



ERJU SYSTEM PILLAR

# Stakeholder Requirements Specification CCS System



# Stakeholder Requirements Specification - CCS System

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Abstract	This document contains all Stakeholder Requirements to be fulfilled by the CCS system. Stakeholder Requirements are derived from System Pillar high level targets.
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# 1 Preamble

## 1.1 Purpose





This document includes all the stakeholder requirements defined for the CCS system. Stakeholder requirements are precise requirements of stakeholders for the system of interest. They are derived from railway requirements and the operational analysis.



## 1.2 Intended audience



This document is intended for all stakeholders involved in the development, implementation, and operation of CCS systems (e.g. Business stakeholders, End users, Development and engineering teams, Assessors, etc).

## 1.3 Document context

As shown in  [SPP-19394](#), the Stakeholder Requirements Specification is based on the following inputs:

- [ [SPP-19162 - OD\\_Operational Vision Breakdown Alignment CCS System\\_V0.3](#)]: This document derives the Operational Requirements and the Stakeholder Requirements from the [ [SPP-19402 - Operational Vision \(Nov. 2022\)](#)]. The [ [SPP-19402 - Operational Vision \(Nov. 2022\)](#)] itself is derived from the [ [SPP-8684 - System Pillar Common Business Objectives \(May 2022\)](#)].

The [ [SPP-18355 - EET\\_Systems Engineering Management Plan\\_V4.0](#)] explains in more detail the dependencies between the different documents.

 [SPP-19394](#) below shows the Stakeholder Requirement Specification CCS-System in the context of the overall document list (see also [ [SPP-19283 - Release Note ESR1.0](#)]).

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ID	SPP-19394
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## 1.4 Glossary

### 1.4.1 Terms and definitions

Term	Definition
FFFIS - Form Fit Functional Interface Specification	In contrast to an FIS (Functional Interface Specification), FFFIS describes not only the functional requirements for an interface, but also its complete, specific design. An FFFIS has the requirement that all devices with an interface developed according to it are interchangeable. "FF - Form Fit" is a classification of interchangeable parts which are identical in shape, fit and function and are therefore interchangeable with one another. An FFFIS is therefore a clear description of an interface between devices or modules.
Stakeholder Requirement	Stakeholder requirements are precise requirements of stakeholders for the system of interest. They are derived from stakeholder needs (e.g. railway requirements and the operational analysis) and provide the stakeholder-oriented view of what the system of interest shall achieve.

### 1.4.2 Abbreviations

Abbreviation	Definition
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## 2 Introduction

### 2.1 Stakeholder purpose

The stakeholder requirements described in this document align and contribute to the [SPP-8684 - System Pillar Common Business Objectives (May 2022)] of the System Pillar.

### 2.2 Stakeholder scope

Will be provided in further release.

### 2.3 Overview

Will be provided in further release.

### 2.4 Stakeholders

Will be provided in further release.


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### 3 Stakeholder Requirements


#### 3-1 - CCS shall autonomously supervise the routine procedures for the handing over of safety responsibility

CCS shall autonomously supervise the routine procedures for the handing over of safety responsibility between two interfacing actors or subsystems - e.g. the granting of working-site possessions, or the provision of a movement authority without complete supervision, etc. -.

ID	SPP-7054
Type	 Stakeholder Requirement


#### 3-2 - Use standard hardware components

CCS shall use standard hardware components and ensure safety by software measures.

ID	SPP-9942
Type	 Stakeholder Requirement

#### 3-3 - Upgradeability of Internal Components

The CCS shall support the upgradeability of internal components during system operation.

ID	SPP-9274
Type	 Stakeholder Requirement


#### 3-4 - Upgradeability of adjacent systems

The CCS shall support the upgradeability of adjacent systems during system operation.

ID	SPP-10245
Type	 Stakeholder Requirement


#### 3-5 - Traffic CS shall support driving in relative braking distance, managed by trackside infrastructure.

Traffic CS shall support driving in relative braking distance, managed by trackside infrastructure.

ID	SPP-6948
Type	 Stakeholder Requirement


#### 3-6 - Timely reservation of track capacities

The CCS shall facilitate timely reservation and release of track capacities.

ID	SPP-10259
Type	 Stakeholder Requirement


#### 3-7 - Support for mixed fleet operation

The CCS shall support the mixed operation of trains, including those with and without train integrity monitoring systems.

ID	SPP-9270
Type	 Stakeholder Requirement


### 3-8 - Support for changing Operational Plans

The CCS shall support modifications to an Operational Plan that is currently being executed.

ID	SPP-9300
Type	 Stakeholder Requirement

### 3-9 - Support for backward compatibility


The CCS shall support backward compatibility within the target system architecture, provided it is economically justifiable.

ID	SPP-10221
Type	 Stakeholder Requirement

### 3-10 - Support Backward compatibility within the Target System architecture

CCS shall support backward compatibility between the subsystems of the target system architecture where technically and economically justifiable.

Note: for Traffic CS this would be an enhanced feature to be technically and economically assessed

ID	SPP-8867
Type	 Stakeholder Requirement

### 3-11 - Supervision methodology

The CCS shall supervise operational production on infrastructure resources using any methodology (manual, automated, or partially automated).


ID	SPP-10233
Type	 Stakeholder Requirement

### 3-12 - Scalable, modular, multi-layered and standardised CCS architecture

CCS shall implement a scalable, modular, multi-layered and standardised architecture that relies on a robust and comprehensive architecture framework.


Notes:

- Subsystems and interfaces within the CCS system are defined during the phase logical architecture of SEMP and will take into account SPT2 architecture guidelines such as "ARC-D2.3 Granularity Concepts and Principles".
- The requirement is to be refined with concrete concepts in further work.

ID	SPP-7122
Type	 Stakeholder Requirement


### 3-13 - Reduction of engineering complexity

The CCS shall be designed to standardise the implementation of internal components and interfaces, minimising unnecessary complexity and variant implementations.

ID	SPP-9297
Type	 Stakeholder Requirement


### 3-14 - Prompt execution of requested plans

The CCS shall enable the prompt execution of changes to the Operational Plan following user requests.

ID	SPP-10260
Type	 Stakeholder Requirement


### 3-15 - Minimum required Configuration Data implementation

The CCS shall be implemented using only the minimum required set of configuration data necessary for operation.

ID	SPP-9298
Type	 Stakeholder Requirement

### 3-16 - Management of variable System Capabilities

The CCS shall automatically manage varying and changing system capabilities, including pre-defined degraded modes of supervised infrastructure and trains, while maintaining safety, production capacity, and automation at the highest achievable level.

ID	SPP-9266
Type	 Stakeholder Requirement

### 3-17 - Limited allocation of infrastructure resources to train movements


The CCS System shall limit the length of the path for a train to move to the lowest possible length whilst guaranteeing that:

- the train speed supervision curve does not enter into the braking phase before a new movement authority can be requested, processed, issued, received, applied.
- trackside asset restrictions are not violated - e.g. non-stop areas, end of block sections, etc.

ID	SPP-6662
Type	 Stakeholder Requirement


### 3-18 - Level of backward compatibility for Traffic CS

The level of backward compatibility for Traffic CS needs to be agreed having in mind the goal to reduce the effort to adapt CCS and to avoid the inclusion of interfaces for the multitude of legacy systems.

ID	SPP-15837
Type	 Stakeholder Requirement


### 3-19 - Integration of external devices

The CCS shall support the integration of external devices during system operation.

ID	SPP-10246
Type	 Stakeholder Requirement


### 3-20 - Integration of external devices

The CCS shall facilitate the integration of external devices with minimal manual configuration and testing requirements.

ID	SPP-10230
Type	 Stakeholder Requirement


### 3-21 - Independence from pre-engineered safety critical logic

The CCS shall perform safety supervision independently of any pre-engineered safety critical logic models, such as fixed block sections.

ID	SPP-10231
Type	 Stakeholder Requirement


### 3-22 - In routine operation, CCS shall support the execution of requests without the need use ambiguous or verbal communication between other actors.

In routine operation, the CCS System shall support the execution of requests without the need to use unambiguous or verbal communication between other actors.

ID	SPP-6688
Type	 Stakeholder Requirement


### 3-23 - In routine operation, CCS shall support Field Force requests without the need of Field Force to have unambiguous or verbal communication with the signaller.

In routine operation, the CCS System shall support Field Force requests without the need of Field Force to have unambiguous or verbal communication with the signaller.

ID	SPP-6687
Type	 Stakeholder Requirement


### 3-24 - Implementation of TSI

CCS shall implement the TSI (Technical Specifications for Interoperability) in order to enable cutting edge technologies, harmonised operational processes and operational rules and to support a Single European Railway Area (SERA).

ID	SPP-7663
Type	 Stakeholder Requirement


### 3-25 - Implement standardised interfaces without hindering of innovation

CCS shall implement standardised interfaces which ensure backward compatibility between systems and subsystems, while allowing different implementations of core functions to ensure innovation.

ID	SPP-8866
Type	 Stakeholder Requirement


### 3-26 - If driver is involved in the driving process, CCS shall support driving assistance recommendations

If driver is involved in the driving process, CCS shall support driving assistance recommendations.

ID	SPP-8839
Type	 Stakeholder Requirement


### 3-27 - Field Force applications and CCS shall support a safe and performant track usage for trackbound (e.g. vehicles) and non-trackbound vehicle, and persons without creating a dangers for the traffic on the track.

CCS shall support a safe and performant track usage for trackbound (e.g. vehicles) and non-trackbound vehicle, and persons without creating a dangers for the traffic on the track.

ID	SPP-6960
Type	 Stakeholder Requirement


### 3-28 - Execution of Safety Supervision based on predefined procedures

The CCS shall execute safety supervision based on predefined procedures, as functional logic and rules, using real-time data related to configurations, track usage, and asset conditions.

ID	SPP-9303
Type	 Stakeholder Requirement


### 3-29 - Usage of FRMCS and GSM-R

The CCS shall support use of FRMCS and GSM-R as the radio connection to vehicles.

ID	SPP-9856
Type	 Stakeholder Requirement


### 3-30 - Ensure fast response times

The CCS shall ensure fast response times for the execution of requested changes to the Operational Plan.

ID	SPP-10258
Type	 Stakeholder Requirement


### 3-31 - Enable implementation of Generic Products with Safety Cases independent of Configuration Data

The CCS shall enable the implementation of 'Generic Products' for its subsystems. Each 'Generic Product' shall have a full generic product safety case in accordance with CENELEC 50126, that is independent of the Configuration Data (Infrastructure Data, Vehicle Data, Parameter Data) utilised.

ID	SPP-10254
Type	 Stakeholder Requirement


### 3-32 - Enable implementation of Generic Applications with Safety Cases independent of Configuration Data

The CCS shall enable the implementation of an 'Generic Application' based on 'Generic Products'. The 'Generic Application' shall have a full generic safety case in accordance with CENELEC 50126, that is independent of the Configuration Data (Infrastructure Data, Vehicle Data, Parameter Data) utilised. This 'Generic Application' shall have no repercussion on the european type approvals of the used 'Generic Products' of the CCS system.

ID	SPP-10255
Type	 Stakeholder Requirement


### 3-33 - Dynamic track path determination

The CCS System shall support the ability for the trackside CCS to dynamically segmentate and allocate track paths to performed planned operations in the most track capacity-optimal manner in relation to the real time operating state of the network and its assets.

ID	SPP-6821
Type	 Stakeholder Requirement


### 3-34 - Decoupling of hardware and software components

The CCS shall ensure the decoupling of hardware and software components to allow independent life cycles, utilising virtualisation, standard communication buses, and standardised software-hardware interfaces. This will also ensure continuous supply improvement and avoid obsolescence issues.

ID	SPP-10174
Type	 Stakeholder Requirement


### 3-35 - Compliance with safety-critical principles

The CCS shall ensure that operational production adheres to safety-critical principles throughout the supervision process.

ID	SPP-10234
Type	 Stakeholder Requirement

### 3-36 - CCS system shall provide standardised interfaces

CCS system shall provide standardised interfaces, enabling the connectivity of adapters (which are to be developed by the legacy party) from legacy side in order to avoid any customizations (e.g. to legacy national scenarios/requirements like Class B ATP systems) in the harmonized CCS systems and products.

ID	SPP-14133
Type	 Stakeholder Requirement


### 3-37 - CCS system shall be protected by managing access in centralised access and identification Systems

CCS system shall be protected by managing access in centralised access and identification Systems.

ID	SPP-9906
Type	 Stakeholder Requirement


### 3-38 - CCS system shall be developed using a security-by-design process, in order to avoid attacks to hardware or software components

CCS system shall be developed (including security) using a security-by-design process, in order to avoid attacks to hardware or software components.

ID	SPP-9905
Type	 Stakeholder Requirement

### 3-39 - CCS subsystems and their interfaces version compatibility


CCS subsystems and their interfaces shall have as little version dependency as possible in order to reduce adaptation efforts.

ID	SPP-14132
Type	 Stakeholder Requirement

### 3-40 - CCS shall verify and process Traffic Management System requests to create, activate, amend, deactivate or delete track usage restrictions considering TMS optimized plan.


The CCS System shall verify and process Traffic Management System's request to create, activate, amend, deactivate or delete track usage restrictions considering TMS optimized plan.

ID	SPP-6678
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Type	 Stakeholder Requirement
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### 3-41 - CCS shall use reference models, reference laboratories and automated compliance testing in accordance with the European approval procedure (CENELEC phases 6 to 9)

CCS shall use reference models, reference laboratories and automated compliance testing in accordance with the European approval procedure (CENELEC phases 6 to 9).

ID	SPP-14326
Type	 Stakeholder Requirement

### 3-42 - CCS shall support virtual coupling of trains, with train-to-train communication.

CCS shall support virtual coupling of trains, with train-to-train communication.

ID	SPP-6950
Type	 Stakeholder Requirement


### 3-43 - CCS shall support trains equipped with ETCS Baseline 3 (ETCS Level 2 only). This means CCS will implement ETCS System Version 2 on the trackside. The implemented ETCS System Versions can be raised over time

CCS shall support trains equipped with ETCS Baseline 3 and above (ETCS Level 2 only). This means Traffic CS will initially implement ETCS System Version 2. The implemented ETCS System Versions can be raised over time.

ID	SPP-6991
Type	 Stakeholder Requirement


### 3-44 - CCS shall support the tool chain provided by centralised services e.g. regarding diagnostics, configuration management, topology update

CCS shall support the tool chain provided by centralised services e.g. regarding diagnostics, configuration management, topology update.

ID	SPP-9904
Type	 Stakeholder Requirement


### 3-45 - CCS shall support the separation between the central system and decentralised lineside devices

CCS shall support the separation between the central system and decentralised lineside devices.

ID	SPP-10110
Type	 Stakeholder Requirement


### 3-46 - CCS shall support the onboard determination of track occupation - i.e. train position, length and integrity, including safety margins.

The CCS System shall support the onboard determination of track occupation - i.e. train position, length and integrity, including safety margins.

ID	SPP-6820
Type	 Stakeholder Requirement

### 3-47 - CCS shall support the integration of complementary sensor information and data sources that enable the supervision of vehicles as well as trackside personnel and rail customers.


CCS shall support the integration of complementary sensor information and data sources that enable the supervision of trackbound and non-trackbound vehicles (e.g. excavator, crane) as well as trackside personnel and rail customers (e.g. passenger counters at the platform) to enable the comprehensive and continuous supervision of the railway operation.

ID	SPP-6957
Type	 Stakeholder Requirement

### 3-48 - CCS shall support the dynamic automated determination of train characteristics


CCS shall support the ability to automatically determine predefined train characteristics - e.g. length, composition, train formation, braking state, adhesion conditions, train acceleration/deceleration regimes on run-time based on the train's current capabilities, etc..

The automatic functionality may follow specific procedural triggers - such as train initialisation procedures - or may be triggered by conditional event recognition - e.g. low adhesion -.

ID	SPP-7053
Type	 Stakeholder Requirement

### 3-49 - CCS shall support technical and operational interoperability

CCS shall support technical and operational interoperability ensuring compatibility among subsystems operating with different system versions.

ID	SPP-7130
Type	 Stakeholder Requirement


### 3-50 - CCS shall support system deployment on centralised data centers.

CCS shall support system deployment on centralised data centers.

ID	SPP-10109
Type	 Stakeholder Requirement


### 3-51 - CCS shall support scalable PRAMSS targets

CCS shall support scalable PRAMSS target requirements (range of acceptable target values).

ID	SPP-9469
Type	 Stakeholder Requirement


### 3-52 - CCS shall support diagnose test of a component during running time.

CCS shall support diagnose test of a component during running time.

ID	SPP-8626
Type	 Stakeholder Requirement

### 3-53 - CCS shall support carrying out maintenance activities under production without blocking a track

CCS shall support carrying out maintenance activities under production without blocking a track


ID	SPP-15529
Type	 Stakeholder Requirement



### 3-54 - CCS shall support advisory systems


The CCS System shall support advisory systems for its actors by providing the needed real-time data.

*Note: It depends on the interfacing advisory system which data from Traffic CS is needed.*

ID	SPP-6882
Type	 Stakeholder Requirement

### 3-55 - CCS shall reduce engineering complexity


CCS shall design the internal components and internal and external interfaces in such a way that they can be implemented in a standardised way and without unnecessary variants implementation, support of isolated cases or unneeded complexity.

ID	SPP-8865
Type	 Stakeholder Requirement

### 3-56 - CCS shall provide to Traffic Management System a complete, consistent and accurate status of the operational state.

CCS shall provide to Traffic Management System a complete, consistent, accurate and up-to-date operating state.

The operating state contains the train location and characteristics, track usages (track path reservations, usage restrictions, occupancies) and the state of the trackside assets in the area of control.

ID	SPP-7020
Type	 Stakeholder Requirement


### 3-57 - CCS shall provide diagnostic information based on the generic part of the EULYNX/EU-Rail System Pillar standardised diagnostic interface, called SDI-xx.

CCS shall provide diagnostic information based on the generic part of the EULYNX/EU-Rail System Pillar standardised diagnostic interface, called SDI-xx.

ID	SPP-9680
Type	 Stakeholder Requirement


### 3-58 - CCS shall perform periodical self-tests and self-diagnostics of its vital functions

CCS shall perform periodical self-tests and self-diagnostics of its vital functions in order to prevent system failures and enable fast recovery times.

ID	SPP-6941
Type	 Stakeholder Requirement


### 3-59 - CCS shall optimize TCO through automation

CCS shall implement automated operational capabilities and shall support processes for the provisioning, configuration, maintenance and replacement of subsystems and components (CONEMP) in order to optimise the Total Cost of Ownership.

ID	SPP-7111
Type	 Stakeholder Requirement


### 3-60 - CCS shall minimize the number of configuration parameters for Generic and Specific Applications

The CCS System shall minimize the number of configuration parameters for Generic and Specific Applications

ID	SPP-6857
Type	 Stakeholder Requirement


### 3-61 - CCS shall minimize the impact of track work on railway operations and increase the safety for the field force

CCS shall enable the standardisation, automation and optimisation of operational processes involving trackside personnel and non-trackbound vehicles (e.g. maintenance work, construction work, shunting work) in order to minimise their impact on rail operations and to increase the safety of trackside personnel.

ID	SPP-7082
Type	 Stakeholder Requirement

### 3-62 - CCS shall merge localisation information from train-side (e.g. position and speed) and trackside sources (e.g. track occupancy) into one safe representation as part of the operating state.

CCS shall merge localisation information from train-side (e.g. position and speed) and trackside sources (e.g. track occupancy) into one safe representation as part of the operating state.

ID	SPP-6949
Type	 Stakeholder Requirement


### 3-63 - CCS shall interface to centralised security services

CCS shall interface to centralised security services.

ID	SPP-14106
Type	 Stakeholder Requirement


### 3-64 - CCS shall in real time optimize the operational plans

CCS shall optimize in run-time the railway operation receiving and executing in real-time adaptation of the operational plans from the TMS.

ID	SPP-7068
Type	 Stakeholder Requirement


### 3-65 - CCS shall implement standardised diagnostics functions and standardised interfaces for faster root cause analysis, recovery processes, failure prediction and prevention.

CCS shall implement standardised diagnostics functions and standardised interfaces for faster root cause analysis, recovery processes, failure prediction and prevention.

ID	SPP-9679
Type	 Stakeholder Requirement


### 3-66 - CCS shall implement functionalities that allow the use and combination of different types of sensor technologies and information

CCS shall implement functionalities that allow the use and combination of different types of sensor technologies and information, in order to increase system availability limiting degraded situation occurrences due to sensor faults.

ID	SPP-6938
Type	 Stakeholder Requirement


### 3-67 - CCS shall implement an architecture based on standardized interfaces to enable the integration of components from multiple suppliers

CCS shall implement an architecture based on standardized interfaces to enable the integration of components from multiple suppliers.

ID	SPP-9614
Type	 Stakeholder Requirement

### 3-68 - CCS shall implement an architecture based on standardised interfaces to facilitate independent safety cases and approval processes for each subsystem

CCS shall implement an architecture based on standardised interfaces to facilitate independent safety cases and approval processes for each subsystem.

ID	SPP-9894
Type	 Stakeholder Requirement

### 3-69 - CCS shall handle different system capabilities supporting standard manual controls


CCS shall handle different and changing system capabilities (e.g. degraded modes) supporting also manual and standardized controls for non-automated or semi-automated operational and system processes during normal and degraded operation.

Note: Ergonomics shall be taken into consideration.

ID	SPP-7084
Type	 Stakeholder Requirement


### 3-70 - CCS shall follow modular design principles

CCS shall follow modular design principles.

ID	SPP-9870
Type	 Stakeholder Requirement


### 3-71 - CCS shall follow a generic safety approach in encapsulating safety relevant functions within building blocks with a separate safety approvals

CCS shall follow a generic safety approach in encapsulating safety relevant functions within building blocks, allowing for separate safety approvals.


ID	SPP-9554
Type	 Stakeholder Requirement


### 3-72 - CCS shall ensure decoupled lifecycles for its components to simplify asset management

CCS shall ensure decoupled lifecycles for its components in order to simplify asset management.

ID	SPP-9555
Type	 Stakeholder Requirement


### 3-73 - CCS shall enable updates of Configuration Data on runtime

The CCS shall enable updates of  SPT2TS-127779 - Configuration Data on runtime.

ID	SPP-9296
Type	 Stakeholder Requirement


### 3-74 - CCS shall disclose incompatibilities between its subsystems and their interfaces during runtime.

CCS shall disclose incompatibilities between its subsystems and their interfaces during runtime.

ID	SPP-9660
Type	 Stakeholder Requirement

### 3-75 - CCS shall deploy and use future sensor technology, based on defined Standard Interfaces) with no impact on the Traffic CS safety logic

The CCS System shall deploy and use future sensor technology, based on defined Standard Interfaces) with no impact on the Traffic CS safety logic

ID	SPP-6940
Type	 Stakeholder Requirement


### 3-76 - CCS shall be flexible enabling an efficient and affordable migration

CCS shall be flexible and able to manage full or partial supervision of shunting, train manoeuvres, yellow fleet and stabling during migration.

ID	SPP-7199
Type	 Stakeholder Requirement


### 3-77 - CCS shall be designed to use ETCS L2 without optical (light) signals.

Traffic CS shall be designed to use ETCS L2 without non-harmonised, optical signals.

ID	SPP-7025
Type	 Stakeholder Requirement


### 3-78 - CCS shall be designed in such a way that specified components can be replaced and interconnected without the need to re-approve other components

CCS shall be designed in such a way that specified components can be replaced and interconnected without the need to re-approve other components.

ID	SPP-9901
Type	 Stakeholder Requirement


### 3-79 - CCS shall be based on standardized products and configurations

The CCS System shall be based on standardized products and configurations to minimize site-specific engineering efforts and project-specific adaptations.

ID	SPP-6860
Type	 Stakeholder Requirement


### 3-80 - CCS shall be based on Generic Products that can be configured using openly available configuration parameters to address varying application needs

CCS shall be based on Generic Products that can be configured using openly available configuration parameters to address varying application needs.

ID	SPP-9513
Type	 Stakeholder Requirement


### 3-81 - CCS shall be adaptable to local performance requirements by ensuring the scalability of its software components

CCS shall be adaptable to local performance requirements by ensuring the scalability of its software components and their configuration and installation procedures.

ID	SPP-9496
Type	 Stakeholder Requirement


### 3-82 - CCS shall be able to handle the specific capabilities and characteristics of the train units when executing train movements

The CCS System shall be able to handle the specific capabilities and characteristics of the train units when executing train movements, in order to benefit early from stepwise introduced new Rolling Stock functionality.

ID	SPP-6934
Type	 Stakeholder Requirement


### 3-83 - CCS shall base the information exchange to/from subsystem component on standard communication interfaces that shall be defined up to the physical layer.

Information exchange to/from subsystem components within interoperable configurations of the defined modular functional system architecture shall be specified in function and form - i.e. the standard communication interface shall be defined up to the physical layer and it shall constitute a FFFIS - Form Fit Functional Interface Specification (see definition in [SPT2OD-6831](#)).

ID	SPP-8810
Type	 Stakeholder Requirement


### 3-84 - CCS shall avoid as much as possible exported Safety-Related Application Conditions

When implementing safety relevant functions, CCS shall avoid as much as possible exported Safety-Related Application Conditions.

ID	SPP-9620
Type	 Stakeholder Requirement


### 3-85 - CCS shall automatically supervise rail operation

CCS shall support automated supervised operation of passenger trains, freight trains, shunting, train manoeuvres, yellow fleet and stabling for a maximum grade of supervised rail operation.

ID	SPP-7081
Type	 Stakeholder Requirement


**3-86 - CCS shall authorise movements only if they don't represent a danger for railway actors (such as driver or passengers), or the infrastructure and rolling stock assets, or non-track-bound track users or mobile objects and if these movements are part of plan or actions derived from degraded operation.**

The CCS System shall authorise movements only if they don't represent a danger for railway actors (such as driver or passengers), or the infrastructure and rolling stock assets, or non-track-bound track users or mobile objects and if these movements are part of plan or actions derived from degraded operation.

ID	SPP-6684
Type	 Stakeholder Requirement

**3-87 - CCS shall allow the definition of specific application configuration(s) for supporting the supervision of operational production of all types of infrastructure needs and users**

The CCS System shall allow the definition of specific application configuration(s) for supporting the supervision of the operational production of all types of infrastructure needs and users

ID	SPP-6819
Type	 Stakeholder Requirement


**3-88 - CCS shall allow movements from any point A to any point B without restrictions, if a route is available and is physically feasible.**

CCS shall allow movements from any point A to any point B without restrictions, if a route is available and is physically feasible..

ID	SPP-6947
Type	 Stakeholder Requirement


**3-89 - CCS shall allow manoeuvres with cab-signalling (with no light signals) or using not-harmonised dwarf light signals.**

CCS shall allow manoeuvres with cab-signalling (with no light signals) or using harmonised dwarf light signals.

ID	SPP-7021
Type	 Stakeholder Requirement


**3-90 - CCS shall allow a visual representation of the complete, consistent and accurate status of the operational situation**

The CCS System shall allow a visual representation of the complete, consistent and accurate status of the operational situation.

ID	SPP-6931
Type	 Stakeholder Requirement


**3-91 - CCS shall allow a visual representation malfunctioning devices and their impact on the operational situation**

CCS shall provide to the Signaller a visual representation of malfunctioning devices and their impact on the operational situation in order to initiate appropriate measures in case of equipment failure.

ID	SPP-6936
Type	 Stakeholder Requirement


### 3-92 - CCS shall acquire the static properties of the trains (e.g. loading gauge) from a centralised service.

CCS shall acquire the static properties of the trains (e.g. loading gauge) from a centralised service.

ID	SPP-9647
Type	 Stakeholder Requirement


### 3-93 - CCS shall acquire the static properties of the infrastructure (e.g. tracks with speed and gradient profiles) from a centralised service).

CCS shall acquire the static properties of the infrastructure (e.g. tracks with speed and gradient profiles) from a centralised service).

ID	SPP-9644
Type	 Stakeholder Requirement


### 3-94 - CCS shall acquire system configuration data from a centralised service via a standardised interface, based on EULYNX SMI-xx.

CCS shall acquire system configuration data from a centralised service via a standardised interface, based on EULYNX SMI-xx. Examples for this system configuration data: software updates, configuration values

ID	SPP-9645
Type	 Stakeholder Requirement


### 3-95 - CCS shall achieve increased standards of reliability, precision and safety

CCS shall ensure higher levels of reliability, precision and safety of the operations in normal and degraded modes regardless of the type of operation (automated, semi-automated or manual).

ID	SPP-7098
Type	 Stakeholder Requirement

### 3-96 - CCS Hardware, Software and Engineering Data shall be independently upgradeable to minimize engineering efforts and reduce deployment time.

CCS Hardware, Software and Engineering Data shall be independently upgradeable in order to minimize engineering efforts and reduce deployment time.


ID	SPP-9553
Type	 Stakeholder Requirement

### 3-97 - CCS designed to reduce OPEX

CCS shall be designed to reduce Opex by prioritising simplification, standardization and automation of Opex processes as far as this is economically justifiable.

Note:


- Opex includes efforts for the following processes: railway operation, railway maintenance, railway migration of CCS system (trackside and trainside), railway engineering as well as system operation, system maintenance and system development and management of system life cycle.

ID	SPP-8863
Type	 Stakeholder Requirement

### 3-98 - CCS able to handle different and changing system capabilities of its actors during operation


CCS shall manage varying and changing system capabilities, including degraded modes of supervised

infrastructure and trains, while ensuring safety and maintaining optimal production capacity and automation.

ID	SPP-8864
Type	 Stakeholder Requirement


### 3-99 - Automated triggering of mitigations

The CCS shall have the capability to automatically trigger event-related mitigations or corrective actions when required.

ID	SPP-10232
Type	 Stakeholder Requirement

### 3-100 - ATO GoA 3/4

CCS shall support automatic train operation in GoA 3/4 with ATO over ETCS.

ID	SPP-7668
Type	 Stakeholder Requirement


### 3-101 - Allow configuration of Generic Application according to local needs within predefined limits

The CCS shall allow to define a 'Generic Application', in accordance with CENELEC 50126, that can be configured according to local needs (combination of subsystems + system parametrisation) within predefined limits.

ID	SPP-10253
Type	 Stakeholder Requirement


### 3-102 - Adherence to operational procedures

The CCS shall ensure compliance with established operational procedures and rules during the supervision of operational production.

ID	SPP-10235
Type	 Stakeholder Requirement


### 3-103 - Standardised interfaces (FFFIS, FIS) to decouple life cycles and safety cases

Traffic CS shall rely on standardised interfaces (FFFIS, FIS) to decouple life cycles and safety cases of trackside assets and central control.

ID	SPP-28337
Type	 Stakeholder Requirement

### 3-104 - Provide a scalable and adaptable system architecture which is suitable for different contexts


Traffic CS shall provide a scalable and adaptable system architecture that is suitable for different contexts depending on the IM use cases.

ID	SPP-28338
Type	 Stakeholder Requirement

### 3-105 - Implement interface designs that enable the determination of smallest common set of shareable functions




Traffic CS shall implement interface designs that enable the determination of functions and function versions to be shared between the interfacing systems, if this is economically justifiable for the specific interface.

ID	SPP-28346
Type	 Stakeholder Requirement


### 3-106 - Handling of train and shunting movements in Traffic CS

Traffic CS shall implement only one algorithm (i.e. signalling principle) to permit movements on the railway. Differences in available information (train data, track clearance, ...) can lead to different protection levels.

ID	SPP-28347
Type	 Stakeholder Requirement

### 3-107 - EULYNX Standard Communication Interfaces SCI-xx

Traffic CS shall connect to Trackside Assets using the EULYNX/EU-Rail System Pillar standard interfaces (SCI-xx), with at least Baseline 4 Release 2.

ID	SPP-28351
Type	 Stakeholder Requirement


### 3-108 - Enable the system integration of legacy systems

The interface design of Traffic CS shall support viable migration paths including system integration of legacy systems if these can be made compatible with standardised interfaces.

ID	SPP-28352
Type	 Stakeholder Requirement


### 3-109 - As a Supplier, I want a Traffic CS system implementing an architecture based on standardized interfaces

As a Supplier, I want a Traffic CS system implementing an architecture based on standardized interfaces, in order to expand the market of my products developing components compatible with systems of other suppliers.

ID	SPP-28353
Type	 Stakeholder Requirement

### 3-110 - Able to provide a standard interface to manage handover of trains between SERA equipped areas

Traffic CS shall specify an interface to manage the handing-over between adjacent Traffic CS. Adapting this interface to other legacy CCS systems (e.g. central traffic control, interlocking, radio block centre) is outside Traffic CS scope. Legacy CCS systems shall use proposed interface to create their own adapters compatible with Traffic CS interfaces, and to reduce the migration effort.

ID	SPP-28354
Type	 Stakeholder Requirement






## 4 Application Conditions

Will be provided in further release.

DRAFT

## 5 Appendix

### 5.1 References

Id	Description	Reference
[  SPP-18362 - EET_Requirements Management Plan Version_1.0]	For System Pillar the plan describes a strategy for traceability between requirements levels, architecture elements and application conditions. Further the type of requirements and their related workflows are defined.	Link
[  SPP-19162 - OD_Operational Vision Breakdown Alignment CCS System_V0.3]	Operational Vision Breakdown Alignment	Link
[  SPP-19402 - Operational Vision (Nov. 2022)]	This document sketches a compressed operational picture of the CCS and TMS/CM future.	Link
[  SPP-19283 - Release Note ESPR1.0]	This Release Note describes the scope of the ESPR1.0.	Link
[  SPP-8684 - System Pillar Common Business Objectives (May 2022)]	Common Business Objectives (CBO) – targets and improvements - to guide the development of the outputs of the System Pillar within Europe's Rail Joint Undertaking.	Link