO)

14.1 Release content

This release from Task 4 (DAC/FDFTO) contains a proposal for implementation of a second channel for Train Length and Integrity on freight trains; as well as the description of a concept FDFTO Central Instance to manage and coordinate the software release and data exchange on DAC-equipped trains. **[**SPP-25151 **]**

14.2 Restrictions of use and Application conditions

No specific Restrictions or Application conditions are applicable to these documents. **[**SPP-25150 **]**

14.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified|unchanged)	Comment
Task 2 interface with CCS systems	new	
Enabling moving block for freight trains	new	
FCI (FDFTO Central Instance) data accessibility for users	new	
Monitoring of SW releases	new	

[SPP-22679 **]**

14.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full| partial)	Comment
STIP_38 Operational standards and RuleBook	full	
STIP_47 Central Instance	partial	
STIP_73 Train interface adaption for integrity handling and train length / overall consist length (from FDFT side)	partial	
STIP_36 FDFTO Train functions	partial	
STIP_73 Train interface adaption for integrity handling and train length / overall consist length	partial	

[SPP-22670 **]**

14.5 Main enhancements from the previous release

N/A (first release). **[**SPP-28437 **]**

14.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Progress	System Concept_Central Instance - Part C WP4_5	System Concept_Central Instance - Part C WP4_5	HEAD
In Progress	System Requirements Specification_Train Integrity and Train Length_Part A WP3_1	System Requirements Specification_Train Integrity and Train Length_Part A WP3_1	HEAD

[SPP-25219]

14.7 More information

An enhanced version of the document describing the concept of FDFTO Central Instance will be developed in the next System Pillar contracts, and in particular to explore its relation to federated data space. [SPP-28688]

14.8 Problems Fixed

On train length and train integrity topics, an alignment with Task 2 has been reached, the output solution is presented in the WP3.1 document, part of the release. [SPP-22674]

14.9 Known open problems, issues

- FDFTO Rulebook : White points are still to be covered, depending on, and in parallel with, FP5 development status.
- Train length and train integrity : Recommendation to be endorsed and technically developed by FP5.
- Central Instance : Financing will be necessary to develop a Central Instance based on the recommended concept.

[SPP-25153]

15 Task 5 (Harmonised Diagnostics)

15.1 Release content

Currently, there is no mechanism in the EU-RAIL which coordinates the activities related to the harmonisation of the diagnostic data exchange and ensures the sharing of the respective outcome, lessons learned, and best practice. **[**SPTH-1021 **]**

As a logical consequence of the European Economic and Social Committee (EESC) targets, the EU-Rail objectives, and the identified need, HERD (Harmonised European Railway Diagnostics) generates a set of proven technically and procedurally harmonised diagnostic data use cases and will provide a guideline for a harmonised diagnostic data exchange for all relevant assets diagnostic data, which will enable the continuous gain of condition information for integrated asset management. **[**SPP-28622 **]**

According to a new standardised process, HERD evaluates the potential applications for railway data harmonisation and identifies the most relevant of them to generate use cases for further investigations. **[**SPTH-1023 **]**

The purpose of HERD is to develop an architecture for harmonising the European railway diagnostic data that principally consists of flexible combination of a mix of trackside sensor and onboard systems. It aims to regularly review the new techniques which automatically and autonomously can acquire the diagnostic data and to integrate them. Furthermore, HERD intends to generate operational, use case dependant concepts for harmonised diagnostic data of the railway assets – both rolling stock and track – and their interfaces beyond the current specifications, with much greater standardisation than at present. **[**SPTH-1022 **]**

We have concentrated our work on two use cases selected from the outcome in Phase 1 “Track Side Vehicle Monitoring for Maintenance” and “On-Board Track Monitoring”. The outcome of the work on both UCs includes expected benefits, description of the gap between the needs and the actual status, analysis of the specific HDDI (Harmonised Diagnostic Data Interface) parameters, definition of the use case dependant cost benefit analysis structure, initial risks and opportunities analysis, and recommendations for the next steps. **[**SPTH-1025 **]**

The work in UC1 shows that harmonising the diagnostic data provided by Wayside Train Monitoring Systems (WTMS) can generate many direct and indirect benefits for both data user and data provider. The impact of HDDI was separately evaluated for the different data users Railway Undertaking (RU), Vehicle Keeper (VK), Entity in Charge of Maintenance (ECM) and Infrastructure Manager (IM) and the outcome describes exemplarily the positive effect on increased safety, improved maintenance, reduced operating costs, shorter off-service times, higher availability and reliability, reduction of secondary damage, better planning and optimisation, data-driven decisions, compliance with regulatory requirements, increased customer satisfaction, environmental improvement, etc. **[**SPP-28623 **]**

The evaluation of two anonymised real applications shows following opportunities:
1) In cross-border freight transport downtimes can be reduced by 77% thanks to digital vehicle control based on WTMS. This is thanks to the known condition of the vehicle and the automated control system.
2) With the development of the digital vehicle inspection, based on the WTMS condition information, the manual inspection effort of a wagon inspector for each individual technical train inspection is reduced by 58%. **[**SPTH-1027 **]**

Today, despite the widespread use of track measurements based on EN 13848 and EN 14363 standards, no standard exists for the exchange and formatting of track condition data. Missing a HDDI leads to inconsistent data outputs, making data analysis more difficult. Additionally, it increases costs associated with developing and maintaining multiple custom interfaces, updating data across different systems, etc. which can cause delays and potential data quality problems. **[**SPTH-1026 **]**

UC2 has carried-out a target-oriented study on Harmonisation of Railroad Infrastructure Diagnostic Data in Europe with various European IMs. The purpose of that study was to investigates the data-driven methods used by European infrastructure managers to monitor the condition of railroad infrastructure. It explores the potential benefits of harmonising diagnostic data across Europe, aiming to understand how a unified approach could improve efficiency in infrastructure management. **[**SPTH-1028 **]**

The outcome of that study shows divers benefits which are relevant for most IM like increased safety and reliability, reduced costs for data import and resources for data management, accelerated data access,

improved data comparison and analysis, enhanced data quality, facilitated interoperability, etc. **[**SPTH-1012 **]**

Additionally, there are some specific opportunities such as utilising best practice information, optimisation, and standardisation in tenders with a profit for both the customer (IM) and the supplier, as well as enhancing the legal compliance with a data standard which guaranties the data comparability over many years. **[**SPTH-1011 **]**

The need of a unified approach to data exchange is a clear outcome of the questionnaire and it states that harmonisation of the diagnostic data, setting standards at least for the data interface to avoid adopting multiple file formats. At least 50% of the responses confirmed that they are already collecting measurements from the commercial trains; others do see the benefits of such practices in the future. **[**SPTH-1014 **]**

The success of harmonisation of the railway diagnostic data directly depends on the quality of cooperation between the stakeholders. Even if the absolute best and optimised architecture is in place, the utilisation of the opportunities and the gain of the benefits need the collaboration between the main players in Europe. **[**SPTH-1013 **]**

Our work clearly shows that the implementation of HDDI Europe wide is not only a challenge to harmonise railway diagnostic systems but much more to overcome established habits, doubting and borders. Proceeding only with the well-instituted local, national, and/or bilateral cooperations won't be sufficient to boost the competitiveness of the European railway transport. **[**SPTH-1016 **]**

We have recognised that in terms of HERD there is a need of much more collaboration between HERD and the Flagship Areas in IP, especially FA1, FA3 and FA5. There are WPs like FA1/WP29 and FA3/WP7 which would be perfectly eligible to implement a demonstrator for the use cases in HERD. Unfortunately, there are too many formal obstacles which hinder an effective conducting with a reasonable effort. **[**SPTH-1015 **]**

In the next period we have committed to develop the needed specifications for UC1-HDDI and the plan for the implementation of a UC1 demonstrator/pilot. Regarding the execution of a UC1 pilot project we need a strong support from EU-RAIL because of the missing budget for it. **[**SPTH-1018 **]**

We also plan to proceed working on UC2 and depending on our resources to initiate the investigations on other UCs. **[**SPTH-1017 **]**

Our conclusion is that harmonising the Railway Diagnostic Data will improve and intensify the collaboration between IM, RU, VK and the railway industry supplier. The higher degree of utilising the data creates a win-win situation that significantly enhances effectiveness, efficiency, and safety in the railway sector and generates valuable benefits for the stakeholders. **[**SPTH-1019 **]**

15.2 Restrictions of use and Application conditions

No specific restrictions or application conditions are applicable to these documents. **[**SPP-28569 **]**

15.3 Capabilities addressed by the release

The capabilities covered by this release are:

Capability name	Change (new|modified|unchanged)	Comment
Definition of Use Case 1: Wheel condition monitoring	new	
Definition of Use Case 2: On-Board Track Monitoring	new	

[SPP-22680 **]**

15.4 STIP items addressed by the release

The STIP items covered by this release are:

STIP item	Coverage (full| partial)	Comment
STIP_162 - Definition of the HERD framework	full	
STIP_163 - Framework Process of Accepting of new Use Cases for Harmonisation of Railway Diagnostic Data	full	

[SPP-22681]

15.5 Main enhancements from the previous release

N/A (first release).

15.6 Deliverables

Document Status	Document ID	Document Name	Name of Document Baseline in Polarion
In Decision by Steering Group	Final Report HERD	Final Report: HERD SC2.3	723610 - Version 3.1 - In Decision by Steering Group

[SPP-25220]

15.7 More information

The report detailing the work carried out between 10/2024 and 09/2025 is currently under review and will be published in the first quarter of 2026. If you are interested, please contact Task 5 Lead Emilia Andreeva-Moschen (Emilia.Andreeva-Moschen@oebb.at) or Jens Kilian (jens.kilian@voestalpine.com). Once published, the results will be available on the System Pillar website: https://rail-research.europa.eu/task-5-harmonised-diagnostics/ [SPP-30250]

15.8 Problems Fixed

N/A (first release). [SPP-22677]

15.9 Known open problems, issues

No specific issues to highlight. [SPP-28570]

16 APPENDICES

16.1 PRAMS open points

Open points in PRAMS documentation

ID	Title	Severity	Description
SPRM-2177	Open Issue	Normal	Please consider that at this stage the EU-RAIL Hazard Database contains current state of knowledge and it is focusing only on Safety. The EU-RAIL Hazard Database is intended to be extended to report both safety hazards and RAM equivalents in future revisions.
SPRM-2216	Hazards Identified by System Pillar Domains	Normal	This section will need to be populated with the hazards not already part of this database identified by System Pillar Domains safety analysis, if any.
SPRM-146	New version for ETCS Baseline 4 missing	Normal	Until 09/2024, the new version of SUBSET-113 (i.e. V1.5.1) is not officially available on the ERA website. Once done, the PRAMS team shall update this section accordingly.

[SPP-28117]